SB

114

March 22
SB 114

Joe, Pappy, Rick

Steve Hole - DOE

Depart. no position since they cannot come up w/ funds.

HB 160 Hurlbert.

Prefer House version as designated pass through Grant. Preference to put it out to competitive bid. Arrange for 3rd party evaluator.

Would like to require for private pilot training if program does what is anticipated for development of instructional curriculum and software designed to be used at pilot dispatch area.

Rick support idea conceptually

Lance Wells - Attny for air carriers

Alaska is a disaster in aviation safety.
Am. Airlines Safety Organization did a study.
70% of 1982 accidents - lack of training
72% " " " - pilot error

1982 - same symptoms as 1980 report.
domestic insurance will not write insurance for Ak. pilots. rates increased over 500% last five years - no relief for costs to rural Alaska.

Lower 48 contractors are coming to Ak.
Helicopter bids 50% lower than Ak - mostly because of insurance.

Have defined what training needs are
FAA has endorsed study.

Industry has contributed several hundred thousand to this end.

Objective to lower insurance rates.

saved $500 000 to industry this year. → Have worked out a 40% discount based (workers comp)

on development of curriculum in 1983.
This is seed money only - future monies should be raised through private industry.

Statistically - most dangerous flying time between 200-2,000 hours.

Only program in US to reduce insur.
1982 - 28 of 33 fatalities were commercial air companies

Need to:

- introduce competition of underwriters (only have lloyd's of London's) have commitments from private underwriters on basis of safety training foundation

Rich - need more info on brokers

Community colleges will have a big role

Rich $750,000 sounds like a lot - breakdown?

1. most expensive cost is bringing in private expertise.
   educator - management & aviation background
2. validation of techniques - teach course. "pilot prog"
3. train teachers to teach the course.

Paul Phase I - cost $300,000 (State and air carriers → $250,000)
AK Aviation Foundation
18 mos. program.

S. Hole If developed w/ State money, should be available to all - flight schools, management etc.

Lance product will be property of State; taught through Community College.

<u>Ken Moore</u> - Dir. Div. of Ins.

support concept.

(USA16)

first bright spot in 3 yrs. Ins. carrier set up in Anch. and will be operational in a few days AOA will also start operating on a selective basis.

Rich can we require reporting at broker level?

Moore - Some will flow from broker to alien market, and broker does not know that adjustment is going on.

Rich - Can we require info gathered at central location?

Moore - we have staff looking at Surplus Lines Brokerage to look at all policies & collect state fees.

Rich what is cost?

Moore - model law requires that association would fund cost of operation. In American market, examination will cost 1/4 - 1/2 %. - must have someone who can analyze.

Rich Look at model law - combine with bill - make sure insurance will.

<u>Walter Kubley</u> - Ak Air Carriers Assoc.

Court settlement - many are out of court - Broker never knows. numbers are ridiculous in reserve - not true figures shown because settlements

Rich Can State require info on settlement out of court

Joe Japer. Carriers don't want settlements known. Many are annuities; insur. policies; etc. hard to translate to cash. Court is not privy to that info.

Rich hates in info exchange will since not reflect
Safety record.

Moss. motion

Joe deleted by Ak Aviation Foundation

Paul - no rec   do Pass Joe
Peggy
Rich

ALASKA AVIATION SAFETY FOUNDATION

PROPOSED

AVIATION SAFETY TRAINING PROGRAMS

CONTENT AND BUDGET SUMMARY

1. Develop and validate the curriculum in the form of 25 lesson plans including instructor ("How to Teach") and student manuals for use by experienced Alaskan aviation operators (pilots, managers, etc.) when training both private and commercial operators to fly aircraft safely in Alaska generally and in specific regions of Alaska. The lesson plans will cover the following most hazardous of aviation operations:

   a. Gathering weather information

   b. Interpreting weather information and trends

   c. Landings and take-offs:
      1. Gravel and sand bars 2. Lakes 3. Tundra 4. Mud 5. Ice
      6. Beaches 7. Airstrips 8. Runways 9. Snow 10. Glaciers

   d. Flight techniques in adverse weather:
      1. Vertigo 2. Whiteouts/depth perception 3. Turbulence 4. Icing

   e. Navigation/Pilotage

   f. Mountain flying, general and specific pass flying

   g. Flight techniques - area specific

   h. Fuel management and handling

   i. Cold weather operations

   APPROXIMATE COST $573,400

2. Prepare one or two exemplary audio-visual presentations for use in teaching specific validated lesson plans.

   APPROXIMATE COST $180,000

   TOTAL ESTIMATE $753,400

It is anticipated that Department of Education will issue Request for Proposal bids based on the attached proposal and the Definition of Alaskan Aviation Training Requirements previously completed by the Foundation.

The cost estimates (detailed on next page) are Foundation estimates based on a single preliminary survey of potential contractors. Actual bids may be more or less than the estimate.

Lance Wells, Executive Director
Alaska Aviation Safety Foundation
301 West Northern Lights Blvd., Suite 600
Anchorage, Alaska 99503

FUNDING REQUEST
TO
IMPLEMENT AND CONTINUE DEVELOPMENT
OF
ALASKAN AVIATION SAFETY TRAINING PROGRAMS

PREPARED BY:

ALASKA AVIATION SAFETY FOUNDATION
301 W. Northern Lights Blvd.
National Bank of Alaska Building
Suite 600, Pouch 6273
Anchorage, Alaska 99501
(907) 279-7684

Rex Bishop, Chairman

EXECUTIVE DIRECTOR & COUNSEL:

Lance Wells

DATE: January, 1983

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EXECUTIVE SUMMARY

PURPOSE: What follows is a proposed plan to develop and implement 25 Alaskan aviation safety lesson plans appropriate for advanced safety training of Alaskan aviators in the most hazardous aspects of private and commercial aviation operations. Piloting, ground operations, maintenance and management are examples of the areas covered with first emphasis on piloting. At least one of the lesson plans will be developed using audio/visual media. Additional audio/visual will be developed in the next phase.

BACKGROUND: In 1981 the Alaska Aviation Safety Foundation (Foundation) received funding from the State of Alaska to define Alaskan aviation safety training requirements which would later be used to design a training program for Alaskan aviators. American Airlines Training Corporation won the contract for that study which was Phase I of the development of a "Total Training System". The study was published in a 175 page report entitled Definition of Alaskan Aviation Training Requirements. A limited number of copies are available for examination.

The National Transportation Safety Board and the FAA have reviewed the study and found it to be excellent. Implementation of the training program suggested in the study will have a dramatic, positive impact on safety in Alaska. Numerous insurance underwriters have indicated the same with respect to insurance rates due to the lower risk they face in a more safety conscious market. This will lead to significantly lower costs to intra-Alaska travelers since over 20% of air fares within Alaska at the present time are attributable to air carriers' insurance costs.

METHODS AND DELIVERABLES: The results of the above study are the basis of Phase II in the development and implementation of a "Total Training System" which consists of 4 phases. The second phase will be the development of 25 lesson plans suitable for use by experienced Alaskan aviation operators when training others to operate safely in specific regions of Alaska. In addition, the Foundation will develop a sample audio-visual training program for at least one of the Phase II lesson plans as an example of what will be done in Phase III of the preparation of a "Total Training System."

The development of these detailed lesson plans anticipate the efforts of experienced education/training specialists on site in Alaska working with highly experienced Alaskan pilots, managers and opinion leaders selected by the industry itself and the Foundation directors. The training specialists have selected several lesson plan formats for use when formulating the information from Alaskan aviators into instructional materials for use throughout the Alaskan aviation community. As part of the lesson plans, the Foundation will develop instructor's materials explaining how to teach, using current methods and media, each training objective.

FURTHER PHASES: (Not included in current proposal costs.) Following the completion of Phase II, the Foundation proposes to expand the use of audio/visual media in the presentation of lesson plans selected by Alaskan operators. This will be Phase III of a planned four-phase effort. Phase IV efforts may require the construction of sophisticated aviation simulation training devices. The final result will be a "Total Training System" specifically and regionally designed for the unique Alaskan aviation environment.

FUTURE FUNDING: The Alaska Air Carriers Association and Aviation Safety Foundation are working hard to minimize, if not avoid all together, future requests for funding from the State for these projects and on-going safety training programs. Private funding mechanisms are being developed and it is anticipated that these will supply the on-going needs of the Foundation. Some of the mechanisms are already in place and others will soon be implemented:

a. Donations from air carriers themselves
b. Group insurance dividends and savings
c. Captive insurance reserve earnings
d. Standard charitable fund raising from major aviation users.
e. Fund raising events (safety conferences, etc.)

The present request is, in effect, seed money which will allow the Foundation to start producing fruits and attract more private money. Future State monies may be needed, however, for transition into more sophisticated training modes.

CHAPTER I

INTRODUCTION

This proposal describes a process for the development of a set of approximately 25 plans. These plans will be appropriate for use by experienced Alaskan aviators to teach courses designed to make the learners safer pilots and managers. In addition, the Alaska Aviation Safety Foundation proposes to develop a sample audio-visual training program. This A/V program will demonstrate sophisticated training programs and devises which might be used in teaching more of the lesson plans.

This paper describes the background leading up to the proposed effort in Chapter II. This includes a review of relevant studies by Parker Associates, the National Transportation Safety Board, and a description of the Definition of Alaskan Aviation Training Requirements prepared by the Foundation in 1981 and 1982. Chapter III describes the proposed method for transforming the previously defined training objectives (see page 76) into lesson plans relevant to the unique needs and conditions in Alaska. A description of the deliverables available at the completion of the proposed work is included in Chapter III. Chapter IV describes proposed future efforts which might be expected in the ongoing process of creating a "Total Training System" for private and commercial Alaskan aviation.

CHAPTER II

BACKGRCUND

Alaska's dependence on the air taxi industry for delivery of needed goods and services and the safety problems besetting the air taxi operators have been documented in previous sudies such as Parker Associates' study, <u>Air Service to Rural Alaska: A Study in Inadequacy</u> and a 1980 National Transportation Safety Board Special Study entitled <u>Air Taxi Safety in Alaska</u>. The NTSB study reported that, "...about 30 percent of all air taxi accidents in the United States occurred in Alaska, and their rate of occurrence was four times that of the accident rate for air taxi operators in the rest of the United States." This accident rate among Alaskan air taxi operators has resulted in a tragic loss of life and injuries sustained, in addition to skyrocketing insurance costs. A recent letter dated January 4, 1983 from the NTSB to the Air Carriers Association points out that the problem identified in 1980 continues to manifest itself in recent accidents. The NTSB urges early implementation of the program proposed by the Foundation in the "Final Report on Definition of Alaskan Aviation Training Requirements." A copy of the letter is attached as Exhibit "A".

The Parker and NTSB studies prompted a search for solutions to a serious problem. An unsuccessful effort was made to identify and obtain an existing Arctic training program.

Inquiries were made of training personnel in the United States Air Force, the Canadian United Forces, and several Scandinavian countries. Existing training programs which were being conducted in Alaska were found to be designed to meet recertification requirements of the Federal Aviation Administration (FAA) and were not responsive to the unique Alaskan operational environment. "Advanced" and "specialized" safety training is necessary for Alaska flying conditions.

The decision was made to develop a specifically designed training program suited to the needs of Alaskan aviators. This training program could be based on accident records compiled by the FAA or the National Transportation Safety Board (NTSB). However, such records were often incomplete and, in fact, represented a list of failures. Instead, it was decided to discover how experienced Alaskan pilots, maintenance and managerial personnel learned to cope with the many challenging problems regularly faced by private and commercial Alaskan aviators. The process of discovery was developed and validated by John Flanagan and reported in Psychological Bulletin in 1954. Flanagan's critical incident methodology, in conjunction with traditional job analysis procedures, is the basis for the interviewing process used in this study.

After careful consideration, the State of Alaska provided funding for the study. The funds were included with those to be administered by the Alaska State Department of Education. American Airlines Training Corporation won the contract and assisted the Foundation with the study.

The goal of the Foundation is to provide effective, advanced flight, operations and management training in Alaska, based on information gathered from experienced Alaskan aviators with excellent safety records.

This training will produce highly-qualified, professionally oriented pilots, mechanics and managers and will result in a lower accident rate. The Air Carriers Association has worked with insurance underwriters attempting to obtain insurance premium reductions for individuals and commercial operators who participate in the proposed Alaskan aviation training programs offered by the Association and the Foundation. Several underwriters have expressed support for the concept of reducing insurance premiums and making direct contributions to the Foundation (a charitable institution) <u>if</u> the Foundation starts producing fruits in the near future. Two underwriters already are, based on assurances that training programs will be forthcoming soon.

During the course of the study, the investigators travelled to 58 locations (cities, towns, villages) throughout Alaska; intereviewed approximately 177 air taxi operators and pilots;

visited numerous aviation facilities; and attended several aviation related seminars and lectures.

The questionnaire used in the interviews was designed by the research team and modified in response to changes suggested by the Foundation Board of Directors, and to respondents' comments and answers during the first interviews. The interviews were conducted on a one-to-one basis and lasted an average of two hours. Background information, flight techniques, and operational conditions in the Alaskan environment were collected from the interviews. Respondents provided a variety of specific techniques which have helped them to prevent hazardous situations from becoming serious accidents. The information in the completed questionnaires was organized into an outline form using a computer. This outline of information provided a data base from which the training objectives were synthesized. The final report contains the unvalidated information from the questionnaires and the training objectives starting at page 76.

The Alaskan aviation training objectives indicate what needs to be taught, the instructional media and devices appropriate for presenting the information, and how to evaluate mastery of the objectives. The training objectives will serve as the basis for further development of an Alaskan aviation training program.

REGIONALIZED APPROACH

Based on information collected in formal pilot interviews and informal conversations with many other Alaskans interested in aviation, a complete Alaskan training system would have to be regionally oriented. There are sufficient differences in flying conditions among geographic regions to warrant training that addresses specific regions in which a pilot operates. Such a regionalized approach would also enable pilots to spend as little time as possible away from their home base to complete a training program. In addition, aviation training in Alaska will emphasize the development and improvement of judgment and decision-making skills rather than the manipulative skills associates with aircraft operation.

In addition to identifying training requirements that address piloting and mechanical skills and competencies, the study also investigated the management of air taxi operations. It became obvious to the research team that some operators in Alaska manage safe, profitable air taxi services. Those factors that contribute to such an operation were identified and serve as training requirements for air taxi management training.

GENERAL FINDINGS: The information collected from the interviews showed that, although some training requirements and the training objectives to meet those requirements were applicable to Alaskan aviation in general, the majority were specific to different geographical areas in the State and also to different types and configurations of aircraft (single engine, ski, helicopter, multi-engine, float, etc.). It was also recognized that the primary emphasis of an Alaskan training system should be the development of decision making skills on the part of the pilot rather than manipulative flying skills. For example, the training emphasis should be on when to make a 180° turn to escape adverse weather or leave a mountain pass, and include specific operational procedures to be performed on the basis of such a decision.

PRELIMINARY RESULTS: The study identified several factors that had to be considered in the design of an Alaskan aviation training system:

PRIVATE AND COMMERCIAL

1. The primary objective of the training system should be acceptable and applicable to private and commercial aviation operators conducting flight operations in a uniquely stressful environment due to weather, geographic, and other adverse operational conditions.

REGIONALLY SPECIFIC

2. The training system should be tailored to specific

geographical areas of the State and to different types and configurations of aircraft.

LOCALLY AVAILABLE

3. Components of the training system should be accessible to pilots in the community in which they are located. This would avoid, as much as possible, pilots spending time away from their primary job to attend training in a distant geographic location.

PRACTICAL

4. The requirement for training system components for localized on-job-site training could be met by using transportable training devices and interactive audio-visual and print media. These programs should contain instructional components tailored to geographic area and aircraft types.

EVALUATION

5. Instructional programs would be designed to teach specific decision-making skills and the operational procedures to be performed on the basis of such decisions. Evaluation of student performance must be made by qualified, certified airmen with extensive experience in the given geographical area using structured evaluation methods.

DECISION MAKING SKILLS THEN APPLICATION

6. The training system should be capable of allowing the airmen to first learn the necessary discriminations and decision-making capabilities, and then apply these skills in a simulated or operational environment. Non-transportable training devices could be required for operational training.

TRAINING CENTERS

7. Area training centers should be established for specific geographic regions. These training centers could be co-located with existing Community College facilities. The training system would thus permit the learning of needed decision-making skills and operational procedures through transportable media, and evaluation of student performance by designated airmen for localized job-site training. Support and administration for this training would be provided by the area training center.

CHAPTER III

METHOD AND DELIVERABLES

This chapter describes the process which the Foundation proposes to use to transform the results of their report, Definition of Alaskan Aviation Training Requirements, into usable lesson plans and a sample audio-visual training program lesson.

The Foundation will assign persons with expertise in Alaskan aviation needs and experience in development of aviation training programs to work with Alaskan aviation Subject Matter Experts (SME's) for the duration of the contract resulting from this proposal. The Alaskan Aviation Safety Foundation will identify suitable SME's for each type of lesson.

The Foundation will contract with these SME's for a period of time sufficient to convert their unique knowledge into the content of the lesson plan. One to two weeks per SME will be required. Several elements will assist in the success of this process. First, appropriate lesson plan formats have been identified. Lesson plan formats will be presented to the Foundation Board for approval. The approved formats will be the basis for the information gathered from the SME's. Second, the research team has and will continue to use the recommended operational techniques previously identified by experienced Alaskan aviators in the study. These techniques can be evaluated for efficacy and validated during the development of the lesson plans.

The validated list of techniques will become the "Trigger" which can serve to remind the SME of as many techniques as possible. In the development of some lessons, it is anticipated that several SME's will be required. Where SME's cannot agree on techniques or appropriate procedures for a lesson, the training developers will look to the Foundation Board for guidance or will include alternative methods in the lesson plans. Provisions will be made in each plan for the experienced Alaskan aviator designated to teach the courses from these lesson plans to provide specific information appropriate to the geographical area in which the learner will be operating.

One or two lessons will be selected for development into an audio-visual format. The lesson, which should take approximately 30-40 minutes, may include slide/tapes or video tapes or similar media. It may, for example, train pilots in a subject such as flying through a pass, landing on a beach, checking weather in Alaska or a similar subject. This sample program will demonstrate the use of various media therefore, the cost of this product may not be representative of each training lesson. The sample program will become the standard for transforming all of the lesson plans into various representative media formats during Phase III of the development of a total training system for Alaskan aviators.

At this time, it appears that the completed lesson plans should number about 25. These would be clustered into the following units:

- Weather in Alaska
- Adverse Weather Flying Techniques
- Takeoff and Landing Techniques for Special Surfaces
- Navigation and Piloting Techniques
- Mountain and Pass Flying
- Area Specific Flying Techniques
- Fuel Management and Handling Techniques
- Cold Weather Operating Techniques
- Hazardous Materials in Alaska
- Survival Training
- Management Training Plans

In addition, a lesson will be developed which will prepare experienced Alaskan pilots and operators to use the plans developed in this project to teach others.

CHAPTER IV

FUTURE PHASES

At the conclusion of the effort described in this proposal, the citizens of the State of Alaska will have a usable product which can have a significant effect on aviation safety in the State. However, although the production of a set of lesson plans is useful and desirable, they do not represent a Total Training System. The lesson plans are a second, but necessary, step in the continuing process of providing safer aviation activities in Alaska through improved training.

The next step is to professionally prepare all of the lessons in an audio-visual, computer assisted and satellite transmittable aviation training program. Even though some Alaskan opinion leaders would prefer that the automated audio-visual programs be produced this year, we believe it is better to prepare the lesson plans and let experienced Alaskan aviators validate their effectiveness before committing the resources to automate them. Then, the Alaska Aviation Safety Foundation can define and build the training media required to produce the best trained arctic pilots possible. Therefore, the Foundation is proposing that each step be taken sequentially and proven before committing to a total training system. This approach will result in the ultimate goal of maximum safety through a "Total Training System" that effectively meets the Alaskan aviation training requirements.

National Transportation Safety Board

Washington, D.C. 20594

Office of the Chairman

January 4, 1983

DUE [illegible]
IN 1/20/83

Mr. Lance Wells
Executive Director
Alaska Air Carriers Association
Box 6469
Anchorage, Alaska 99502

Dear Mr. Wells:

As a result of its special study [1] of air taxi safety in Alaska, the National Transportation Safety Board recommended on September 25, 1980, that the Alaska Air Carriers Association, "Extend its safety program to reiterate the hazards of air taxi operations in Alaska and to overcome, in particular, the 'bush pilot syndrome'" (A-80-105). The Safety Board later classified the recommendation "Closed-Acceptable Action" as a result of your organization's efforts in launching the Alaska Aviation Safety Foundation to promote a safer air transportation environment in Alaska.

The concerns which prompted the Safety Board to conduct the special study of Alaska air taxi operators in 1980 reappeared during a recent investigation. On May 16, 1982, a Gifford Aviation, Inc., deHavilland DHC-6, operated as Wein Air Alaska Flight 517 under the provisions of 14 CFR Part 135, crashed at Hooper Bay, Alaska. [2] The investigation revealed a casual attitude on the part of the pilots regarding adherence to weight and balance regulations and operating procedures which led to the airplane operating with a center of gravity considerably aft of the published limit. Additionally, the investigation revealed poor maintenance practices regarding the condition of seatbelts in the accident airplane as well as two other DHC-6's operated by Gifford Aviation, Inc. These unsafe practices were precisely the same type noted during the Safety Board's special study and which generated the Safety Board's earlier recommendation to your organization.

Our staff has recently reviewed the "Final Report on Definition of Alaskan Aviation Training Requirements" prepared by American Airlines Training Corporation under the auspices of the Alaska Aviation Safety Foundation. The Safety Board is pleased with the program's content, objectives, and goals and urges its early implementation as soon as funds become available.

Respectfully yours,

Patricia A. Goldman for
Jim Burnett
Chairman

---

[1] Special Study--"Air Taxi Safety in Alaska" (NTSB-AAS-80-3).
[2] For more detailed information, read Aircraft Accident Report--"Gifford Aviation, Inc., deHavilland DHC-6, N103AQ, Hooper Bay, Alaska, May 16, 1982" (NTSB-AAR-82-14).

EXHIBIT A

Air carriers seek state-funded pilot training

Alaska Daily News 1-1-83

By CHUCK KLEESCHULTE
Daily News business reporter

Prompted by the promise of reductions in current sky-high insurance rates, Alaska air carriers are pushing hard to get a new pilot training program off the ground.

Air carriers over the weekend voted unanimously to seek $780,000 from the state's Legislature to fund the second stage of a proposed training program. It is designed so air taxi operators can offer courses for pilots and ground personnel tailor-made for Alaska weather and flying conditions.

"There is just no question that the aviation industry in this state needs more training. By additional training we can improve safety, cut accidents and reduce the rates air [illegible]s pay for insurance," said [illegible] Dodson, an official of the newly formed Alaska Aviation Safety Foundation, sponsor of the new training program.

The Alaska Air Carriers Association in 1980, fresh on the heels of a National Transportation Safety Board report critical of air taxi operations in Alaska, hired American Airlines Training Corp. of Texas to study possible improvements in air carrier operations.

The American report completed last year stressed that Alaska's nation-leading air accident rate could be cut if pilots uniformly would be trained to handle Alaska aviation problems and be educated in safety practices so they would avoid wreckless behavior.

"We discovered when we studied Alaskan pilots that most needed more training to learn how to handle many uniquely difficult flying conditions. Flying in whiteout conditions and flying where navigation is much more difficult make it important for Alaska pilots to be better trained than those in the Lower 48," says Michael K. Mitchell, an official of American Airlines Training Corp. "Flying out of Bethel daily requires more skill than a commercial 747 pilot ever needs," said Mitchell.

He says Alaska pilots, unlike those in the Lower 48, frequently have to fly by "dead reckoning" and by "pilotage," using surface maps and landmarks to determine locations, rather than nagivational aides.

Mitchell said Alaska pilots especially face the danger of overconfidence promoting poor judgment in flight decisions, the so-called "Bush Syndrome."

To overcome such problems Mitchell proposes drafting pilot lessons especially tailored to Alaska problems, course manuals which Alaska air taxi operators will then use to satisfy Civil Aeronautics Board required refresher training.

Such training manuals, Mitchell said, could be written and in use by the end of 1984, provided funding for the safety program is found by this summer.

Lance Wells, executive director of the AACA, says the expenditure to fund the training program would ultimately benefit all air users through lower air fares, possible because of lower insurance liability premiums.

Dodson said several insurance firms have already promised to provide discounts to air taxi operators who complete the proposed safety program. He said the course also might attract other insurance firms to write policies for Alaska air carriers.

At present only Lloyds of London underwrites aviation insurance given Alaska's high-risk loss history.

The possibility of lower rates is good news to an industry which already has seen nearly a dozen smaller operators go out of business during the past several years because of rapidly escalating insurance rates — the direct result of the state's high accident rate.

Alaska has a rate of non-fatal air accidents five times the rate of the Lower 48, a rate of fatal accidents twice the national average, says Alan L. Crawford, an NTSB regional investigator in Los Angeles.

Crawford during the carrier's annual convention in Anchorage Saturday urged Alaska officials to find funding for the safety program. Wells says carriers have received a commitment from the Sheffield administration to provide at least part of the amount needed for the program in the state's FY 84 budget, now under development.

Wells, however, urged carriers to contact lawmakers to try to obtain full funding for the drafting of the training program.

Katherine Fanning
Editor and Publisher

Gerald E. Grilly
General Manager

Howard Weaver
Managing Editor

Steve Lindbeck
Editorial Page Editor

Lawrence Fanning Editor and Publisher 1967 to 1971
Alaska's Only Morning Newspaper • Founded in 1946 by Norman C. Brown

ADN-3/1/1983.

Upgrade pilot training programs in Alaska

Alaska's air carriers have improved their aim considerably in efforts to shoot down the high cost of flying insurance. The target this legislative season is improved pilot training, and there is at least some chance of success.

Last year the industry sought help from Juneau in the form of legal limits to the financial liability facing air carriers in Alaska. Reducing the carriers' (and thus the underwriters') liability, it was thought, would translate into reduced insurance rates. But the legislation went nowhere — presumably because it pinpointed the wrong problem.

The problem with aviation and insurance coverage in Alaska is the high rate of accidents — not the legal responsibilities arising from them. And the high rate of accidents stems too often from human error arising from the combination of harsh weather, natural hazards, navigational difficulties and unwarranted overconfidence known as "the Bush syndrome."

Industry representatives tacitly admit as much in pressing for a state-funded pilot training program tailored to the special demands of Alaska flying conditions. "There is just no question that the aviation industry in this state needs more training," says Jim Dodson, an official of the Alaska Aviation Safety Program. "By additional training we can improve safety, cut accidents and reduce the rates air carriers pay for insurance."

There may be a battle over who will pay for the training. Air carriers have asked the legislature for $780,000 to fund the second stage of a proposed training program pitched to the needs of Alaska air taxi operators. The Sheffield administration apparently has expressed interest in picking up part of the tab, though a case also could be made for funding the program through a special levy on the industry.

There is little doubt of the pressures, challenges and risks associated with flying in Alaska. But the crucial factor in safely confronting those challenges is the human judgment of pilots who must know their profession better in Alaska than anywhere else in the country. "Flying out of Bethel daily requires more skill than a commercial 747 pilot ever needs," says an official of a company hired to study air carrier operations in Alaska.

That realization alone is enough to justify upgrading pilot training programs in our state. Aviation is a crucial lifeline to every corner of Alaska, and high insurance costs ultimately raise the cost of living throughout the Bush. Working to improve the competence and training of thousands of Alaska pilots can only improve the quality of life in dozens of communities who depend on them.

FINAL REPORT
ON
DEFINITION OF ALASKAN AVIATION TRAINING REQUIREMENTS

FROM
AMERICAN AIRLINES TRAINING CORPORATION

TO
ALASKAN AVIATION SAFETY FOUNDATION
JULY 1982

PROJECT DIRECTOR	M. K. MITCHELL, PHD
PROJECT INVESTIGATOR	C. F. EICHHORN
TRAINING ANALYST	M. J. WILD

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EXECUTIVE SUMMARY

This Executive Summary is designed to give the reader an overview of the background, activities and results of the study entitled "Definition of Alaskan Aviation Training Requirements" conducted by American Airlines Training Corporation. For a more detailed discussion of the topics presented here the reader is referred to the Final Report.

Alaska's dependence on the air taxi industry for delivery of needed goods and services and the safety problems besetting the air taxi operators have been documented in previous studies such as Parker Associates' study, "Air Service to Rural Alaska: A Study in Inadequacy" and a 1980 National Transportation Safety Board Special Study entitled "Air Taxi Safety in Alaska". The NTSB study reported that, "...about 30 percent of all air taxi accidents in the United States occurred in Alaska, and their rate of occurrence was four times that of the accident rate for air taxi operators in the rest of the United States." This accident rate among Alaskan air taxi operators has resulted in a tragic loss of life and injuries sustained, in addition to skyrocketing insurance costs.

In December of 1980, Tulinda Deegan, President of the Alaska Air Carriers Association (AACA) and Executive Director of the Alaskan Aviation Safety Foundation (AASF), asked American Airlines Training Corporation to submit a proposal to develop a training program for Alaskan aviators. In February, American Airlines Training Corporation (AATC) sent Dr. Michael K. Mitchell to Anchorage to meet with the Alaska Air Carriers Association Board and to observe flying conditions in Alaska during the winter.

In the report of his observations to the AACA Board, Dr. Mitchell concluded that flying conditions in Alaska were unique. An unsuccessful effort was made to identify and obtain an existing Arctic training program. Inquiries were made of training personnel in the United States Air Force, the Canadian United Forces, and several Scandinavian countries. Existing training programs which were being conducted in Alaska were found to be designed to meet recertification requirements of the Federal Aviation Administration (FAA) and were not responsive to the Alaskan operational environment.

The decision was made to develop a specially designed training program suited to the needs of Alaskan aviators. This training program could be based on accident records compiled by the FAA or the National Transportation Safety Board (NTSB). However, such records were often incomplete and, in fact, represented a list of failures. Instead, it was decided to discover how experienced Alaskan pilots learned to cope with the many challenging problems regularly faced by Alaskan aviators. The process of discovery was developed and validated by John Flanagan and reported in Psychological Bulletin in 1954. Flanagan's critical incident methodology in conjunction with traditional job analysis procedures, is the basis for the interviewing process used in this study.

After careful consideration, the Legislature provided funding for the AATC portion of an AASF proposal. The funds were included with those to be administered by the Alaska State Department of Education. A contract was signed by AATC and AASF to conduct the study. This contract included a statement of work which listed the activities and specified the deliverables due during and at the conclusion of the study.

The goal of American Airlines Training Corporation is to provide effective flight training in Alaska, based on information gathered from experienced Alaskan pilots, and AATC's proven capability in aviation training systems. It is believed that this training will produce a highly-qualified, professionally oriented pilot and will result in a lower accident rate. AATC and the AASF also have worked with insurance underwriters attempting to obtain insurance premium reductions for personnel completing the proposed Alaskan aviation training program. Several underwriters have expressed approval of reducing insurance premiums based on training.

The staff dedicated by American Airlines Training Corporation to the Alaskan aviation training requirements study consisted of Dr. M. K. Mitchell, Project Director and Investigator; Mr. C. F. Eichhorn, Project Investigator; and Mr. M. J. Wild, Training Analyst.

During the course of the study the investigators travelled to 54 locations (cities, towns, villages) throughout Alaska, interviewed approximately 177 air taxi operators and pilots, visited numerous aviation facilities, and attended several aviation related seminars and lectures.

The questionnaire used in the interviews was designed by the AATC research team and modified in response to changes suggested by the AASF Board of Directors, and to respondents' comments and answers during the first interviews. The interviews were conducted on a one-to-one basis and lasted an average of two hours. Background information, flight techniques and operational conditions in the Alaskan environment were collected from the interviews. Respondents provided a variety of specific techniques which have helped them to prevent hazardous situations from becoming serious accidents. The completed questionnaires were sent to the training analyst in Dallas/Ft. Worth who organized the information into an outline form using a computer. This outline of information served as a data base from which the training objectives were synthesized. The Final Report contains the unvalidated information from the questionnaires and the training objectives.

The Alaskan aviation training objectives indicate what needs to be taught, the instructional media and devices appropriate for presenting the information, and how to evaluate mastery of the objectives. The training objectives will serve as the basis for further development of an Alaskan aviation training program.

American Airlines Training Corporation believes, based on information collected in formal pilot interviews and informal conversations with many other Alaskans interested in aviation, that an Alaskan training system would have to be regionally oriented. There are sufficient differences in flying conditions among geographic regions to warrant training that addresses specific regions in which a pilot operates. Such a regionalized approach would also enable pilots to spend as little time as possible away from their home base to complete a training program. In addition, aviation training in Alaska will emphasize the development and improvement of judgment and decision-making skills rather than the manipulative skills associated with aircraft operation.

In addition to identifying training requirements that address pilot skills and competencies, the study also investigated the management of air taxi operations. It became obvious to the research team that some operators in Alaska manage safe, profitable air taxi services. Those factors that contribute to such an operation were identified and serve as training requirements for air taxi management training.

The proposal outlining the continued development of an Alaskan training system is included as section H of the Final Report. Two primary activities are described; an instructional analysis of the training objectives, and specification of the curriculum design and instructional content. A sample lesson is to be produced during the second phase of program development.

General Findings

The information collected from the interviews showed that although some training requirements and the training objectives to meet those requirements were applicable to Alaskan aviation in general, the majority were specific to different geographical areas in the state and also to different types and configurations of aircraft (single engine ski, helicopter, multi-engine, float, etc.) It was also recognized that the primary emphasis of an Alaskan training system should be the development of decision-making skills on the part of the pilot rather than manipulative flying skills. For example, the training emphasis should be on when to make a 180° turn to escape adverse weather or leave a mountain pass, and include specific operational procedures to be performed on the basis of such a decision.

Preliminary Indicated Results

The study identified several factors that had to be considered in the design of an Alaskan aviation training system:

1. The primary objective of the training system should be acceptable and applicable to airmen conducting flight operations in a uniquely stressful environment due to weather, geographic, and other operational conditions.

2. The training system should be tailored to specific geographical areas of the State and to different types and configurations of aircraft.

3. Components of the training system should be accessible to pilots in the community in which they are located. This would avoid, as much as possible, pilots spending time away from their primary job to attend training in a distant geographic location.

4. The requirement for training system components for localized on-job-site training could be met by using transportable training devices and interactive audio- visual and print media. These programs should contain instructional components tailored to geographic areas and aircraft types. Instructional programs would be designed to teach specific decision-making skills and the operational procedures to be performed on the basis of such decisions. Evaluation of student performance must be made by qualified, certified airmen with extensive experience in the given geographical area using structured evaluation methods.

5. The training system should be capable of allowing the airmen to first learn the necessary discriminations and decision-making capabilities, and then apply these skills in an operational environment.

Non-transportable training devices could be required for operational training.

6. Area training centers should be established for specific geographic regions. These training centers could be co-located with existing Community College facilities. The training system would thus permit the learning of needed decision-making skills and operational procedures through transportable media, and evaluation of student performance by designated airmen for localized job-site training. Support and administration for this training would be provided by the area training center.

7. Area training centers would be used to provide additional training, practice, and evaluation through training devices located at the regional facility. Evaluation of student performance at the area training centers would again be made by qualified, certified airmen with extensive experience in the given geographical region using structured evaluation methods.

8. A centralized administrative facility would be required for the administration, standardization, and evaluation of area training centers and job-site training activities. This facility would probably be located in Anchorage.

Acknowledgements

Before commencing with the more formal sections of this report the members of the research team wish to express their thanks to all of the Alaskan pilots and other persons who gave so freely of their time and knowledge. We are impressed with the high degree of skill and dedication of these Alaskan aviators. This dedication is rooted in service to others and has resulted in the development of many techniques which need to be offered to others through a structured training program.

Furthermore, we would like to emphasize that this report is a summary of what the research team learned from the Alaskan aviation community. We asked the questions, recorded the answers and summarized the responses; therefore, the information contained herein is a contribution from many experienced Alaskan aviators.

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INTRODUCTION

This is the final report of the activities, processes and results of a study conducted by American Airlines Training Corporation under a contract with the Alaskan Aviation Safety Foundation. This study accomplishes the first step in the program development process which should lead to the establishment of a total training system for Alaskan aviation personnel.

Contractually the results of this study effort are incorporated into this Final Report including, but not limited to:

A. A description of the study methods used and results from the interview process.

B. A list of unranked aviation training objectives for Alaskan aviators.

C. Scenarios of typical flight profiles recommended for each aviation training objective.

D. Specifications for training devices appropriate for each training objective. The specifications include, but are not limited to, descriptions of training devices, cost estimates, and available sources for purchase or lease.

E. A written report of progress made with insurance underwriters relative to possible premium reductions for aircraft operators who complete a training course based on the findings of this study and future program development efforts.

F. A written proposal for implementing a training program for Alaskan aviators. The proposal shall include, but not be limited to, staffing requirements, training facilities, training devices, and cost estimates.

SECTION A

PURPOSE OF THE STUDY TO DEFINE ALASKAN AVIATION TRAINING REQUIREMENTS

This section of the report explains the purpose of the study and its relationship to the need for increased safety in the Alaskan aviation environment as documented in several previous studies. In addition to the need for increased safety, a lack of existing formalized training programs addressing the needs of many air taxi operators has been identified.

Need for the Study

The crucial role of the air transportation industry in delivering supplies and services throughout the State and the high accident rate of the air taxi operations associated with this activity are well documented.

Although reports on the number of miles of roadway in Alaska vary widely it may be generally assumed that there are approximately 10,000 miles of road in Alaska, not all of which are paved. Alaska's area is equal to one-fifth of the rest of the United States, resulting in a low ratio of roadway to square miles. Therefore, hundreds of villages and thousands of citizens are wholly dependent on air transportation.

According to a study by Parker Associates, "Air Service to Rural Alaska: A Study in Inadequacy," ". . . air service plays a major role in the day-to-day lives of every bush resident. Even those Native Alaskans who have never strayed far from the villages of their birth must now depend on air services for many of the essentials of life."

A 1980 National Transportation Safety Board Special Study entitled "Air Taxi Safety in Alaska" clearly illustrates the problem of safety.

> "Alaska, however, has an air safety problem. From 1974 through 1978, the general aviation 1/ accident rate (based on 100,000 hours flying time) for Alaska was more than double the rate for the rest of the United States. More importantly, about 30 percent of all air taxi accidents in the United States occurred in Alaska, and their rate of occurrence was four times that of the accident rate for air taxis in the rest of the United States."

Indeed, the NTSB made a specific recommendation to the Alaska Air Carriers Association, "Extend its safety program to

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1/ The Safety Board classified general aviation kinds of flying as air taxi, instructional, pleasure, business, and corporate/ executive.

reiterate the hazards of air taxi operations in Alaska and to overcome, in particular, the "Bush Pilot Syndrome"." (Class II, Priority Action). (A-80-105).

In addition to the tragic loss of life and injuries sustained, this accident rate has resulted in substantially higher insurance costs for aircraft owners and operators which are transferred to the customers. Furthermore, an air taxi operator can become involved in a vicious financial cycle causing the operator to accept flights that normally would not be undertaken in order to meet increased costs due to higher insurance premiums. These flights have a higher accident probability which could raise the operators' insurance cost again. American Airlines Training Corporation will, with input from Alaskan aviation experts, develop and implement an Alaskan aviation training program that could reduce the fatality and injury rate of air taxi operations and curtail the rising cost of aircraft liability and hull insurance.

Lack of Existing Training

Good program development methodology begins with a synthesis of existing training programs which address the problems proposed to be solved. AATC and the AACA searched for Arctic training programs appropriate for use in Alaska. Consideration was given to existing Alaskan programs, those available from the United States Air Force, the Canadian aviation community, and Arctic pilots in Scandanavian countries.

The Alaskan Air Carriers Association President came to the American Airlines Training Corporation for help in developing an Arctic training program. Although during the study the research team became aware of existing Alaskan training programs they did not evaluate them and the question of their efficacy remains unresolved.

Dr. Mitchell attended the United States Air Force "Air Occupational Analysis Conference" at Randolph AFB in San Antonio, Texas, in the spring of 1981. He asked if the U.S. Air Force had an Arctic aviation training program in progress. Air Training Command personnel whom he questioned said they were not aware of any programs. Comments were made that Air Force jet pilots are not subject to the same problems as pilots who fly reciprocating engine aircraft, therefore the Air Force probably would not have an appropriate training program.

However, training developers from the Canadian United Forces attending this conference offered to share their training syllabi. Unfortunately, after several phone calls and letters the response was, except for a brief course for a particular aircraft, Arctic training was not available. It is worthy of note that since the completion of this study, Transport Canada, Air (the Canadian equivalent of the FAA) has written to AATC requesting eleven specific findings from this study.

After having heard a presentation delivered by Dr. Mitchell in Ottawa in April 1982, the Canadian Aviation Safety Bureau chief reported having similar problems with Canadian charter/contract operators.

Through the marketing personnel of Fokker Aircraft, inquiries were made concerning the existence of an Arctic flying program in Scandanavia. The response was negative. No training program for Arctic aviators was reported to exist in the Scandanavian countries.

Finally, a search was made for a list of validated training objectives. Since a list was unknown to the AACA and AASF Board of Directors, the decision was made to develop these training objectives.

Purpose of the Study to Define Alaskan Aviation Training Requirements

The study entitled "Definition of Alaskan Aviation Training Requirements" was designed to synthesize preliminary training objectives and is the first step in the process of developing and implementing an Alaskan aviation training program. It was not designed to stand by itself. It was determined that training is a crucial part of the solution to the air transportation safety problem. The next step was deciding what must be taught. That was the primary purpose of the present study. The training objectives synthesized from the many interviews conducted by the AATC Program Development Research Team describe what must be taught to enable a pilot to fly safely in Alaska. Additionally, the researchers discovered several practices whereby some air taxi operators contribute to a greater than expected accident rate due to management decisions which do not encourage safe operating practices.

SECTION B

Alaskan Aviation Safety Foundation and American Airlines Training Corporation Background and Philosophy

The summary background and philosophy of the Alaskan Aviation Safety Foundation (AASF) and American Airlines Training Corporation (AATC) is presented in this section.

Alaskan Aviation Safety Foundation Background and Philosophy

At the present time, most air carriers in Alaska do not have standardized training programs. In 1978, the industry established the Alaskan Aviation Safety Foundation, a non-profit corporation designed to foster aviation safety through education programs. The Foundation plans to offer aviation training programs throughout the state.

The first meeting of the incorporators of the Alaskan Aviation Safety Foundation convened on October 3, 1978. Present were Rex R. Bishopp, Richard A. Wien, and James M. Dodson, the Alaska Air Carriers Association Executive Director.

In addition to efforts to secure a tax exempt status, the Alaskan Aviation Safety Foundation held several management and mechanic seminars during the years of 1978 and 1979. During 1979, meetings were held with the Office of the Governor for the State of Alaska to determine whether or not funding for the establishment of the Alaskan Aviation Safety Foundation would be feasible in the 1980 budget. Efforts to secure such funding, however, were set aside as the Alaska air carrier industry wrestled with the proposed legislation to radically alter the economic regulation of the industry within the state. This legislation extending the Alaska Transportation Commission was finally signed by the Governor in the summer of 1980, thus freeing the air carrier industry to focus again on launching the Alaskan Aviation Safety Foundation.

In September of 1980, the incorporators and the Board of Directors of the Alaska Air Carriers Association discussed possible programs to be sponsored by the Alaskan Aviation Safety Foundation. In December of 1980, Tulinda Deegan, President of the Alaska Air Carriers Association and Executive Director of the Alaskan Aviation Safety Foundation, asked the American Airlines Training Corporation to submit a proposal to develop a training program for Alaskan aviators. After meeting in Dallas, it was determined that it would be necessary to develop a specially designed training program suited to the unique needs of Alaskan aviators.

Before the 1981 session of the Alaska State Legislature began, the air carrier industry had several meetings with Legislators to discuss methods of securing funding to launch the Alaskan Aviation Safety Foundation. In February of 1981, American Airlines Training Corporation sent Dr. Michael K. Mitchell to Anchorage to meet with the AACA and AASF Board of Directors and observe Alaskan flying conditions during the winter. Dr. Mitchell concluded that flying conditions in Alaska were unique and that a training program should be formulated using the experience of Alaskan pilots who have learned to cope with the many challenging problems regularly faced by Alaskan aviators.

A written proposal by the American Airlines Training Corporation was delivered to the Alaskan Aviation Safety Foundation in March of 1981. At that time, several formal meetings were held with various committees of the Alaska State Legislature, the Governor's office, and the Division of Insurance.

Dr. Mitchell returned to Alaska and joined Tulinda Deegan to continue the briefings of the Alaska State Legislature in April of 1981. Final decision on funding the Alaskan Aviation Safety Foundation came in late June by way of a direct grant from the Department of Education.

The Department of Education awarded the grant to the Alaskan Aviation Safety Foundation on September 1, 1981. On September 11, 1981, the Alaskan Aviation Safety Foundation and American Airlines Training Corporation finalized a contract to conduct a study to identify Alaskan aviation training requirements.

American Airlines Training Corporation Background and Philosophy

American Airlines Training Corporation (AATC) is a wholly owned subsidiary of American Airlines, Inc., Fort Worth, Texas, and is responsible for the development, marketing, production, and contracting associated with commercial and military training program development, hardware development and associated support services. These products and services are an outgrowth of years of training experience at American Airlines.

The key to safe and successful operation of any aircraft is a highly qualified and skilled pilot. Because of its belief in this basic premise American Airlines pioneered the development of an integrated flight training system over fifteen years ago. In response to increasing regulation, unacceptable accident rates, and non-standardized instruction, American conducted an indepth study to identify problems and find solutions. This study found that airline operations were becoming too complex for existing training programs. A new system was needed which would enhance proficiency and professionalism and bring standardization to aircraft operation.

As a result of the study, American Airlines decided to use a systems approach to training development. American Airlines developed its own programs based on a thorough analysis of their requirements and the types of equipment best suited for the identified tasks. The result was a training system which incorporated a suite of training devices. The areas of change encompassed training techniques, use of computer-based instructional equipment, use of simulation, standardization, and management, plus a phased plan of implementation in which each step was validated before moving to the next phase. The role of the aircraft as a training device was reduced in this system. American learned that total use of its aircraft for instruction was costly, unsafe and unsuitable for much of the training required.

Since 1966, American's utilization of aircraft for training has been successfully reduced by use of ground-based instruction so that today no aircraft are removed from revenue flying for training. During this period, over 131,065 students have received training at the American Airlines Flight Academy, demonstrating that the experience base at American is large. American did not realize immediate and total success with its training systems, but developed them through years of study, analysis and modification. American has proved that one key element of training success is the requirement for continued update and improvement of each program.

Designing a new training system is a detailed and careful process that pulls together state-of-the-art training concepts from a variety of sources and combines them into a unique approach aimed at meeting specific learning objectives. This basic approach is to utilize the most learner-effective and cost-effective means for the task to be taught, combined with a learning philosophy that phases the student through the program in a building-block form. In each step of the process, the student demonstrates a required level of proficiency before progressing to the next phase.

Training any crew member can be ineffective and frustrating if he or she is required to learn facts or skills not related to real-world problems and the actual operating environment. With the development of the U. S. Air Force KC-10 training system, American Airlines conducted an in-depth study of the required skills of each crew member found necessary to operate effectively in their environment. The results allowed American to eliminate, with confidence, many traditional but unnecessary training requirements. Overall, the new step-by-step learning process was improved by development of specific learning objectives that optimized the learning process. AATC is prepared to offer the benefit of American's experience to the Alaskan aviation community for the continuing development of an aviation training program. We believe that AATC is able to provide a total training system that is cost effective and will produce trained pilots of the highest standards. One significant result of better training has been a dramatic improvement in American's safety record.

AATC's experience in designing and implementing training programs with an emphasis on training system development and training to proficiency, plus its aircraft operating experience, provides a user-oriented approach that is unparalleled in the industry. Combining this user knowledge with program design expertise ensures the development and implementation of an effective, efficient program which meets specific customer needs.

SECTION C

PROJECT METHODOLOGY

This section describes the methodology used by the AATC project staff in collecting, organizing and utilizing the information needed to define Alaskan aviation training requirements. An important aspect of the methodology is that the needed information was gathered directly from experienced Alaskan pilots. The methodology utilized and the data collected also allow a logical progression to the next stages in the development of an Alaskan aviation training system.

Basis for Choosing a Methodology

In order to define Alaskan aviation training requirements a methodology for determining those requirements had to be chosen. Two possible sources of information first considered regarding aviation problems in Alaska or similar environments were accident records compiled by the FAA and National Transportation Safety Board (NTSB) and existing training programs dealing with problems similar to those of Alaska.

After reviewing the Alaskan accident records and statistics it was realized that the information was too general and often incomplete to be of use in determining what requirements an Alaskan aviation training program should fulfill. More important, in many cases an accident statistic reflects a failure on the part of the pilot to deal successfully with an adverse situation. A training program to improve aviation safety should primarily teach a pilot to stay out of an adverse situation and also how to deal with a potentially hazardous situation if it should develop. This type of information is not easily obtainable from accident reports.

The second possible source of information for an Alaskan aviation training program was existing Arctic training programs. As previously stated, inquiries were made of training personnel in the United States Air Force, the Canadian United Forces, and several Scandinavian countries. These inquiries brought little to light which pertained to Alaskan aviation problems. Training programs conducted in Alaska often seemed to be designed to meet recertification requirements of the Federal Aviation Administration. In addition, there were courses on "bush" flying being taught through the University of Alaska and the Community College systems but these courses were not perceived to be directed toward training of professional pilots and had little impact on the needs of air taxi operators throughout the State.

After it was determined that existing sources of information would yield little in an attempt to define specific Alaskan aviation training requirements it was decided to utilize a methodology which would allow the investigators to discover how experienced Alaskan pilots had learned to cope with the many challenging problems regularly faced by Alaskan aviators. This methodology was a combination of the critical incident technique developed by John Flanagan and reported in Psychological Bulletin in 1954 and the job analysis process utilized in Instructional Systems Development (ISD).

Critical (Hazardous) Incident Technique

The critical incident technique is a job analysis methodology but with an emphasis on the determination of critical job requirements. To quote from Flanagan's 1954 article in Psychological Bulletin: "The requirements include those which have been demonstrated to have made the difference between success and failure in carrying out an important part of the job assigned in a significant number of instances." The intent of the critical incident technique as utilized by the AATC project interviewers was to discover those specific techniques utilized by a pilot in avoiding, or successfully coping with a critical situation. The interviewer first asked the person being interviewed (after background information had been collected), "Describe the most hazardous situation you have ever experienced as a pilot in Alaska." (The interviewers used the term "hazardous incident" rather than critical incident to clarify the question.) The interviewers then explained the intent of the question. They asked pilots to describe the hazardous situation, how it was analyzed and how the pilot successfully resolved the situation. This type of questioning created the situation that Flanagan described as one in which, "The cooperating individual described a situation in which success or failure was determined by specific reported causes." To ensure that all relevant data regarding the reported incident were collected, the interviewer had a checklist of information to be gathered, such as the type of aircraft, phase of flight, weather conditions, location, etc. Refer to Section E for details of the hazardous incident checklist. If the person interviewed had a hazardous incident to describe the interviewer would listen and write the details of the incident in as much a narrative style as possible. The interviewer would seldom prompt, allowing the pilot to describe the incident without interruption. After the initial description of the incident, the interviewer then used the checklist to ensure that all pertinent data were collected and also asked questions to clear up any details he was unsure of.

Job Analysis

During the initial development of the questionnaire it was realized by the project staff that in some cases the pilot being interviewed would not provide a hazardous incident description that yielded useful data. Either the pilot would claim that he or she had never been in a hazardous situation, or provide such sketchy, generalized information that nothing of note could be collected regarding specific, trainable pilot decisions and techniques. To ensure that useful information relevant to the determination of Alaskan aviation training requirements was gathered, the project staff incorporated many other questions into the questionnaire that reflect the traditional job analysis process. A job analysis is the first of three steps in the instructional analysis phase of the Instructional Systems Development (ISD) process. The purpose of the entire instructional analysis process is to determine what must be learned in an instructional program and the first step is job analysis, the process of breaking a job down into its component tasks by observing job performance and questioning those who perform the job being analyzed. The result of the job analysis for this study is a list of training objectives, those tasks a pilot should be able to proficiently perform to do the job of flying an aircraft safely.

Training Objective Synthesis

The training objectives were written after extracting relevant information from the interviews and organizing this information into an outline form. For example, after reading several interviews in which the respondents described their technique for landing on lakes, the training analyst utilized a computer to construct an outline with a major heading for Landing Techniques under which a sub-heading, Landing on Lakes, was inserted. Every time a technique for landing on lakes was described in an interview the technique description was coded to the interview number and inserted under the heading, Landing on Lakes. The result of this procedure was an outline of the observations, techniques and decision-making parameters for flying in Alaska as reported by those pilots interviewed. Some information gathered from the interviews may or may not be accurate, or in the best interest of safety, but it does point out the need for training in that particular area. As an example, much information was collected from the interviews on how to land on a beach, hence the creation of a training objective addressing landing on a beach in a variety of aircraft and configurations (floats, tundra tires, etc.). The specific information collected will be reviewed and evaluated by experienced pilots during the subsequent phases of the training system development process.

Miscellaneous Questions

In addition to questions related to decision making skills and piloting techniques, pilots were asked a number of other questions. These questions were designed to give the research team a better understanding of the pilot's operating environment and to indicate those problem areas a training program would have to address to provide realistic, effective training to pilots from all areas of Alaska. If the person interviewed also had managerial responsibilities in air taxi operations, specific questions were asked about the management of the operation.

Opinion Leaders

The AATC project staff realized that the latter phases of program development would require considerable input and feedback from experienced Alaskan pilots. In an attempt to identify these pilots during the initial interviews, those persons interviewed were asked to name one pilot they would consult about flying in Alaska. Those pilots named were termed "opinion leaders" reflecting the fact that their opinions on flying in Alaska represented the opinions of many other Alaskan pilots. When possible, the locale in which the opinion leader flew and their area of expertise (float, helicopter, etc.) were noted. The project staff thus compiled a list of experts as identified by Alaskan pilots. Those persons named as opinion leaders will be utilized in later phases of training program development.

Interview Critique

To ensure that the interview process was indeed gathering relevant information and that the process itself was perceived favorably by those persons interviewed, the project investigators left an interview critique with a stamped envelope, allowing the respondent an opportunity to answer specific questions and also to comment on the interview anonymously. Respondents completed and mailed in 100 interview critiques to the project office in Anchorage. The questions asked and a total of the responses are presented on the following page.

INTERVIEW CRITIQUE SUMMARY

1. Was the purpose of the interview and the use of the results clearly explained to you?

   Yes - 100 No - 0

2. Did the interviewer allow you to express yourself freely?

   Yes - 100 No - 0

3. Do you believe that the information requested will be relevant to the development of an effective pilot training program?

   Yes - 91 Maybe - 4 No - 4

4. Do you believe that the information requested will be relevant to the development of an effective management training program?

   Yes - 77 Maybe - 7 No - 8

5. Do you feel that any of the information you were asked to provide was in any way threatening to you?

   Yes - 12 No - 86

6. Were questions asked by the interviewer clear? (If possible, please specify the questions below.)

   Yes - 98 No - 0

7. The amount of time the interview took was:

   too long - 6 too short - 8 just right - 75

<u>Examples of comments added to critique form by respondents:</u>

Your company has an excellent idea in this program.

Excellent interview.

Effort is impressive - time allowed to adequately study the problem.

The interviewer is gathering a realistic picture of what we are up against in this business safety wise.

SECTION D

PROJECT ACTIVITIES

The purpose of this section is to describe the different activities carried out by the American Airline's Training Corporation (AATC) staff assigned to conduct the Study to Define Alaskan Aviation Training Requirements.

The following activities are discussed:

- Questionnaire development
- Procurement of maps and materials
- Interviews
- General aviation interviews
- Insurance meetings
- Public relations activities
- Progress Report meetings with the AASF
- Facilities visited
- Aviation seminars and clinics attended

Questionnaire Development

The AATC project staff spent several weeks in Dallas/Fort Worth prior to starting the interviews in Alaska developing the initial set of questions to be used. These questions were based on the perceived purpose of the study, the AATC staff's experience in aviation and training, and guidelines and observations derived from Dr. Mitchell's previous trips to Alaska which included discussions with the AACA Board of Directors and several flights from Aniak (Kuskokwim Delta area) with an air taxi operator. As the original interview questionnaire was written the project staff anticipated some questionnaire modifications would be required during the first weeks of the interview process. As expected, modifications were made after conducting the first several interviews. The AATC staff (both investigators and the training analyst) was involved as a team during the first few interviews, attempting to improve the interviewing process and ensuring that the information would be detailed enough and understandable to the training analyst when compiling training objectives from the collected data. Some questions were unproductive, others needed rewording, and new questions were added. The added questions were suggested by respondents and the team believed they should be part of the remaining interviews. These modifications were discussed with members of the AASF Board of Directors and Gary Fuller, the Project Officer for the Alaskan State Department of Education.

Procurement of Maps and Materials

Materials and information (in addition to that obtained from the interviews) were obtained and utilized throughout the progress of the study. These materials gave the project staff a better understanding of the Alaskan aviation industry, the operational environment and problems faced by the Alaskan air taxi industry. Two important studies, previously quoted, helped the research team to appreciate Alaskan aviation training requirements. These two studies were "Air Service to Rural Alaska, A Study in Inadequacy" by Parker Associates (1979) and "Air Taxi Safety in Alaska" a study by the National Transportation Safety Board (1980). Other reports and studies were reviewed, including a report on the Alaska State Aviation Weather Station program (SAWS) and a study by Louis Berger and Associates titled "Western and Arctic Alaska Transportation Study" (WAATS). A study similar to the WAATS study is presently being conducted by the Alaska Transportation Consultants group. Ed Peebles was interviewed regarding the progress of the study.

The research team purchased complete sets of Sectional Charts for use throughout Alaska. They also obtained a copy of the Dictionary of Place Names in Alaska for identifying locations referred to by respondents during each interview. One of the questions asked of respondents relates to the geographic areas in which they have flown. The map utilized by the research team when asking pilots where they had flown was the Hydrological Unit Map for the State of Alaska - 1974. This map divides the state into the different drainage areas. With input from the AASF Board and other pilots, the drainage areas were subdivided into regions that represented different operational conditions for pilots. A total of 19 regions were marked on the map. By showing the map to the person being interviewed and asking where they had flown, the research team was able to determine the respondent's breadth of experience. Refer to Figure D-1 for a map of Alaska divided into the 19 geographical regions.

Aviation Sectional Charts were used when greater detail was required or specific locations needed to be identified. Alaska Topographic Series maps, scale 1:250,000 were used to identify features in selected passes throughout the state.

AREAS USED TO IDENTIFY WHERE PILOTS HAD FLOWN

Figure D-1

Miscellaneous materials collected from pilots and operators and FAA sources during the course of the study included various weight and balance forms, company training syllabi, a complete set of FAA Airport Master Record forms (FAA Form 5010-1), FAA accident reports and special purpose charts and maps.

Interviews

The team started interviewing in Anchorage using the FAA list of certified air taxi operators as of June 1981. The AASF Board of Directors recommended those operators who should be interviewed first. The Lake Hood operators were selected for the first interviews since many of them closed for the winter months. During the study the team interviewed many Alaskan aviators who were recommended by their peers because of their skill and knowledge about flying in Alaska. Many productive interviews were obtained as a result of these recommendations.

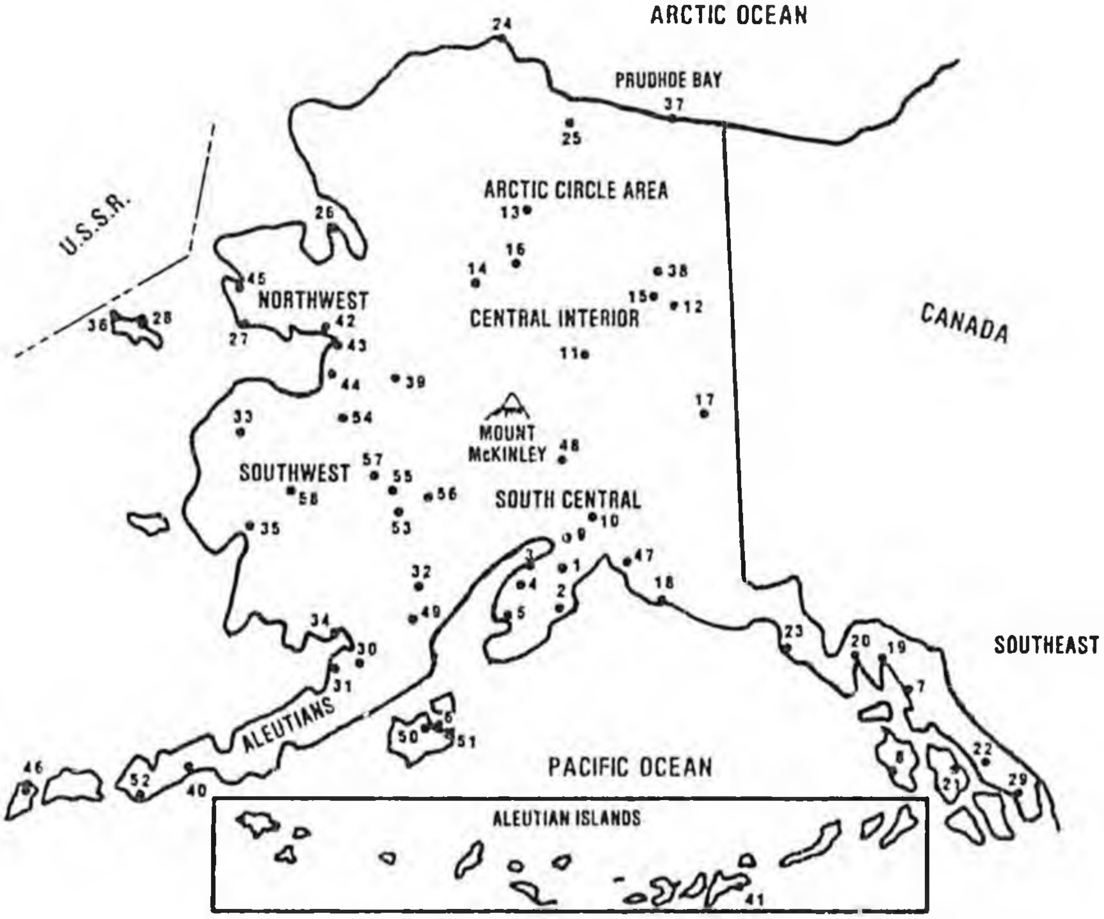
The first cycle of interviews in the Anchorage area lasted approximately three weeks and twenty six interviews were conducted. Once the process was finalized a permanent Anchorage office was set up, and the interviewers worked separately conducting a minimum of two interviews daily.

Since the project office was located in Anchorage, interviews were conducted with Anchorage operators throughout the length of the study whenever staff members were between interviewing assignments.

After the initial round of interviews in Anchorage and a trip back to Dallas/Ft. Worth the researchers returned to Alaska. Mr. Eichhorn interviewed operators on the Kenai Peninsula, Kodiak Island, Juneau and Sitka. Dr. Mitchell drove to Fairbanks and interviewed operators in that area.

During the next phase, Dr. Mitchell conducted interviews in the Anchorage area and continued with operators in the Fairbanks area along Alaska Highways 1, 2, 3, and 4. Mr. Eichhorn interviewed in the Southeastern part of the state and in the interior.

LOCATIONS VISITED



LIST OF LOCATIONS VISITED BY AATC INTERVIEWERS

1. Moose Pass
2. Seward
3. Kenai
4. Soldotna
5. Homer
6. Kodiak
7. Juneau
8. Sitka
9. Anchorage
10. Palmer
11. Fairbanks
12. Circle
13. Anaktuvuk Pass *
14. Allakaket *
15. Birch Creek *
16. Bettles *
17. Tanacross †
18. Cordova
19. Skagway †
20. Haines †
21. Petersburg
22. Wrangell
23. Yakutat
24. Barrow
25. Deadhorse
26. Kotzebue
27. Nome
28. Savoonga *
29. Ketchikan
30. King Salmon
31. Naknek
32. Nondalton
33. St. Mary's
34. Dillingham
35. Bethel
36. Gambell *
37. Barter Island (Kaktovik)
38. Fort Yukon
39. Galena
40. Sand Point
41. Adak
42. Koyuk *
43. Shaktoolik *
44. Unalakleet
45. Teller †
46. Dutch Harbor
47. Valdez
48. Talkeetna
49. Iliamna
50. Port Lions
51. Ouzinkie
52. Cold Bay
53. Sleetmute *
54. Holy Cross *
55. Red Devil *
56. Stony River *
57. Crooked Creek *
58. Kalskag *

* Location visited but no interview conducted.

† Location not visited but interview conducted with an operator based there

Figure D-2

During the months of January and February Dr. Mitchell was on the North Slope and spent one week each in Kotzebue, Nome, and Bethel. Mr. Eichhorn interviewed in the Dillingham area, Southwestern Alaska and the North Slope. Both researchers also continued to conduct interviews in Anchorage, as time permitted.

The last two weeks in March, Dr. Mitchell travelled to Adak, Nome and Unalakleet. He then went to Juneau to meet with key legislators to discuss the findings of the project and solicit their assistance in providing further funding for the Alaskan Aviation Safety Foundation. Mr. Eichhorn went to Fairbanks, Galena, Talkeetna, Anchorage, Sand Point, Cold Bay and Dutch Harbor. The team then closed the AATC office in Anchorage and returned to Dallas/Ft. Worth on March 30th.

During the study, the team visited 54 cities, towns and villages interviewing approximately 250 persons. For a map of locations visited refer to Figure D-2. For a listing of persons and companies interviewed refer to Appendix A and the section entitled "Facilities Visited" (p. 31).

General Aviation Interviews

Although the interviews focused on air taxi operators the project staff recognized the importance of obtaining information from the general aviation population. Many general aviation people expressed an interest in contributing to the study and indicated that a method should be found to solicit information from the general aviation population. To respond to general aviation's desire to participate in the study, the existing questionnaire was modified and printed in two editions of Air Alaska, which has a circulation of approximately 12,000 persons statewide. The response was disappointing. Only 20 questionnaires were filled out and mailed into the project offices in Anchorage. Mr. Wild, the training analyst for the project, conducted three interviews with general aviation pilots who were interested in the project and willing to be interviewed. The information gathered reflected many of the same problems identified in this and other studies concerned with Alaskan aviation. Particularly, a lack of weather information and communication facilities combined with rapidly changing weather and terrain, making flying conditions marginal at best. This is especially true for pilots with little Alaskan flying experience or pilots flying in unfamiliar territory.

Even though the Alaskan air taxi industry, as represented by the AACA and AASF, was the motivating force behind this initial effort to develop a training program, it has always been the goal of all organizations associated with this effort that the proposed Alaskan aviation training program be made available to any Alaskan pilot.

Insurance Meetings

Throughout the study, meetings were held in Anchorage with insurance underwriters and brokers to apprise them of the progress made and the kind of information being collected. The cooperation of the insurance underwriters is essential to the success of the proposed Alaskan aviation training program. By offering insurance discounts to operators whose pilots attend a training program, it is hoped that those operators who would not normally express interest in a training program would be more inclined to have their pilots attend.

In addition to regular meetings with key insurance brokers in Alaska, meetings were held in Anchorage with the following brokers and underwriters from Lloyd's of London:

- Philip Jenkins of Gooda Walker, Ltd
- Chris Holland of C. E. Heath
- Michael Charlesworth of M.E. Charlesworth, Ltd

The meetings with Mr. Michael Charlesworth, a London underwriter, were especially significant, since he stated he would consider discounts to operators whose pilots took the training described by AATC and received a certificate. One result of Mr. Charlesworth's visit was a Telex from him inviting Dr. Mitchell to visit Lloyd's and explain the work of the Alaskan Aviation Safety Foundation (see Figure D-3). The meeting in England was arranged

8812338CHARLS G

2 MAR 82

ATTN: G. ANDERSON

PLEASE PASS FOLLOWING TO M. MITCHELL

AS LEADING LLOYD'S UNDERWRITERS ON MANY ALASKAN OPERATORS I WISH EXTEND INVITATION BEHALF MY COLLEAGUES AND MYSELF THAT YOU VISIT LLOYD'S IN NEXT 2 MONTHS TO EXPLAIN TO LLOYD'S AND LONDON COMPANY U/WRS THE WORK OF THE NEW ALASKA AVIATION SAFETY FOUNDATION, WHOSE WORK WE VALUE HIGHLY.

YOUR PRESENCE IN LONDON ESSENTIAL TO ASSIST US WITH FULLEST EXPLANATION OF THIS WORK, SO THAT WE MAY ASSESS THE LIKELY IMPACT ON AIR SAFETY, AND THUS CALCULATE POSSIBLE PREMIUM REDUCTIONS FOR THOSE OPERATORS WHO UNDERGO THE TRAINING COURSES THAT YOU ARE ORGANISING.

REGARDS

MICHAEL CHARLESWORTH

8812338CHARLS G

◆

RBH ALASKA AHG

REPLY TO THIS TELEX VIA RCA
T

Figure D-3

and the opportunity to participate was extended to members of the board of the AACA and AASF. The following persons were able to accept the invitation of Mr. Charlesworth:

- Gayle Anderson
- Rex Bishopp
- Ruth Bishopp
- Jim Dodson
- Bill Fisher
- Charles Eichhorn
- Michael Mitchell

A full week of activities was planned by Ms. Anderson and Mr. Charlesworth. Two group meetings were held and attended by 51 persons from Lloyd's. (See Appendix B). Many individual meetings were held in the various underwriters' and brokers' offices.

The results of these meetings were beneficial to both the insurance underwriters and the AACA/AASF/AATC representatives. The Lloyd's of London insurance underwriters expressed the fact that they were impressed with the efforts of the Alaskan Aviation Safety Foundation to improve the safety of flying in Alaska. The Alaskan contingent learned that the prospect of getting any committment of a discount for those operators whose pilots take the training described by AATC will not be a simple matter. In the words of one underwriter, "The London market is not organized for discounts." However, there was considerable interest among the London underwriters for more information regarding the relative safety of air taxi operators. They supported the concept of an audit or appraisal of air taxi operations by an entity other than the broker. An audit which has been previously tried, by one of the underwriters, has not been considered successful because the evaluation was neither structured nor well documented. Underwriters suggested that training, although very important, was not the only part of the solution to the very complex problem of increasing safety in Alaskan aviation. The underwriters expressed the belief that if they were able to get well documented information on each operator, information which was consistent among operators and detailed enough, insurance rates could be adjusted to differentiate between the safe and unsafe operations. This differentiation could be significant enough to cause the unsafe operator to either improve his safety record or pay a premium for the higher risk imposed on his pilots, passengers and the underwriter.

Public Relations Activities

In an effort to make the Alaskan public aware of the AASF's promotion of aviation safety and also to explain the purpose and nature of the study, Dr. Mitchell made himself available to various media for interviews. Some interviews and presentations are listed below:

- Several interviews by Bert Tarrant of Air Alaska produced some excellent articles which proved to be most helpful in apprising Alaskan aviators of the need for, progress of and results from the study.

- A television interview by Eric Meindl for the P.B.S. Aviation Weather Special Segment. This interview was broadcast on October 20. Comments from many people indicate that the interview was seen by a large audience.

- Reporter Deb Davis conducted an interview with Tulinda Deegan and Dr. Mitchell for the Anchorage Times. The article appeared in the October 24th edition of the "Times".

- An interview with reporter Everett Long of the Fairbanks Daily News-Miner was published on Saturday, October 31st in the Pilots Corner column.

- An interview with Peter Friend of the Tundra Drum was conducted during Dr. Mitchell's trip to Bethel in February.

- Mr. Eichhorn and Dr. Mitchell spent considerable time with an independent freelance aviation writer, Barry Stott. Mr. Stott is preparing several articles on aviation in Alaska and plans to include comments on the activities of the Alaska Aviation Safety Foundation.

- Other activities included a talk to the Alaska Airmans Association, and a presentation to an aviation safety class at the Anchorage Community College. The research team also coordinated AATC's involvement in the AACA annual convention. The AATC team used this opportunity to describe the project to participants at the convention, both formally, and informally at the AATC trade show booth. The formal presentations by Dr. Mitchell were titled "Overcoming Alaskan Aviation Hazardous Incidents" and "A Study to Define Alaskan Aviation Training Requirements". In addition, many meetings were scheduled throughout the convention with industry leaders and insurance persons.

Progress Report Meetings with the Alaskan Aviation Safety Foundation Board

One of the contractual agreements between AATC and AASF was to deliver a monthly Progress Report on the study, "Definition of Alaskan Aviation Training Requirements". These reports were written at the end of the month and described the progress and activities of the AATC research team for the preceding month.

The first Progress Report was delivered to the AASF Board at a meeting held in their Anchorage office suite at 4790 Business Park Blvd. on Saturday, October 24, 1981, at 10:00 a.m. This meeting was attended by Rex Bishopp, President, AASF; Jim Dodson, Secretary/Treasurer, AASF; Tulinda Deegan, Executive Director, AASF; Jim Wood, President, Alaska Airman's Association; Jerry Smith of the Alaska Society of Safety Engineers; M. K. Mitchell, Project Director, AATC; and Charles Eichhorn, Project Investigator, AATC.

At this board meeting, each section of the first Progress Report was reviewed and input was sought from those attending for any modifications they would recommend be incorporated into the interviewing process. A description of the planned activities of the research team for the months of October and November was presented for suggestions and comments.

The meeting concluded with the AASF Board's approval of the first Progress Report.

The second, third and fourth Progress Reports were also presented to members of the AASF Board for their inputs and recommendations. All Progress Reports were approved by the Board.

The Progress Report meetings with the AASF Board served a valuable purpose by informing the Board members of the study's progress and allowed them to offer valuable recommendations to the research team.

Appendix C contains the milestone and timeline charts for the Alaskan aviation training requirements study.

Facilities Visited

Throughout this study the research team accepted a number of invitations to visit aviation facilities in Alaska. Each visit resulted in an increased understanding of the requirements of the Alaskan aviation community.

Alaskan Regional Headquarters:

Regional Director
Chief Aircraft Management Branch
Hazardous Materials Coordinators
Accident Prevention Coordinator
Chief, Investigations and Internal Security
Airports Division
Chief, Plans, Programs and Evaluation Branch

Other FAA facilities visited included:

General Aviation District Offices
Flight Inspection District Offices
Flight Standards District Offices
Flight Service Stations
Air Carrier District Offices

The research team visited these FAA facilities in Anchorage, Fairbanks, Juneau, Nome, Kotzebue, Gulkana, Bethel and Ketchikan.

Other organizations visited and persons met with or interviewed include:

- "Air Alaska" -
  - Bert Tarrant, Editor
- Alaska Airmen's Association -
  - Jim Wood, President
  - Kent Woodman, Vice-President
- Alaska Department of Commerce and Economic Development -
  - Kenneth C. Moore Director, Division of Insurance
- Alaska Department of Education -
  - Gary Fuller, Project Officer
  - Kerry Romesburg, Executive Director, Commission on Post Secondary Education
- Alaska Department of Public Safety -
  - Ray Tremblay, Aircraft Supervisor
  - L. Samsall, Pilot
- Alaska Department of Transportation -
  - James Moody, P.E., Airport Facilities Branch
- Alaska State Legislature Senators and Representatives
- Alaska Transportation Commission -
  - Keith Miller, Chairman
  - Walter Kubley, Commissioner
  - Hesden Scougal, Commissioner
- Alaska Transportation Consultants -
  - Ed Peebles, Transportation Analyst
- Anchorage Community College -
  - Larry Kingry, Dean of Instruction
  - Dr. Loretta Seppanen, Assistant to the Dean of Instructional Services
  - Michael Pannone, Air Traffic Control
  - Charlie Williams, Aircraft Maintenance
  - Ronald Haney, Aviation Technology
  - Charlene West, Aviation Technology and Air Traffic Control
  - Ronald Pearson, Aviation Technology
- City of Fairbanks -
  - Paul Haggland, Airport Manager
- Department of the Interior - Office of Aviation Services
  - Tom Belleau, Flight Training Manager
  - Jack Corey, Fixed Wing Specialist

- Federal Aviation Administration -
    Lynn Helms, Administrator
- Kotzebue Technical Center -
    Russ Lloyd, Mechanics Instructor
- Meteor Data, Inc. -
    Frank Price, President
- Municipality of Anchorage, Department of Transportation -
    James Dunn, Director
    Joe Fonts, Airport Manager, Merrill Field
- National Transportation Safety Board -
    John Faulk, Administrative Law Judge
    Jerry Dennis, Air Safety Investigator
- 99's -
    Joy Craig, President
- Office of the Governor of the State of Alaska -
    Jessie Dodson, Special Assistant to the Governor
- Eagle Enterprises -
    James Snoderly, Survival Equipment Specialist
- Parker Associates -
    Walter B. Parker
- Pathology Associates -
    Donald Rogers, M.D., Pathologist
- Rescue Coordination Center, Elmendorf A.F.B.
- Reed Stenhouse -
    Bob Carney, Aviation Safety Consultant
- Seaplane Pilots Association -
    John Pratt, Jr., Field Director
- SOHIO -
    Larry Plessinger, Safety Supervisor
- University of Alaska, Fairbanks -
    William Nelms, Jr., Head, Aviation Training Department
- University of Alaska, Fairbanks, Geophysical Institute -
    Tom George, Applications Specialist
- University of Alaska, Arctic Environmental Information and Data Center -
    Albert Comiskey, Associate, Atmospheric Sciences
    James Wise, Alaska State Climatologist

Aviation Seminars and Clinics Attended

Dr. Mitchell attended the following aviation seminars and clinics:

- The Flight Instructor Refresher Clinic conducted by the Aircraft Owners and Pilots Association (AOPA). In his address to the 116 Flight Instructors, Dr. Mitchell described this study, the interview process, the type of information being collected and how the information is being used. Over the three days of the clinic the opportunity was available to hear some concerns of those in attendance and to review existing styles and methods of flight instruction.

- The FAA Aviation Safety Seminar conducted by Tom Carter of the Anchorage GADO at East High School in Anchorage. A presentation of the study was delivered to the approximately 365 pilots present.

- The FAA Aviation Safety Seminar conducted by Don Nelson of FAA GADO. The subject of this seminar was icing and winter operations of General Aviation aircraft.

- The Alaska State Troopers Annual Refresher Training Course. The three day course was held at the National Guard Training Center and the Department of Public Safety Hangar. Among the subjects covered were ski operations, the psychology of safety, propeller care, and many other subjects of interest to Alaskan pilots.

- The Hazardous Materials Seminar taught by Jack Peters and Bill Gray of Wien Air Alaska. This excellent three-day course was a thorough training program on the requirements imposed by the U.S. Government for the transportation of hazardous materials. The students in attendance shared their concerns and problems with meeting the unique needs of customers in the Alaskan Bush while remaining in compliance with the regulations.

SECTION E

INTERVIEW QUESTIONNAIRE AND DATA COLLECTED

The interview questionnaire utilized by the research team and the data collected from the interviews are described in this section. Each question from the questionnaire is presented, followed by a discussion of why the question was asked and the data collected. The last part of this section describes the questions asked of air taxi managers, their responses, and suggestions for management training.

Interview Questions and Data Collected

This section lists each question and explains the reasons for the question or series of questions and presents a summary of the responses. The questions asked during the interview are boxed for easy identification.

Interviewer____________________ Number________________________
Date ___________________________ Start time______ Stop Time__
Name ___________________________ Position____________________
Business phone_________________ Home phone___________________
Mailing address____

A number was written on the cover sheet (represented above) of the questionnaire; that number was then written on the first page of the questionnaire and the cover sheet removed. This process preserved the confidentiality of the respondent because others can see the completed questionnaire without knowing who was interviewed. However, if in the development of the curriculum it becomes necessary to clarify a technique or process, researchers can re-contact the respondent for further information.

Also included for record keeping purposes was the name of the interviewer, the date, and the time the interview began. If for any reason the interview was cut short, the stop time was recorded. When the interview extended for more than two hours the recording of the stop time could be omitted. Typically interviews took in excess of two hours with many lasting for five hours while one ran as long as eight hours.

In developing the questionnaire consideration was given to the possibility that a respondent might be called from the interview to conduct other business. Therefore, the questions were arranged so those deemed most necessary by the research team were asked first and questions deemed least necessary by the research team were asked later.

How many years have you flown?________ Total hours____

How many years have you flown in Alaska?____ Total hours____

The purpose of asking these questions was to document the experience level of the pilots interviewed. The results are shown below.

CATEGORY	AVERAGE
Total Years Flown	21
Total Hours Flown	10,343
Total Alaskan Years Flown	14
Total Alaskan Hours Flown	7,007

Describe the type of flying done. (Hunting, fishing, cargo, etc.)

Because of the wide variety of types of flying done by Alaskan pilots the researchers believed it would be helpful to know what type of flying had contributed to each pilot's experience base.

Since it was revealed that each type of flying had its special problems and unique solutions, and, because of the wide variety of flying done by almost all pilots, training should be offered that addresses a variety of operational activities.

If you had to consult one pilot about flying in Alaska who would you choose?

This question was asked in order to satisfy any future requirement to validate the training objectives and techniques by providing a source of pilots whose expertise was recognized by their peers.

The responses were not as precise as expected. Respondents often could not name <u>one</u> pilot whom they believed was the most knowledgeable about flying in Alaska. Usually the answer to this question resulted in multiple responses in which more than one pilot was named and his special area of expertise was specified. Selected personnel from this list will be contacted during further program development activities.

> Describe for me the most hazardous situation you have ever experienced as a pilot in Alaska.

The rationale for this question having been described in detail in Section C is summarized here. Flanagan's critical incident method of interviewing is reflected in this question. It is the heart of the process of translating actual successful Alaskan piloting experiences into appropriate Alaskan training objectives. After asking this question the interviewer encouraged the respondent to freely relate the details of the incident which were recorded in narrative style.

Using the <u>Critical Incident Checklist</u> prepared by the researchers, the interviewer ensured that sufficient details had been documented to permit the training analyst to prepare training objectives. The list of questions which follow are from the checklist.

The following WHO, WHAT, WHEN and WHERE questions are self-explanatory.

WHO - was involved (number of passengers, description of flight and baggage)

WHAT - type of aircraft (how many hours in type, aircraft flown previous 90 days)
weather conditions
physical condition of pilot
VR, IR, (Visual reference, Instrument reference)
phase of flight

WHEN - day/season
day or night and dark or light
time in flying career (years and hours)
time in Alaskan flying career (years and hours)

WHERE - latitude and longitude
description of terrain

After determining that the level of detail had been accurately documented in accordance with the checklist, five additional questions were posed regarding the critical incident described. These questions were designed to extract specific cues and actions which the pilot learned to use to avoid a similar hazardous incident from developing.

The five questions were:

- What caused this critical incident to occur?
- What alerted you to the fact that a hazardous situation had (or was) developing?
- What specific actions did you take regarding this incident?
- What specific judgements were made which led to the actions taken?
- What do you do now to prevent a similar situation from occurring?

The responses to these questions were synthesized into training objectives from these reported cues and will be validated by selected Alaskan aviators. They will then be incorporated into formalized training programs.

Ratings Pvt.____ Comm____ Inst____ ATP____ A____ SEL__
MEL_____ SES_____ MES_____ CFI____ CFI-I____
Tailwheel____ GI____ H____ A&P___Type___

In addition to the number of hours a pilot had flown, the research team also collected information on the ratings obtained. This data served to give the interviewer an idea of the type and scope of pilot experience. Out of the 177 interviews conducted 145 pilots reported having an instrument rating. The other ratings were not totaled across interviews as the purpose was to validate the experience of an individual pilot rather than the group as a whole.

Which areas have you flown in?

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

All ________ All except those circled _______

During each interview, the respondents were shown the Hydrological Unit Map of Alaska subdivided into major drainage areas. These geographical areas were identified by the AASF Board as each having significantly different flying conditions. Respondents were asked to identify the areas in which they had flown. (Refer to Figure D-1 (p. 22) for a representation of the map used.)

What area do you fly that you consider the most hazardous?

After having identified only those areas of Alaska in which the pilot had flown, pilots were then asked to identify which area, in their opinion, presented the most hazardous flying conditions. The purpose of this question was not to identify the most hazardous area in Alaska, but to cause the pilot to focus attention on one particular area, so that specific go/no go parameters and flight techniques could be solicited in greater detail.

What makes it hazardous?

After the pilots specified the area which in their opinion was most hazardous they were then asked to identify the conditions which made it hazardous.

How do you determine whether or not to fly it?

By asking this question the interviewer gathered information on the judgment factors or cues used to make go/no go decisions.

How do you fly it?

When the pilot identified the circumstances under which they decided to go, the interviewers then inquired as to what special techniques the pilot believed appropriate to ensure a successful flight.

The data from the above four questions were synthesized by the training analyst into training objectives which addressed area specific flight techniques, knowledge of weather sources, and interpretation of weather.

What would you teach me to enable me to fly safely in this area?
How would you teach it?
How often would one have to do this?
What skill level do you believe is required?

The four questions above solicited information regarding the teaching of techniques appropriate for training pilots to fly in this specific area. Many pilots said they were not able to identify specific training techniques to transfer their knowledge to pilots unfamiliar with the area, other than having the inexperienced pilot accompany the experienced pilot on various flights. It should be noted that many operators expressed the belief that this type of training on-the-job) was inefficient and extremely costly. The training offered or required varied greatly among air taxi operators, as did the skill levels required by the operators.

Do the areas you fly have adequate enroute communication facilities?

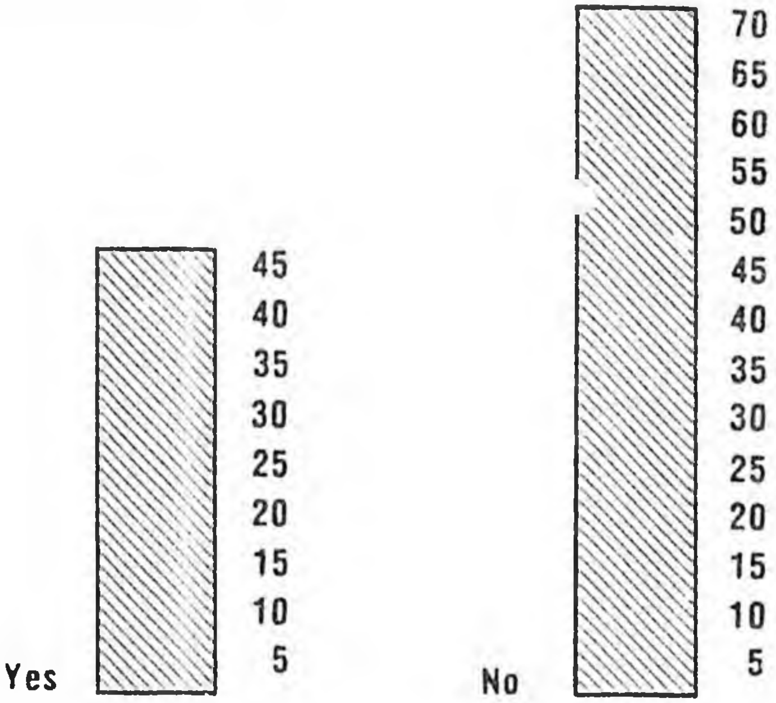
A non-parametric statistical analysis of the responses to this question revealed that there was a significant difference in the opinion of respondents regarding this question, with the majority of respondents indicating a belief that communication facilities were, in fact, inadequate. Refer to Figure E-1 .

Some respondents revealed that when operating at low altitudes or in mountainous areas, signals ordinarily received at higher altitudes were not receivable close to the ground.

A previous study by Parker Associates identified this problem area and made recommendations to correct many of the inadequacies. As a result of the Parker study, the Alaskan Legislature appropriated the necessary funds to construct additional NAV/COMM facilities. Furthermore, the FAA and FCC are presently involved in a program to update and add strategically located communication sites to alleviate this problem.

However, the research team learned that many operators used supplementary communication systems such as SSB, HF, Marine VHF, etc, and utilized cooperative radio procedures and techniques to circumvent the perceived lack of enroute communications. These procedures and techniques will be included in the curriculum of an Alaskan aviation training program.

ENROUTE COMMUNICATION



Do the areas you fly have adequate enroute communication facilities?

COMMENTS

My VHF has better transmission/reception than the FSS radio.

No communication of value in the bush when flying low.

You need an SSB to supplement.

We need more repeater sites and ADF installations.

FAA maintenance is poor on existing facilities.

Facilities are adequate for IFR but not for VFR.

The remote stations don't seem to work very regularly.

Figure E-1

Do you use the following aids to plan weight and balance?

Aircraft owner's manual ________
Calculator ________
Company weight and balance forms ________
Rule of thumb ________
Other (specify) ________

Overloading beyond the manufacturer's maximum authorized gross weight may be a contributing factor to the Alaskan accident rate. The research team believed the curriculum should include training in aircraft loading which addresses the unique needs of the citizens of Alaska. Therefore, each respondent was asked for information concerning how they computed the weight and balance for each flight. Seldom did anyone indicate they used methods of loading an aircraft similar to those tested in FAA written or pilot flight tests.

Interviews frequently indicated that aircraft operators used a rule-of-thumb method for determining the total load and weight distribution. Some respondents routinely exceeded the manufacturer's recommended limits. However, they stated that economic pressures forced them to overload in order to be competitive. Other operators stated that overloading was a dangerous form of discounting one's services. Some operators expressed the belief that rather than overload they would complete the trip using two aircraft or fly the lesser weight in two trips.

Some managers stated that overloading of an aircraft had three adverse effects on an air taxi operator's performance: it reduces revenue, it places additional stresses on the aircraft resulting in increased maintenance costs and reduced hull life, and it escalates minor problems to dangerous situations, i.e., an overloaded light twin has a potentially hazardous increase in VMC (Velocity-Minimum Control).

Because weight and balance can affect performance and safety and because the actual loading of most aircraft in Alaska is not consistent with the methods which pilots are normally taught when loading aircraft, it is proposed that hands-on weight and balance training be included in an aviation training program for Alaska.

This training could involve having a typical light aircraft fuselage mounted on a balance scale. The learner would then have the opportunity to experiment with various load configurations. Ideally after having been encouraged to load the training device to its maximum capacity with typical Alaskan "mail", (cases of beverages, pilotbread, Pampers, etc.) the pilot would then fly a simulator which was automatically programmed to perform as though loaded like the weight and balance trainer. Typical simulated emergencies enroute could be programmed to demonstrate to the pilot the potential danger of operating an aircraft in excess of the manufacturer's recommended gross weight.

Do you consult the following while planning a trip?

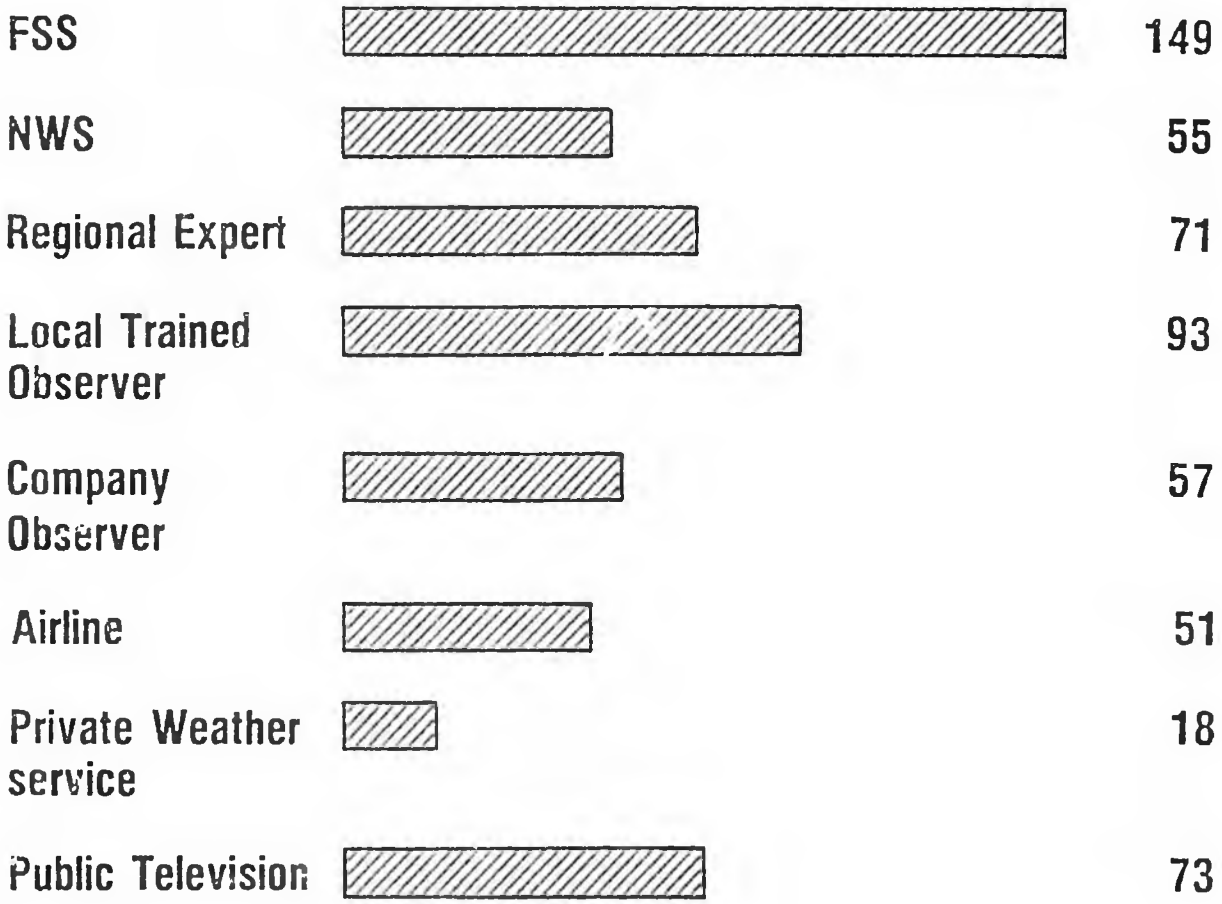
FSS ____
N.W.S. ____
Regional expert ____
Local trained observer ____
Company observer ____
Airline (telex,Airinc) ____
Private weather service ____
Public T.V. ____
Other (specify) ____

Most respondents, when asked about pre-flight planning, stated their frustration regarding the ready access to weather information. Having heard this concern expressed repeatedly in the early phases of this study the AATC team decided to ask about sources of weather information. Refer to Figure E-2 for a summary of responses.

Although nearly all pilots made some contact with the FAA Flight Service Stations (FSS) there were mixed feelings about the completeness or accuracy of the information provided. After listening to many FSS specialists and numerous pilots, the problem seems to be that often when a pilot calls the FSS and requests

SOURCES CONSULTED WHEN PLANNING A FLIGHT

Number Of Pilots Reporting Usage



FSS	149
NWS	55
Regional Expert	71
Local Trained Observer	93
Company Observer	57
Airline	51
Private Weather service	18
Public Television	73

OTHER SOURCES USED

Pilot Reports (PIREPS)
Newspaper
Military Briefing
Marine Weather
Local Untrained Observer
Public Safety Officer Or Trooper, Someone Not Involved In The Flight
Dispatcher Checks With Villages By HF Radio
Canadian Marine Weather Forecast
Forest Service Camps

Figure E-2

the current weather at his intended destination he becomes angry if the FSS specialist begins to provide a systematic and detailed briefing. In time the FSS specialist may wish to alleviate the irritation of repeated criticism by responding with only the answers to the questions asked by the caller. On the other hand, although considerable information seemed to be available on weather in Alaska it was not always reported at the pilots actual destination but within approximately a fifty mile vicinity, and sometimes at much greater distances from the landing site. Pilots have learned to supplement the official weather reporting process by enlisting the aid of cooks at mining and lumber camps, personnel at canneries, home owners living near frequently traveled mountain passes, fishing boat crews, etc. Some airlines (pilots) frequently provided weather information directly to air taxi pilots by radio, as well as through the normal PIREPS given to FSS. Pilots aware of the Aviation Weather program, televised on the Public Broadcasting System, commented very favorably regarding the assistance it provided in gathering and presenting general weather information. They also felt that the aviation education segment of the program was very informative, helping to upgrade their aviation knowledge and capability to analyze general weather trends.

Air taxi operators providing transportation services along coastal areas felt that weather systems frequently came upon them with insufficient warning. This problem was generally corrected by installing special radios with Marine frequencies allowing communication with ships operating in areas with unusual and poorly reported weather conditions.

Do you feel pressure to accept flights in marginal conditions? (From whom - management, self, passengers/customer?)

After speaking to some passengers of air taxi services, the team felt it would be appropriate to ask pilots if they felt pressure to fly in marginal conditions. Refer to Figure E-3 for a

PRESSURE TO ACCEPT FLIGHTS

Do You Feel Pressure To Accept Flights In Marginal Conditions?

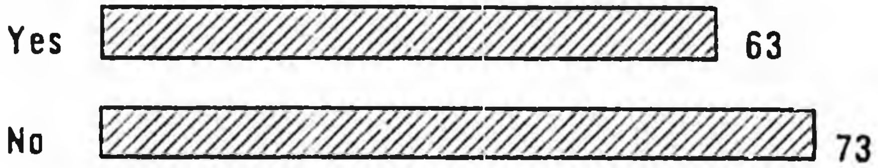


Figure E-3

summary of responses. Frequently, management, attempting to accommodate their good customers, would request its pilots to fly a marginal weather trip, rather than lose business to a competitor who would be willing to go if the original operator refused to go. Pilots attempting to gain recognition as one who could do the job no matter what, frequently pressured themselves to take unfavorable trips to prevent a loss of the "macho" image. Some situations resulted in the pilot and passengers becoming unfavorable statistics through injuries or fatalities. Passengers with the "I must get there" attitude also contributed to a pilot's stress by making requests to continue into marginal conditions.

Pilots should be made aware of the passenger arguments most frequently used to pressure pilots to accept flights in marginal conditions. Management's firm refusal to dispatch flights in these marginal conditions, will reduce exposure to these high risk, potential accident situations.

Describe your personal criteria for whether or not to make a trip in the absence of published minimums.

The intent of this question was to elicit from pilots and/or air taxi management personnel what standards were used for dispatching aircraft. However, the team learned that many pilots operating in the various regions used flexible weather criteria to decide the operational minimums. Frequently, the dispatch of flights was determined by how long it had been since the last flight had been made to a village. Dwindling supplies, medicine, etc. forced operators to conduct flights to these villages in very undersirable conditions. Factors such as enroute terrain conditions, visibility, wind direction and velocities, mountain passes to be negotiated, etc., were considered when deciding to make a trip. Consequently, those variables prevented strict adherance to standards. Management assessment of regional and local weather conditions and trends, and the areas serviced, could result in developing realistic company weather minimums for the guidance of pilots unfamiliar with the area.

(Helicopter only) Do you refer to the appropriate height-velocity and performance charts before a mission?

When helicopter operators were interviewed, this question was asked to determine if pilots utilized these charts to predict the performance capabilities of the helicopter in their operating environment. Respondents usually stated that these charts were not routinely referred to prior to takeoff.

Do you fly in actual instrument conditions?

Although an instrument rating is required of pilots in air taxi operation, it was discovered that many did not maintain these necessary skills and therefore lost their instrument flying privileges. In addition, many operators opted not to maintain their aircraft in an acceptable instrument flying condition. Unfortunately this situation forced pilots to fly by maintaining visual contact with the ground in very undesirable meteorological conditions, frequently requiring pilots to abort the flight, turn around or press on into dangerous conditions.

How many FAA presentations have you attended in the past 12 months? Why or why not? Do you read FAA publications? Why or why not?

These questions were asked to determine the degree of participation in the free aviation presentations offered by the FAA and the reason for attending or not attending these seminars. Many respondents complained about the availability (time and location) of these presentations. Some professional pilots felt the presentations were directed toward student or private pilots and did not contain enough useful information for air taxi pilots. Interviews with the FAA Safety Coordinator indicated some of the material did, in fact, have relevance to many degrees of pilot competency and could benefit those attending the presentations. The degree of dedication of the personnel in the FAA Safety program was exemplary and indications were that these men are "putting out good information", thus increasing their credibility, and pilot attendance at FAA seminars. Most pilots stated that they frequently read FAA publications and found them to contain useful information and flying tips that could be applied in their operational area.

Do you use the following navigational aids?

NDB ______ Comments -
VOR ______
VOR/DME ______
RNAV ______
ILS ______
ILS (BC) ______
ASR ______
PAR ______
DEAD RECKONING ______
PILOTAGE ______
OMEGA ______
LORAN ______

When developing a curriculum for training Alaskan pilots it is important to determine what areas need emphasis. It was discovered that the most common method of navigation is by dead and pilotage. The preference for this type of navigation is determined primarily by the terrain and the meterological characteristics of the area. Whereas all types of navigational methods are available and could be utilized in certain areas of Alaska, the most common electronic navigational aid is the Non-Directional Beacon. This electronic aid is not restricted to line-of-sight and has other operational and cost advantages. Unfortunately, the type of navigational techniques used in Alaska are not given sufficient training emphasis in the pilot programs presently conducted in the Lower 48, necessitating an Alaskan training program to reinforce the ability of pilots to use these methods. Refer to Figure E-4 for a summary of responses.

Do you fly Victor Airways? _____
Do you fly low frequency airways? _____

Again, the questions above tried to determine the frequency with which pilots used the enroute navigational systems in Alaska. The general consensus seemed to indicate that the radio assisted enroute system was used infrequently, however many pilots used approach facilities as an aid to finding airports in marginal weather. Refer to Figure E-4.

Do you land on the following surfaces? Describe how you evaluate these surfaces and any special landing/takeoff techniques.

Paved	_____	Gravel	_____	Tundra	_____
Snow	_____	Rivers	_____	Roads	_____
Lakes	_____	Sandbars	_____	Beaches	_____
Sea Ice	_____	Fresh water ice	_____	Mud	_____

NAVIGATIONAL AIDS

Number Of Pilots Reporting Usage

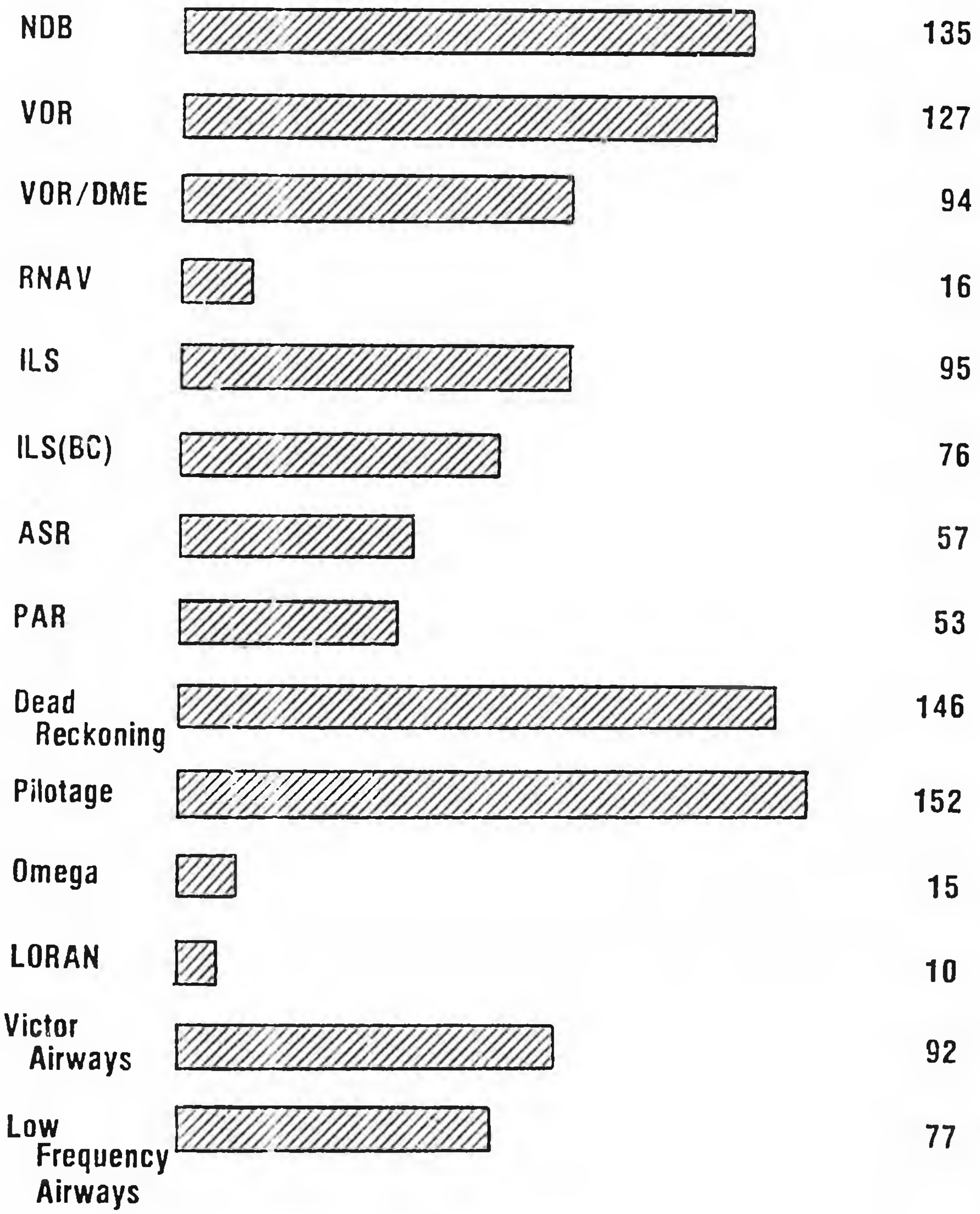


Figure E-4

The interview team knew the demands placed on Alaskan aviators to land on many different surfaces under conditions of varying extremes. Since the majority of these landing sites were away from conventional well-equipped airports, training objectives were developed to be incorporated into the curriculum for Alaskan pilots. In addition to learning to operate airplanes from these unique surfaces, training and proficiency is required of pilots in short and soft fields with high obstacles at both ends, small lakes at elevated altitudes, and in cross-winds with velocities well above the values experienced in the Lower 48. Refer to Figure E-5.

What is your opinion of your initial pilot training effectiveness in relation to safe Alaskan flying?

Many pilots answered this question stating they felt areas of their initial training were definitely lacking. Some of the reported deficiencies were:

- Mountain flying was not included in their initial training course.
- Actual off-airport take-offs, approaches and landing were not part of the initial curriculum.
- Seaplane training and ratings for initial certification were not related to real world pilot requirements in Alaska.
- Short and soft field take-off and landing procedures, although taught, were not practiced in the actual environments.

Suggestions on how the training could have been improved.

LANDING SURFACES

Number Of Pilots Reporting Landings On These Surfaces

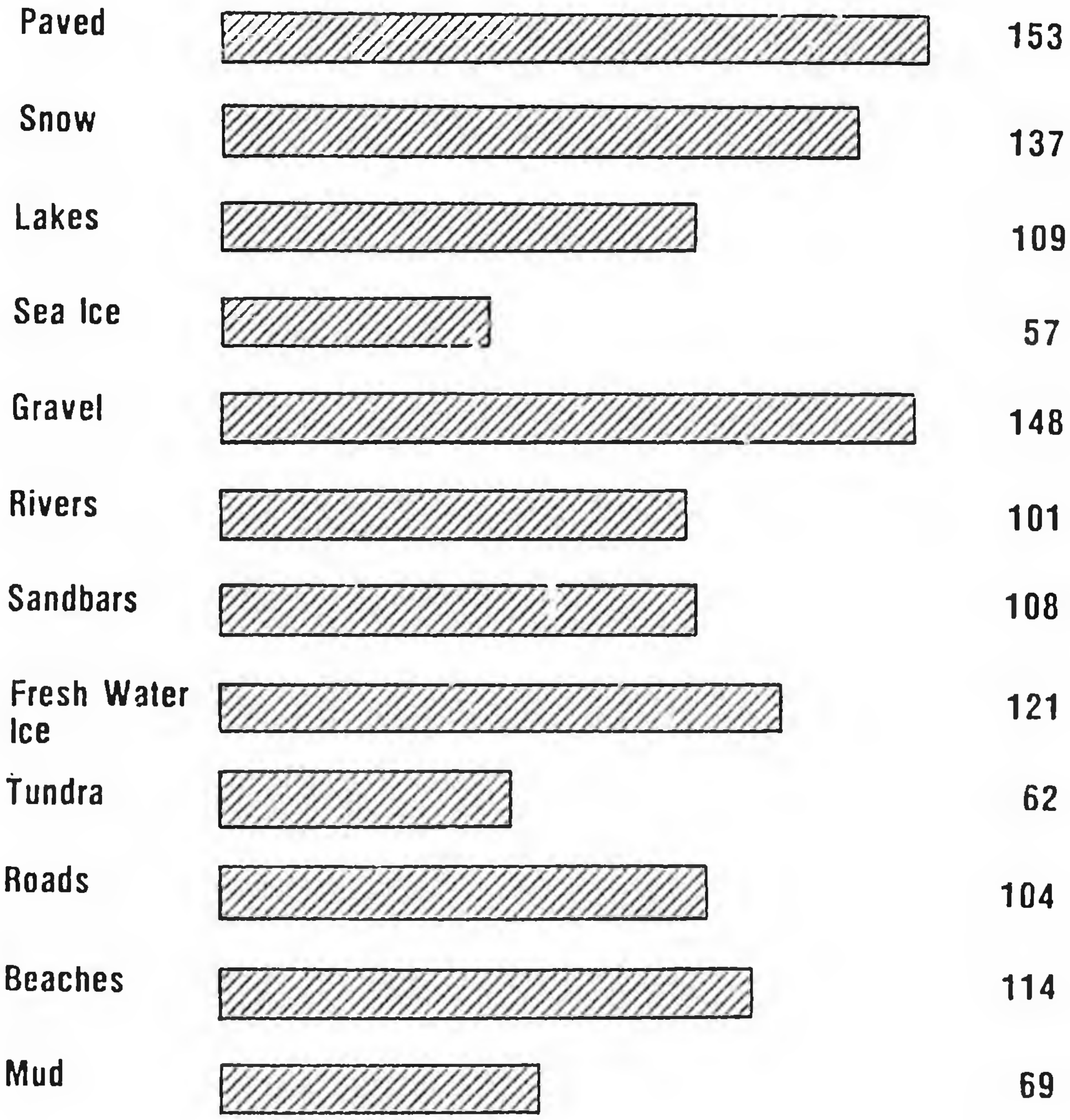


Figure E-5

Pilot recommendations included: incorporating training in operations from actual off airport sites, mountain pass flying techniques, improved proficiency when operating in a strong crosswind, extra emphasis on pilotage and dead reckoning forms of navigation, operating in snow and ice environments along with the illusionary problems associated with these operations. Many other items of required instruction are included in the training objectives.

Describe your Alaskan pilot training.

A surprising number of respondents answering this question indicated most pilots did not receive any formal training to help them cope with flying in Alaska. Most reported they either learned by trial and error or received minimal amounts of on-the-job training. The more fortunate pilots who were in a position to fly as co-pilots for a few years expressed much appreciation for being afforded this learning process; some relating the sad experience of their friends lost to the trial and error method used by some operators.

How could it have been improved?

Attending a formal training program seemed to be the most popular response to this question.

Describe your recurrent training.

Recurrent training generally was not conducted by many operators. On the other hand a very few operators did offer impressive, detailed instruction in a wide variety of subjects including survival, winter operations, handling of hazardous material, ground school classes for aircraft systems and checks by chief pilots of their pilots' proficiency, and operational line checks of these pilots by personnel designated by management.

Are federal aviation minimum standards for training adequate to enable a pilot to fly safely in Alaska?

Most interviewees felt that the manipulative techniques required by the FAA for pilot certification were adequate however, they indicated enhanced training in Alaskan operations would be very desirable. Refer to Figure E-6 for a summary of responses.

What changes do you recommend?

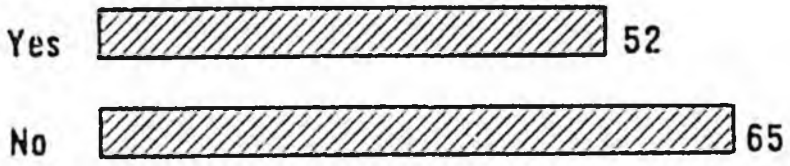
Many of the recommendations that were offered when these questions were answered appear as training objectives for an Alaskan pilot training program.

Which passes in this area do you fly on a regular basis?
What cues do you use to determine go/no go?
Describe typical conditions in the pass.
Describe extraordinary conditions you have encountered.
What alternative actions do you plan?
Describe any special techniques that you utilize.

The questions above attempted to identify any problem areas associated with flying through passes. During the investigation the interviewers were told about the high accident rate in the passes in the vicinity of Anchorage. Much of the information gleaned from operators flying through these passes is now reflected in the training objectives included in this report.

FEDERAL AVIATION MINIMUM STANDARDS

Are Federal Aviation Minimum Standards For Training Adequate To Enable A Pilot To Fly Safely In Alaska?



COMMENTS

Need a good hard check ride.

Proficiency should be the standard, not time.

Simulator training for cross country in poor weather.

Need additional training for professional flying in Alaska.

Needs heavy emphasis on terrain recognition.

Designated examiners are too lax.

Float rating should include all conditions pilots normally encounter.

Separate rating for taildraggers.

Figure E-6

Are you aware of pilots with an alcohol problem?

YES	93
NO	64

Do you know of pilots violating the 8-hour rule? (none, few, many)

YES	100
NO	50

Although the questions above were not part of the study, the Alaskan Aviation Safety Foundation requested the interviewers to gather this data when talking to pilots and operators. Some respondents initially thought the questions pertained to pilots flying in their own air taxi operation and seemed hesitant to respond, however further explanation of the intent of the questions usually provided them with a willingness to answer. Some asked why questions were not asked about the use of drugs and felt there may be some abuses in that area.

Do you perform the following duties?

Maintenance ___

Loading/unloading ___

Scheduling/administration ___

This question was asked to learn if Alaskan pilots used unique methods of maintaining or servicing their aircraft in the extemely cold and sometime hostile operating environment. Routinely, pilots are required to spend considerable time at the end of a flying day getting the airplane prepared for the following day's flying. In very cold environments it could mean draining the oil to prevent it from congealing, placing engine and wing covers in position, etc. Lack of maintenance personnel at some locations necessitated pilot involvement in minor maintenance. In almost all cases, the pilot personally did the loading and unloading of the aircraft or supervised the placement of cargo within the airplane. External loads were flown occasionally by some experienced operators. The scheduling and adminstrative duties varied among the operators. The smaller operators had the pilots arranging their own flights while the larger operators utilized office personnel, some using dispatchers, when many routes were serviced.

Management Questions

From the inception of this project the AATC research team was told by many Alaskan aviators that much of the responsibility for the high accident rate in Alaska was due to deficiencies in management policies and procedures. In order to determine the cause of these deficiencies, the decision was made to ask managers of air taxi operations several questions relating to the management of their company.

At first the interviewers had a list of questions most of which were related to information required by the FAA to be included in the company operations manual. Most of these questions could be answered yes or no. After answering only a few of the questions on the form respondents perceived the relationship between the operations manual and the questions, and began to answer each question with "Yes, that's in the company operations manual." For example, the interviewer might ask "Are copies of the company manual available to pilots?" The answer given was nearly always, "Yes, that's required by the Federal Air Regulations." However, many operators were volunteering information on what they thought made their operation safer than their competitors such as "Our operation is safer because we require our pilots to have an ATP, be current on instruments, and have 500 hours in type." The decision was made to gather similar data from all the respondents who were in management positions, consequently with the approval of the AASF board, the eight questions which follow were added to the questionnaire while the original management questions were deleted.

The eight questions which were asked of management respondents are presented with comments on the findings. The questions and comments are followed by a summary of the recommendations of the AATC research team regarding management training. Also a plan is suggested to encourage insurance underwriters to discriminate among operators, thereby rewarding the safer operators with discounts while surcharging those operators whose accident record is contributing to the overall higher insurance costs in Alaska.

What qualifications do you require when hiring? (total hrs, Alaska hrs, etc.)

Many operators volunteered information on their minimum requirements for employment. They perceived these minimums as representing the reason their air taxi service was safer. Many managers said that the insurance company sets the minimum standards. Although the range of responses indicate considerable variability, the typical operator requires 1,000 to 1,500 hours total time and from 250 to 500 hours in Alaska.

How do you check on a pilots background?

Operators claimed that their pilots were safer because of the high initial qualifications and experience level required. However, many managers said the only way they checked on a pilot's background was by reviewing log books and resumes. Some operators complained that they were unable to get accident/violation records from the FAA. It appeared to the researchers that few operators did a very complete pre-employment check. Because a pilot's accident violation record was usually not discovered, some pilots could go for many years drifting from one operator to another having one or two accidents or mishaps, then moving on.

Many operators claimed that they called previous employers when doing a pre-employment check. However, one operator said he had employed over 150 pilots at various times in his air taxi service and reported he received only one call from another operator checking on a former employee's background.

Several respondents suggested that a significant step toward reducing the high accident rate in Alaska would be to have a readily accessible source of information regarding a pilot's flight experience and employment record. Hopefully this would not only eliminate careless pilots from the employment pool, but would also encourage pilots who are dedicated to the aviation industry to maintain a professional attitude.

How do you train a new pilot?

Managers' responses to this question varied widely. Few operators had well structured, systematic initial and recurrent training programs. Some had the new pilot read the company operations manual, then fly as a co-pilot on one of the multi-engine aircraft for a year or more. Most gave a check ride and had the pilot observe on a flight or two, then fly a few revenue flights with a check airman, after which no further training was provided. Most training as reported by the pilots was either trial-and-error or on-the-job.

On the average, how much time and money do you spend on training a new pilot?

The responses were very diverse due to the type of flying done and equipment used. Our examination of the responses revealed that air taxi operators spent two to three days, which included a local flight check and sometimes a trip check with an experienced pilot on a typical route. Some operators reported that the estimated cost of the initial training process was about $1.500 to $2,500, however most respondents were unable to quantify their response to this question.

How often is it necessary to have a pilot fly into unfamiliar territory?
How do you brief a pilot about unfamiliar territory?

Most operators reported that pilots were frequently required to fly to areas they had never flown into before. Although some operators provided a detailed briefing before the flight many pilots reported that they received no briefing and had to rely on their own resources to learn how to avoid problems.

Because of a pilot's need to fly into unfamiliar and difficult areas without structured route checks, a training program must emphasize contour map reading skills and pilotage. For example, a pilot should be trained to read a contour map with enough proficiency that he can determine the lowest altitude he can fly in a mountain pass and still make a 180° turn, while maintaining adequate terrain clearance on each side of the aircraft.

How are pilots paid? (hourly, monthly, etc.) How much?

In the early interviews several of the larger operators stated that they were able to obtain the best pilots because they paid a good salary, plus an hourly rate, in addition to a generous per diem and a good benefit program. Other operators, however reported that they paid an hourly rate only for the hours flown. Interviews with pilots revealed that many of the operators who paid an hourly rate only paid for the time between takeoff and touchdown. A few operators paid an hourly rate but specified the time for each route. Still others paid the pilot a commission for the revenue generated on each flight. Some operators used a combination of the above remuneration plans.

Pilots reported that they believed a relationship existed between safe operating practices and pay plans. Some of the implications are:

1. Turnover. Pilots who are adequately remunerated tend to remain with an operator longer, thereby reducing training costs and the potential for accidents through familiarity with routes and equipment.
2. Hurry-up syndrome. Pilots paid on a block-to-block basis may enhance their hourly rate by taking many shortcuts. Likewise, pilots paid only for the time between take-off and touchdown may short cut the preflight planning, inspection, loading and engine warmup hurrying to become airborne.
3. Coercion. Although operators did not report paying their pilots only if the trip was completed, a few pay their pilots on a commission basis. This encourages pilots to press on to complete a trip even when the weather is below operational minimums indicating that the successful completion of the trip may be in doubt.

Several operators suggested that there is a definite relationship between the method by which pilots are remunerated and the safety of an operation.

When pilots are out on a flight, how do you keep informed of their location and/or changes in their route?

Some operators providing hunting and fishing services reported they installed elaborate and expensive company communication systems. However, many on-demand charter operators did not have a formal means of keeping informed of the flight's progress after dispatch. The operators not maintaining a continuous communications contact need to ensure that the pilots they dispatch are highly experienced for the flight being conducted. Operators without company communication systems frequently availed themselves of the Federal Government Flight Plan system when flights were operated within range of FAA radio facilities. Many operations were conducted by notifying company personnel of the intended route to be taken, estimates of time enroute, anticipated delays at each airport, etc., so overdue flights could be searched for using the information provided by the pilot. Changes made enroute were sometimes reported by the microwave telephone system when radio contacts were not possible.

Management Factors Affecting Safety

From the beginning of this project many Alaskan aviators reported the belief that the principal problem of air taxi safety in Alaska was not limited to piloting skills. Respondents reported case after case of some managers creating unsafe conditions through shortsighted attempts to increase profits. This attitude could have resulted in the high accident rate previously reported in the National Transportation Safety Board Study "Air Taxi Safety in Alaska". In this study many of the accidents were attributed to the "Bush Pilot Syndrome". The research team discovered that this "Bush Pilot Syndrome" seemed to be more prevalent in some companies. Other companies had considerably fewer accidents. The question which faced the research team was, "What factors differentiate among companies with higher accident rates compared with those with a lower accident rate?" The answer to this question seems to validate the fact that management is ultimately responsible for everything that happens in its organization. The management factors identified as those affecting the safety of an operation included; operational control, accounting procedures, and personnel practices.

1. Operational Control

When the interviewers asked questions regarding go/no go criteria, the responses were often vague and ill defined. Standard procedures were often poorly defined.

Even though Federal Air Regulations and operating manuals may specify limits, standards, and go/no go criteria, enforcement was frequently non-existant. Sometimes pilots were rewarded for "getting through", although company or federal regulations prohibited the dispatch or continuation of the flight.

Some managers expressed a need for training in the techniques of setting standards and ensuring compliance from their personnel. An effective training program must include a heavy emphasis on management psychology. Managers must be trained to avoid unwittingly pushing pilots into attempting flights beyond the capability of the pilot or the aircraft. Managers must learn to cope with passenger pressure; passengers who want to go anyway or go because other pilots have or passengers who tell the operator or pilot how to fly.

Finally, managers must be aware of the self-imposed pressures placed on pilots or pressure from other pilots in the company. An example of this pressure manifests itself when an incapable, inexperienced pilot attempts to duplicate the skill level of a senior pilot who has acquired his expertise over many years of flying in the local area.

In short the manager must learn to define standards and enforce them.

2. Accounting Procedures

Accounting procedures employed by Alaskan air taxi operators seemed to be very diverse. Many operators began their flying operation with minimal assets and equipment. After only a short time in business, the requirements and demands of the Alaskan economy necessitated increased flights, and many operators expanded their businesses to include sizeable airplane fleets. Some operators, however, personally attempted to handle the accounting and financial tasks, though their expertise was mainly in the cockpit. Others who hired professional accountants seemed to fare better. Good management discouraged the cost-cutting efforts employed by some operators who were inexperienced in accounting practices. This false economy sometimes contributed to the cause of accidents; less frequent maintenance inspections, employing less skilled pilots, etc.

Successful managers constantly reviewed the price and cost structure within their organization, adjusting prices to ensure a profitable venture, rather than employ the haphazard "guess-timates" or quick fixes used by other operators attempting to remain competitive. For example aircraft overloading is frequently done by some operators to accommodate customer requests in order to be looked upon favorably for future business. Unfortunately, these operators who gave away "the company store" paid the price for their benevolence by incurring increased operating costs, higher maintenance costs, reduced number of flights etc., reducing the company's profitability.

As profits decreased, some operators reacted by postponing or neglecting maintenance, reducing or eliminating training, hiring the least qualified personnel, and taking trips in weather conditions which were below minimums. These attempts to reduce costs often resulted in accidents which add even more costs to the operation and the cycle goes on in a continuing downward spiral. Management training must be designed to prepare the manager to include all of the costs of the operation into the price of the services offered. Managers must know how to maintain a continuous cost review. They must learn what the hidden costs of having an accident are and that it is more profitable to have an accident-free air taxi business than to pay the price of an unsafe operation.

3. Personnel Practices

A frequently cited reason for the cause of an accident is "pilot error". If there is any validity to this statement, then the solution to the problem lies in an operator's personnel practices. There seem to be several factors which a manager needs to be trained to consider in developing his personnel policies; how to set standards, how to verify previous employment, how to provide training, and how to establish salary and benefits programs which enhance safety.

The first step in the development of an effective personnel policy is a definition of the job to be performed. Following this, minimum job related standards need to be set for the personnel hired for the job. These standards need to be job related and realistically measurable. New employees are then selected based on the flying skills needed to perform the job.

The AATC researchers asked what qualifications were required when hiring a new pilot. Nearly always the answer was limited to a minimum number of hours total flying time and a minimum number of hours of flying in Alaska. The researchers seldom discovered a discriminating categorization of the various types of flying related to required job skills. For example, flying touch-and-go's at Merrill Field with an occasional cross-country trip with a student to Talkeetna or Birchwood is hardly the kind of Alaskan experience appropriate to prepare one to fly to Anaktuvuk Pass.

Several times during this research the interviewers heard the comment that it was not possible to get accident/violation information from the FAA, therefore operators were forced to hire pilots without a thorough background check of the new employees. As previously reported some operators stated that they seldom received calls or correspondence concerning former employees. This leads one to believe that few background checks are in fact being made.

When operators were asked how they check on an employee's qualifications most responded that they limited their checks to a review of the applicant's resume and a look at the log book. Managers need training which will prepare them to conduct a thorough background search of new employees to ensure that the qualifications which they are seeking are in fact possessed by the applicant. Then, if the applicant's experience and qualifications are not congruent with the tasks to be performed on the job, an initial training program must be provided. The training must address all deficiencies in a pilot's preparation and the beginning and ending competencies should be documented. If the operator does not have enough demand for such a rigorous training program, then he or she might use a special training program which is designed to prepare pilots to fly in Alaska. Having identified the pilot and provided the appropriate training, the operator needs to provide adequate compensation.

In many interviews and discussions the research team had with pilots and managers in Alaska, a factor emerged which may have an indirect but significant effect on safety. Some respondents related tales of pilots going into the bush to fly as professionals and living in "boxes" (truck bodies without windows or plumbing), eating crackers and soda pop as the major source of nutrition, and living without proper facilities for bathing or sanitation. The result of this was a gradual deterioration in self-image and morale which translated into poor operating practices often resulting in accidents. One way of addressing this problem, which seems to have worked for some bush operators, is to include accommodations and benefits in the remuneration package. Furthermore, to pay pilots as little as possible or to pay them based on the revenue produced (commission) or to pay an hourly rate from take-off to touchdown or even block to block may be more expensive than paying a base salary plus per flight hour. As previously discussed, these pay plans encourage the pilot to either cut corners or leave to seek a "better paying job". The cost to the operator for this turnover is quite expensive.

Management Training

Although AATC has the capability to organize and conduct the training which would be appropriate for an air taxi management training course or courses, it seems that this phase of the training could be conducted by the Community College system. Existing business management courses would need some modification to focus them directly on the requirements of the air taxi operation in Alaska. These requirements have been identified by AATC and we are willing to work with the Alaska Community Colleges and the Alaskan Aviation Safety Foundation to develop the curriculum. In order for an air taxi management training course to be approved, it is recommended that the ongoing evaluation of the training process be monitored by the AASF acting as a technical advisory committee.

Professional Certification

How then can the public and insurance underwriters presently differentiate between safe and unsafe operators; between those who should pay lower insurance rates and those whose rates should be higher? The answer to that question is that they can't. Many passengers with whom we spoke lauded air taxi operations whose operation and safety record was appalling. Insurance underwriters have stated that they are thoroughly frustrated in their attempts to gather valid data on the companies they are asked to insure. This lack of information has led us to conclude that a certification process be established which will rate operators according to verifiable standards.

Having recognized that there are factors which differentiate between safe and unsafe operators, the question arises, how does one tell which is which? A possible answer might be to regard any FAA 135 certificated operator as safe, but this certification only ensures that the applicant has met minimum standards. Furthermore, some FAA personnel exclaim that they fear to fly with some of the certificated operators. In one interview an FAA inspector was asked, "What kind of clothing do you think I should wear when I go to interview in the bush?" He responded by saying "If I were you I wouldn't fly with the bush operators, they're sloppy pilots and their equipment is poorly maintained and dirty. I won't fly with them."

Many professions have recognized that the attainment of the minimum standard to perform a job is not enough. These professionals have established a means to certify those who elect to excel in their calling. Accountants can become Certified Public Accountants, life insurance agents can become Certified Life Underwriters, real estate agents can become Realtors, surgeons can become elected to fellowship in the American College of Surgeons. If a similar process was implemented to recognize the safest operators in Alaska's air taxi industry, many factors would need to be considered. Certainly this certification should be voluntary and no operator should be required to participate. When an operator requests that the air taxi company be certified the following factors need to be examined:

- The safety record of the operator for the past three years based on the ratio between the number of hours flown and accident frequency and severity statistics.

- The quality of training provided for:

  - Management
  - Maintenance personnel
  - Pilots
  - Support personnel
    - Dispatchers
    - Loadmasters
    - Ticket agents

- The successful completion of both periodic and spot assessments by an impartial evaluation panel using a validated checklist.

- Professional membership in a recognized air carrier trade association.

Conclusion

As discussed in detail in this part, the problem of safety in Alaskan aviation is multi-faceted. Consequently, there is no easy solution; no quick fix, no panacea. The solution will require that those operators whose pilots are having accidents will have to face an economic penalty which will either force them to increase the safety of their operation or cease flying.

The evidence clearly indicates that it is possible for an air taxi operator to fly safely in Alaska. Operators were identified who set and enforced standards, didn't push pilots, and made a profit while paying their pilots adequately. They maintained their aircraft to above minimum standards and provided personnel with excellent training.

The next step in improving the safety of air taxi operations in Alaska is to train personnel in the aviation business in those techniques which have resulted in safe and profitable air taxi operations. The proposal to validate the techniques reported in this first phase, develop the curriculum for conducting the training and produce a sample training program is described in Section H.

SECTION F

TRAINING OBJECTIVES, INFORMATION COLLECTED, and QUESTION TYPES

The first part of this section contains the training objectives synthesized from the Alaskan pilot interviews and the unvalidated information relevant to these objectives. The information collected for a specific subject area, such as landing on snow, is presented first and is followed by the training objectives addressing that subject area. The last part, Question Types, describes the types of questions referenced in the training objectives and includes a sample training scenario.

Training Objectives

The following Alaskan aviation training objectives serve as the basis for further development of an Alaskan aviation training program. These objectives were synthesized from information gathered in 177 interviews with Alaskan pilots, mechanics and air taxi operators and reflect their views on what a pilot needs to know to fly safely in Alaska. As development of the training program continues these objectives will be expande . Enabling objectives (skills and knowledge the student must learn to satisfy a complex objective such as demonstrating pass flying techniques) will be identified and standards for successful mastery of the training objectives will become more specific.

An objective describes three things: an observable student behavior, the conditions under which the behavior is performed, and minimum standards of performance. Examples of observable student behaviors are: choosing the correct response to a multiple-choice question, stating to the instructor the cues used in making a decision, or demonstrating a technique such as a short or soft field landing. The conditions of an objective describe the relevant aspects of the environment in which the performance of the objective is demonstrated. Any materials or aids the student may use (charts, calculator, etc.) are described, as is the nature of the testing situation, i.e., a multiple-choice test or in a simulated operational environment. The standard of performmance of an objective specifies the quality and/or quantity of the behavior performed. At this stage the Alaskan objectives defining aviation training requirements are subject to qualitative standards (instructor judgement), however, as the lesson content is defined, instructor guides will be detailed enough to standardize the instructors' evaluation of student performance. Also, as the curriculum (the sequence of instructional events) is developed, appropriate performance standards become more apparent and will be incorporated into the training system.

Objectives define the type of test used by stating the student behavior required and describing the conditions under which performance is measured. By knowing the types of tests planned, guidelines can be established for selecting the most appropriate media for presenting information and testing performance.

Unvalidated Information Collected From Alaskan Interviews

The following pages contain information relevant to a particular subject matter such as weather, followed by the training objectives addressing that area. This information has been collected from the Alaskan pilot interviews conducted by the AATC research team and is not yet validated. There may be techniques included here that are not safe, several techniques that contradict each other, and incorrect information. However, regardless of the validity of the specific techniques and information collected, a need for training in that area is indicated. AATC proposes to validate and expand this initial data base of Alaskan pilot knowledge and techniques with the aid of experienced Alaskan pilots in the next phase of training program development.

Unvalidated Information Collected On Weather Sources, Interpretation, Trends, Etc.

> NOTE: The information presented here represents only the unvalidated information collected from the initial Alaskan interviews. In the next phase of training program development selected Alaskan pilots will be used to validate and expand this preliminary data about weather sources, interpretation and trends.

General Weather Information

Turbulence is indicated by swirls of snow, dust, etc. and by lenticular cloud formations.

Observe how the clouds cling to the mountains. Rising, stretched clouds indicate improving conditions. If clouds are slowly increasing in density conditions are generally worsening.

Check the weather from three to four hours back and try to determine the trend.

When the weather is bad on the high pressure side it may be O.K. on the low pressure side.

With a low over the Gulf of Alaska there are east winds and low visibility at the east end of the passes. The reverse is true with west winds.

Look for severe turbulence when there is low pressure on one side of the hill, high pressure on the other side and a wide temperature difference.

Winds always blow down a glacier.

Blowing snow from the top of the mountain indicates strong winds at altitude, from 30-50 knots.

To check turbulence check the wind direction and velocity in relation to terrain features.

Keep a weather log. Make weather notes (winds, temperature, barometer pressure) and do your own forecasting.

To judge icing you can judge humidity by the size and density of the water drops on your windscreen.

Study satellite pictures to determine trends.

A williwaw is where the wind goes up a valley and hits the surface of a hill causing a downdraft on the other side.

Cold air over a glacier creates sinking air and can cause large sink rates.

Use surrounding area weather and weather trends, and consider the season.

Look at the dew point spread. If there is any fog in the area and the temperature/dew point is close, don't go.

Watch trends in the weather and the stability of the weather mass (movement). If there is a short time between periods of bad weather, don't go.

If wind is from offshore to onshore there will always be a downdraft.

Check weather several hours in advance to check trends. Verify the forecast with the actual weather at takeoff.

Consider the wind flows which can indicate where things get plugged up.

Low pressure on one side of a pass and high pressure on the other side create severe turbulence in the pass.

Alaska has a low icing level, 4,000 to 5,000 feet even in the summer.

Northeast circular air flow dumps warm, moist air on the 55th parallel and creates weather as it moves west and southwest.

Ground fog blows up a glacier.

Area Specific Weather Information

Anytime the winds are from west to east through the northern half of the chain, turbulence will be present.

The ice alleys in the Fall and Spring are past Anchorage, down the Knik Arm and through Lake Clark Pass. Also east from Anchorage down Turnagain Arm to Cordova and Valdez.

On the Alaska Peninsula west/southwest winds crossing the mountains create severe turbulence on the downwind side of the mountains.

Look for temperature and pressure differences at Fairbanks.

Look at Mt. Susitna. The position of the clouds on the mountain can predict conditions for Lake Clark and Merrill Passes.

In the Alaska Range, if the upper air flow is from the north the valley winds are influenced by the glaciers and are 180 degrees to the upper winds.

There are wind shears on the glaciers at Valdez. There are winds from Workman's Glacier and from the south. They are worst from 12 PM to 2 PM but O.K. at 4 PM.

Nuka Bay, southwest of Seward. Northerly wind coming off the Harding Ice Field can create severe turbulence.

Yukon Flats has an inversion fog. There is a tremendous amount of ice in an inversion fog.

There are strange optical illusions on the North Slope; inverted mountains and things at lower altitude seem higher.

With 2500 foot tops over the North Slope the ice crystals will go to the ground.

On the Alaska Peninsula winds cause a venturi effect. Fly out over the water.

Valdez - Weather usually clears up on the north side of the glaciers (Chugach Mts.).

Cordova - Downdrafts are common. To predict turbulence, know the wind direction and velocity. Look at the funnel necks in the hills.

Cordova - Check Kodiak. If Kodiak is bad, Cordova will be bad in 24 hours. Weather can be good at Kodiak but not at Cordova.

Cordova - With a southeast wind you can expect rain or snow.

You can expect a cloud ridge from Icy Cape to Hinchinbrook Islands. The tops increase to 10 thousand feet at Yakutat to 18 thousand feet over Hinchinbrook then drop to 6 thousand feet over Whittier. The clouds are broken over Prince William Sound producing a layered effect.

Whittier has williwaws you can see on the water.

Kotzebue - A north wind blowing for a few days causes fog over the water. A south wind blows it back onto land.

When Lake Clark, Merrill and Rainy Passes are closed Windy Pass will be open and vice-versa.

Savoonga - 80% of the time the wind is from the north and weather is terrible. If wind is from the south, weather on the runway should be O.K. Savoonga usually has a 10-15 knot crosswind.

When flying from Nome to Anchorage you usually have a headwind so you will be low on fuel.

Aleutian Chain - Windward side has low visibility with fog. The other side is usually better but not always.

Aleutian Chain - With a northwest wind the Bering side is IFR and the Pacific side is VFR. Reverse is true with a wind shift.

Illiamna, Alaska Peninsula, Kodiak, Bruin Bay - Turbulence to 10-12,000 feet with low visibility and high winds.

In the Kuskokwim area wind shears are not prevalent.

Bethel is a bad weather area where pilots should not fly when the weather is below 500 feet and 2 miles.

Nelson Island - Low, rolling terrain without vegetation. A pilot can fly into the ground without ever seeing it.

Bethel - Slick runway with a crosswind is a common condition.

Kuskokwim - Mirages are common due to large temperature inversions.

Weather Information

Sources

Big River Lakes has a log cabin with a H.F. radio.

Finger Lakes (National Weather Service)

Channel (Frequency) 122.9

Marine weather - 156.25

Kotzebue Flight Service Station

Gulkana - Paul Goodrich

Automated weather stations in Girdwood and Moose Pass give temperature and wind direction and velocity

Dept. of Highways

Lockheed weather service in Canada

Universal Weather is a private weather service

Ask postmaster at Red Devil

Call Healy for Windy Pass weather information

Contract observer at Minchumina that you can call direct

There is an observer at Chelatna Lake Lodge

N.W.S. broadcast on Marine Band 162.55 VHF (FM)

Use the watchman at the Salmon canneries

Peggy Dyson is a Marine Weather radio operator in Kodiak

Cape Yakataga has a weather station

There is an AMOS at Middleton Island but the reports are not always complete

Alascom communication company

Indian Mountain remote, you can talk to Bettles

Barter Island

Call postmaster in Eagle

Southeast Canadian Marine Weather forecast

Observers in Noorvuik and Selawig

Contract weather service at Anchorage International

Valdez Airlines has good pilot reports

Forest Service has F.M. Motorola in St. Petersburg area

Common pilot frequency is 122.9

In Bethel the local operators have H.F. radios. They get better weather information than from the F.S.S.

When going to Marshall check the weather at Bethel, St. Mary's and Aniak

Techniques

If you get on the weather briefer's case they will get weather reports from places like Aniak.

ATC can vector pilots around turbulence in Anchorage. They know where the winds are coming from.

From Nome Shishmaref call to Ten City and phone Teller. Ask the F.S.S. to call you if weather moves in.

Call the customer on H.F. radio to get destination weather

On a pipeline crew change we have the crew on the pipeline call us the weather.

SSB radio is a must on the coast. You should know the locations of the fishing boats.

Use center frequency in an emergency - no one listens to 121.5

When you request weather information from a village consider how long it has been since the last flight in.

Weather Training Objectives

Given weather information for a specific area, indicate if potentially hazardous weather conditions are present and describe such conditions.
Hazardous weather conditions must be identified, and descriptions must agree with established grading standards as contained in the instructor test guide.

Predict the weather conditions for a specific area, given weather information and applicable charts for that area.
Prediction of weather conditions must be accomplished in accordance with the grading standards contained in the instructor test guide.

With a slide, photo or drawing of a specific geographic area as seen from an aircraft cockpit, indicate if potentially hazardous weather conditions exist; describe such conditions and describe the cues used to recognize the conditions.
Identification of hazardous weather indications must be made without error and descriptions of conditions and cues must meet established grading standards as contained in the instructor test guide.

Describe the sources of weather information at departure, enroute and at the destination, given a flight plan and a description of available communications equipment.
The description of sources must agree with established grading standards containing the list of sources specific to the area.

Demonstrate correct use of communications equipment (HF radio SSB, VHF, etc) and correct communications procedures given communciations equipment and a list of sources to contact.
All equipment demonstrations and communications procedures must meet established grading standards which reflect I.C.A.O standards.

Simulate contacting weather sources designated by the instructor and requesting weather information when given communications equipment(HF, SSB and VHF radios).
All equipment use must be accomplished correctly and the weather information received must satisfy instructor judgement and meet grading standards as contained in the instructor test guide.

Given a description of actual weather conditions and a series of PIREPS describing those conditions choose the PIREP that most accurately describes the weather conditions given.
Accomplish in accordance with grading standards as contained in the instructor test guide.

From a sequence of weather reports describe any trends indicated by the reports and the possible effects on weather in a specified area.
Identification of trends and description of effects must meet grading standards as contained in the instructor test guide and satisfy instructor judgement.

Unvalidated Information Collected on Gravel Bar, Lake, Tundra, Mud and Sandbar Evaluation, Landing and Takeoff

NOTE: Information presented here represents only the unvalidated information collected from the initial Alaskan interviews. In the next phase of training program development, selected Alaskan pilots will be used to validate and expand this preliminary data about gravel bars, lakes, tundra, mud and sandbar evaluation, landing and takeoff.

Gravel Bar

Keep the strut fully extended with back pressure to keep the prop out of the gravel and to provide clearance during breakup.

Roll one wheel on the surface. Fly off and look at the track to see if it fills with water. If it does, don't land.

Look for ditches that might have been cut by streams. Be able to judge the size of the rocks.

The rounded end of a gravel bar points upstream.

Gravel can have soft, wet, sandy areas.

Heavy braking on gravel can cause tail damage.

Use slow acceleration when the gravel is large (3/4 - 1 1/2 inches)

Lakes

Time a lake by flying over at 80 knots and counting the number of seconds.

Use a checklist.
1. How to get out of the area.
2. How to beach and unbeach the aircraft alone.
3. Figure out the touchdown point.
4. Look for obstructions.
5. Land close to the beaching point.

Put a fuel cache at a large lake. Go into the small lake empty and ferry passengers and cargo out. Refuel at the large lake.

Land empty and takeoff before loading passengers. This will prepare you for a full takeoff and let you know if you can get out.

Polaroid glasses are dangerous to use.

On short lakes you need to shuttle the loads. Takeoff with a partial load; if it flies easily go back and get more.

On glassy lakes find a wind pattern. This is O.K. for large lakes but difficult on small lakes.

Look at the lake for the glassy spot which is the left side. This will tell you the wind direction.

At dusk you can see your navigation lights on the water. Use this to estimate your height above the water and set up a 100-150 F.P.M. sink rate.

Use a fishhook turn to gain speed to get on the step.

Tundra

Determine the underlying base. If it is dirt, stay off. A volcanic base is best.

If the tundra is underlined with dark soil it's probably permafrost. This has an uneven surface and results in rough landings.

Land on a nearby gravel bar and walk out over the tundra to check it out.

Consider the soil drainage. Look at the greenness of the vegetation which indicates the amount of water near the surface. If it is wet stay off.

Be aware that tundra has big tussocks which make for a rough landing.

Look for dry spots in the tundra. Check the surface with a pass and then look at the tracks for water.

Check the rate at which the aircraft slows to determine if the tundra is bunching under the tires. Don't hit the brakes.

Mud

Stay away from dark grey mud without vegetation. It is like quicksand.

Mud flats are hard to read. The water level varies and the aircraft can sink if you don't learn how to read them.

Land in the water first and taxi up on the mud.

Wheels can kick up mud on the wings adding extra weight.

Sandbars

Roll one wheel on the surface. Fly off and look at the track to see if it fills with water if it does, don't land.

Look for vegetation. Land where there is a medium amount.

Turn downhill when landing using momentum and gravity.

Sandbars may be narrower upriver.

Sandbars change day to day. Fly over at 25 feet. If you're not sure, do it again. If you have to make three passes don't land.

Wet sand could be solid but not necessarily. Stick to known areas and use animal tracks for information.

Color is important but not always a reliable indication.

Sandbars are difficult because they are too short, too rough and the approach ends are dangerous.

On short sandbars take off light at first and shuttle the stuff out.

Objectives for Evaluation of Landing on and Takeoff from Gravel Bars, Lakes, Tundra, Mud and Sandbars

Given multiple choice questions on evaluating, landing on and taking off from:

gravel bars
lakes
tundra
mud
sandbars

Choose the response which best answers the question. Accomplish in accordance with established grading standards as contained in the instructor test guide.

Presented with incomplete statements regarding evaluating, landing on and taking off from:

gravel bars
lakes
tundra
mud
sandbars

Write the response which best completes the statement.
The responses written must meet established grading standards as contained in the instructor test guide and satisfy instructor judgement.

Given statements concerning evaluating, landing on and taking off from:

gravel bars
lakes
tundra
mud
sandbars

Indicate whether the statements are true or false and briefly explain why.
Accomplish the true/false indications without error. Explanations must meet established grading standards as contained in the instructor test guide and satisfy instructor judgement.

Presented with a slide, photo or drawing of:

a gravel bar
a lake
tundra
mud
or a sandbar

and given weather conditions and aircraft type and configuration; state if the area shown is suitable for landing and takeoff; describe the cues used to determine suitability; recall common hazards and describe appropriate landing and takeoff techniques. All decisions must be made without error and all descriptions must meet established grading standards as contained in the instructor test guide.

In a simulated operational environment with a scene of:

a gravel bar
a lake
tundra
mud
or a sandbar

state whether the area is suitable for landing and takeoff, describe the cues used to determine suitability, and demonstrate appropriate landing and takeoff techniques specific to the type aircraft simulated if it is determined the area is suitable.
All decisions must be made without error, all descriptions must meet established grading standards as contained in the instructor test guide and all demonstrations must satisfy instructor judgement.

Unvalidated Information Collected On Ice Evaluation and Landing

NOTE: The information presented here represents only the unvalidated information collected from the initial Alaskan interviews. In the next phase of training program development selected Alaskan pilots will be used to validate and expand this preliminary data about ice evaluation and landing.

Evaluation

Rotten ice has water on it and is pitted. Check the air temperature and how long it was at or below freezing.

Use an ice auger and ruler to measure the thickness of the ice.

To check the thickness of the ice throw out a rock or brick. If it doesn't go through the ice you can land with tundra tires.

Sea ice has leads where water leaks through the ice. When you land don't stop, go around and look for water in the tracks.

With fresh water ice, land along the shore in the fall and the middle during the spring. Don't rely on throwing out bricks, rocks, etc.

Stay away from beaver lodges. Look out for snow drifts and sloughs (may be warm water). Wear Bausch and Lomb shooting glasses.

Look at the color of the ice, should be clear and blue.

Hard to perceive depth, like a glassy water landing. You can hit ridges you can't see.

In the spring ice is rotten. Don't land.

With sea ice don't land on grey ice, land on white ice. Drag the strip a time or two.

After dragging a strip and landing, walk out the landing area to learn to read ice and snow.

On ice leads look for busted ice on the edges to determine thickness of new ice.

Consider local temperatures to figure out how fast the ice will freeze. You need 4 to 6 inches to land.

Beware of snow covered lakes. Snow insulates and the ice thickness grows more slowly.

Fresh water ice is brittle at 3 inches. Make a test hole in clear ice, you need about 4 inches.

With unfamiliar sea ice you need good weather (sunshine and shadow). Look at the type of ice and the surface.

In an open lead don't land on the dark lead.

On pack ice the drift pattern on the snow is mixed because ice floats around and gets variable winds.

On sea ice look for pressure cracks caused by the tides.

Leads can be a smooth place to land but it's hard to evaluate the ice thickness.

Drop a rock from 50 feet.. You will get spider cracks in 6 inch ice.

Landing

After landing don't shut down, wait and see if the ice will support the aircraft.

On skis land with wheels down if possible to have some braking control.

Saltwater ice is rubbery, you need about five inches and must be moving when you hit it.

With a glare ice landing with a crosswind, touch down and let the aircraft slide down the runway sideways, you have no longitudinal control.

Ice Evaluation and Landing Objectives

Presented with multiple-choice questions concerning evaluating and landing on ice, choose the response from those provided that best answers the question.
Accomplish in accordance with established grading standards as contained in the instructor test guide.

Write the response which best completes the incomplete statement given regarding evaluating and landing on ice.
Responses must meet established grading standards as contained in the instructor test guide and satisfy instructor judgement.

Given statements regarding evaluating and landing on ice, indicate whether the statements are true or false and briefly explain why.
Accomplish true/false indications without error. Explanations must meet grading standards as contained in the instructor test guide and satisfy instructor judgement.

Presented with a slide, photo or drawing of an ice landing area and given weather conditions and aircraft type and configuration, state if the area shown is suitable for landing and takeoff, describe the cues used to determine suitability, recall common hazards and describe landing and takeoff techniques appropriate for the given conditions.
All decisions must be made without error and all descriptions must meet established grading standards as contained in the instructor test guide and satisfy instructor judgement.

In a simulated operational environment with a scene of an ice landing area, state whether the area is suitable for landing and takeoff, describe the cues used to determine suitability, and demonstrate appropriate landing techniques specific to the type aircraft simulated if determined the area is suitable.
All decisions must be made without error, all descriptions must meet established grading standards as contained in the instructor test guide and all demonstrations must satisfy instructor judgement.

Unvalidated Information Collected On Beach Evaluation, Landing And Takeoff

NOTE: The information presented here represents only the unvalidated information collected from the initial Alaskan interviews. In the next phase of training program development selected Alaskan pilots will be used to validate and expand this preliminary data about beach evaluation, landing and takeoff.

Evaluation

Look for hard ripples just above the tide line. Dunes and vegetation indicate soft sand. A lack of vegetation can indicate hard sand.

Roll one wheel on the surface. Fly off and look at tracks to see if they fill with water. If they do, don't land.

Look out for rocks and fishing lines (indicated by floats in the water).

Drag the beach. Make a touch-and-go and look for overflow.

The beach should be free of debris. An inside beach protected from the surf is best.

Offshore at 100 feet altitude look 90 degrees at beach to evaluate slope and surface.

Consult a tide table book. From the tide action you can determine the condition of the beach (amount of debris, etc.).

Look out for beach lines. Fishermen's lines hold nets across the beach and are sometimes hard to see.

If the slope is steep, stay away. Get close to the shore, an onshore wind is best.

Bounce the tires into the sand at high speed, go around and check the displacement of the sand.

Look for swells in the sand.

Wind on a beach is important. Avoid crosswinds.

If beach is scalloped don't land. This is difficult because most beaches are sloping and scalloped.

Look for a beach with some rock in it. This indicates some firmness.

Test the beach with rollout rather than impact on beach. Impact area may be O.K. but not rollout area.

Landing

Make a smooth touchdown near the water line.

Land on wet sand, the water cut will be shallower.

Turn downhill using momentum and gravity when landing.

Never touch the brakes on a beach. Fly in a tailwheel aircraft if you use brakes.

Keep the aircraft straight. Turn upslope, not down.

Takeoff

Let 1/2 of the air out of the tires on a soft beach. Aircraft is much easier to taxi and get speed for takeoff.

Beach Evaluation, Landing and Takeoff Objectives

Presented with multiple-choice questions concerning evaluating, landing on or taking off from beaches, choose the response from those provided that best answers the question.
Accomplish in accordance with grading standards as contained in the instructor test guide.

Write the response which best completes the incomplete statement given regarding evaluating, landing on or taking off from beaches.
Responses must meet established grading standards as contained in the instructor test guide and satisfy instructor judgement.

Given statements concerning evaluating, landing on or taking off from beaches, indicate whether the statements are true or false and briefly explain why.

Accomplish true/false indications without error. Explanations must meet grading standards as contained in the instructor test guide and satisfy instructor judgement.

Presented with a slide, photo or drawing of a beach and given weather conditions and aircraft type and configuration, state if the area shown is suitable for landing and takeoff, describe the cues used to determine suitability, recall common hazards and describe landing and takeoff techniques that are appropriate for the given conditions.
All decisions must be made without error and all descriptions must meet established grading standards as contained in the instructor test guide and satisfy instructor judgement.

In a simulated operational environment with a scene of a beach state whether the area is suitable for landing and takeoff, describe the cues used to determine suitability, and demonstrate appropriate landing and takeoff techniques specific to the type aircraft simulated if determined the area is suitable.
All decisions must be made without error, all descriptions must meet established grading standards as contained in the instructor test guide and all demonstrations must satisfy instructor judgement.

Unvalidated Information Collected On Snow Evaluation, Landing And Takeoff

NOTE: The information presented here represents only the unvalidated information collected from the initial Alaskan interviews. In the next phase of training program development selected Alaskan pilots will be used to validate and expand this preliminary data about snow evaluation, landing and takeoff.

Evaluation and Aids to Depth Perception

To aid your depth perception have the airport operator cut evergreen boughs and stick them in the snow along the runway.

Throw out weighted garbage bags to provide ground references.

Drag a ski through the surface to see if the tracks fill with water. If they do, don't land.

Use animal tracks for snow depth information.

Bausch and Lomb shooting glasses are helpful, you can see ridges and berms.

Throw out your jacket to provide depth perception

Operations on unlevel ground are a problem in winter and summer but in the winter snow makes it seem level.

Make sure the vegetation is not the tops of four foot trees instead of Caribou grass.

Recommended snow depths for operation on wheels:
6" if dry, 3" if slushy
5" if soft, 2" if slushy
2-3" if soft, 2" if slushy
axle depth
3" maximum depth
5" maximum depth

With Aerodyne skis you can land with wheels down and stop fairly rapidly in 1 1/2 to 2 inches of snow

5" of snow with large tires; 2" in C-206

Landing lights at night pick up greater detail in the snow than a daylight landing.

Objects on snow give only depth perception and no information on surface roughness. You need sunlight for contrast.

Snow Landing

On wheels touchdown midway at 50 knots, when the tail comes up use full throttle and pull stick back until you are stopped.

Snow Takeoff

On snow the aircraft will skip off the high spots.

Wet, slushy snow is difficult to takeoff from.

Pack down the snow with empty weight touch-and-go's.

Taxi up and back the full length of the runway to check it out and to leave tracks to follow.

Checkout the entire runway and takeoff area.

To lift off from slush, drop an extra 10 degrees of flap.

On wheels in deep snow with heavy weight and a short field accelerate to the end of the runway, pull on full flaps and pitch the nose to where the aircraft neither climbs nor sinks but accelerates. As it accelerates bleed off flaps until airspeed and flap configuration permit a normal climb.

Snow Evaluation, Depth Perception Aids, Landing and Takeoff Objectives

Choose the response that best answers the multiple-choice questions presented on snow evaluation, depth perception and landing and takeoff techniques.
Accomplish in accordance with established grading standards as contained in the instructor test guide.

Presented with incomplete statements regarding snow evaluation, depth perception aids and landing and takeoff techniques write the response which best completes the statement.
Responses must meet established grading standards as contained in the instructor test guide and satisfy instructor judgement.

Given statements concerning snow evaluation, depth perception aids and landing and takeoff techniques indicate whether the statements are true or false and briefly explain why.

Accomplish true/false indications without error. Explanations must meet established grading standards as contained in the instructor test guide and satisfy instructor judgement.

State if the area shown is suitable for landing and takeoff, describe the cues used to determine suitability, recall common hazards and describe landing and takeoff techniques that are appropriate, when presented with a slide, photo or drawing of a snow landing area and given weather conditions and aircraft type and configuration.

All decisions must be made without error and all descriptions must meet established grading standards as contained in the instructor test guide.

In a simulated operational environment with a scene of a snow landing area state whether the area is suitable for landing and takeoff, describe the cues used to determine suitability, and demonstrate appropriate landing and takeoff techniques specific to the type aircraft simulated if determined the area is suitable.

All decisions must be made without error, all descriptions must meet established grading standards as contained in the instructor test guide and all demonstrations must satisfy instructor judgement.

Unvalidated Information Collected on Flight Techniques in Adverse Weather

NOTE: The information presented here represents only the unvalidated information collected from the initial Alaskan interviews. In the next phase of training program development, selected Alaskan pilots will be used to validate and expand this preliminary data about flight techniques in adverse weather.

Whiteout/Lack of Depth Perception

Avoid large, snow-covered lakes. You won't have any reference points. Detour around to keep ground reference points.

When glacier flying in a whiteout use the best climb angle for a possible impact.

If you have navigation equipment stay 1000 feet AGL and go IFR. If not, try to follow the willows on a creek.

If you are following a river and you get into bad weather don't turn such that only the river is in. sight. If it is snow covered you will be in a whiteout.

In blowing snow you can see straight down but not forward. Turn into the wind, look down, slow down, and land.

Whiteouts are partially caused by light conditions. Doing a 180 turn may get you into one behind you.

Whiteouts don't engulf or envelope you. Do a 180 turn or continue on instruments holding heading and altitude.

You need good instruments, radar altimeters, good navigational aids, to really fly in whiteout areas.

When you're over water and a whiteout occurs the open water beyond the ice pack can look like clouds. You need instruments.

Procedure for a whiteout.
1. Go on instruments, quit looking outside.
2. Maintain heading and climb straight ahead.
3. Get 500 feet above obstructions, then level.
4. Do a standard rate 180 turn back to where you came from. Don't climb and turn at the same time, this induces vertigo.

Don't use flat approaches in whiteout conditions. Use a steep approach.

Turbulence

Get low to avoid turbulence. Surface friction softens the turbulence.

Experienced pilots go out from land two to three miles, get low over the water and slip in under the turbulence (200 to 300 feet).

Slow to VA and ride it out while maintaining attitude.

A lower altitude over the water means smoother air.

Fly offshore to get into smoother air.

Icing

Use flaps and full power so ice won't build up on the bottom of the aircraft and add weight. Keep the ice on the leading edges.

A cue to icing is decaying airspeed.

In the interior icing occurs in layers. Find an altitude without ice and request it for enroute. This is not true for the Anchorage area.

The important thing about icing is not to get to the point where the aircraft stalls. Land while you still have control.

Go to METO to keep ice from forming on wing bottom and fuselage. Use speed, not flaps.

With the temperature at -40 degrees, clear air and your airspeed below 115 you can pick up frost. Add full power and pick up speed to get rid of ice.

Around Kotzebue when ice builds up on the wing, climb while you can. Don't descend, the air layers are stratified in the winter.

In a C-207 the windshield ices up first. Watch the rate of build-up.

Miscellaneous

When pushing the weather always stay far enough from the clouds to make a 180 turn.

VFR flying in bad weather is flying a boundary; river, valley, coastline, mountain, etc.

Fly away from the boundary a distance equal to the turn radius of the aircraft, then you can do a 180 to land.

Don't fly over the landmark. If you have to turn you may lose it and get lost.

Never mix turbulence with low visibility. One or the other is O.K. but not both.

Always expect the weather to go down and have a way out planned.

Figure the visibility by checking the time it takes to fly to a point in front of the aircraft.

Flight Techniques in Adverse Weather Objectives

Given multiple-choice questions concerning flight techniques in adverse weather conditions such as whiteouts, turbulence, icing and various miscellaneous conditions, choose the response which best answers the question.
Accomplish in accordance with established grading standards as contained in the instructor test guide.

Write the response which best completes an incomplete statement regarding flight techniques in adverse weather conditions such as whiteouts, turbulence, icing and various miscellaneous conditions.
Responses must meet established grading standards as contained in the instructor test guide and satisfy instructor judgement.

Indicate whether statements regarding flight techniques in adverse weather conditions such as whiteouts, turbulence, icing and various miscellaneous conditions are true or false and briefly explain why.
True/false indications must be accomplished without error and explanations must meet established grading standards and satisfy instructor judgement.

Given a description of the piloting actions and techniques, applicable flight information such as current altitude, airspeed, etc., and aircraft type and configuration, during an encounter with adverse weather conditions, such as whiteouts, turbulence and icing, identify the incorrect actions taken and/or techniques used, if any, and describe, if applicable, the correct actions and or techniques.
All identifications of incorrect actions and/or techniques must be accomplished without error and descriptions of correct actions and/or techniques must meet established grading standards and satisfy instruction judgement.

During a flight scenario in a simulated operational environment demonstrate correct actions and/or techniques when encountering adverse weather conditions such as whiteouts, turbulence and icing.
All actions and/or techniques demonstrated must meet established grading standards as contained in the instructor test guide and satisfy instructor judgement.

Unvalidated Information Collected on Navigation/Pilotage Techniques

> NOTE: The information presented here represents only the unvalidated information collected from the initial Alaskan interviews. In the next phase of training program development selected Alaskan pilots will be used to validate and expand this preliminary data about navigation/pilotage techniques.

Fly with your finger on the map. Turn the map as you fly.

When you're lost, follow a water source downstream. It is easier to be found on a river than on tundra. Try to intercept a large river.

Watch the drainages as you fly along.

Fly with the map folded and placed up by the windshield. You can also put the map on the passenger's lap.

Constantly orient the map to the direction in which you are flying.

Always keep informed of your location by the time/speed/distance so you can let down if radio navigation fails.

On a nice day look at the map so on a lousy day you will know where you are.

When you're in strange terrain use a sectional constantly.

On the North Slope the wind blows 50 or 230 degrees. The ridges in the snow are perpendicular to the wind direction and can be used for a navigational aid.

Know the drainage you're in. If the weather gets bad go downstream. Sweepers face downstream, drift piles are on the upstream side.

Line up the aircraft visually then set the directional gyro to zero to keep the heading. Keep the directional gyro set to zero.

Learn to read sectionals for shore line and relief contours.

Nap of earth flying is important and also what heading to fly.

The rounded end of a gravel bar points upstream.

Leave room to turn around by flying offshore. When you can't see the shoreline do a 180 or land if possible.

Fly 50 feet off the water on a clear day to recognize the shoreline from that altitude and check the checkpoints.

Use marine charts to locate checkpoints.

Know what heading will keep you out of the rocks on a climbout.

On the North Slope you should have a radio altimeter.

You don't know how high you are over a glacier unless you monitor your altimeter.

If a pilot uses a sectional it tends to destroy the customer's confidence. Know where you are without a map.

When boundary flying, fly off to one side of the river or road. Stay close enough so you can make a turn over it.

Use a 1:63,000 geological map.

Turn toward the shore if the weather goes bad. Verify the compass and directional gyro heading. If your visual reference is lost the heading is 180 degrees from the original.

Always know where the closest available alternate landing spot is throughout the flight.

Learn to scan your instruments while glancing outside.

Know the water shed. When the weather gets bad the river is the last thing to go out of sight.

Pilots should mark on their maps features which are not printed on the maps.

Look at the drift pattern on the snow at the North Slope. Prevailing winds are 60 degrees at Barrow and 90 degrees at Prudhoe Bay. Bethel also has 90 degree prevailing wind.

When flying GCA's watch for any variation in the attitude of the aircraft.

Altimeter errors can be caused by cold weather or low pressure due to a venturi effect.

Carry a book with the distance radial and MEA for each village enroute.

You can call DEW line stations for radar coverage on 126.2. They can give emergency location and heading information.

Managers should have new pilots make up a map with distance, heading and minimum altitude manager is willing to fly at night.

When carrying a mass of ferrous materials be sure to do a compass check on the runway before takeoff.

Swing the compass in any aircraft you have not flown before. Know the precession rate of the directional gyro.

Mark up sectionals to become familiar with headings relative to prominent landmarks.

Don't use the autopilot if you're alone. You can get sleepy and have an accident.

When going to a village on the shore approach at an angle so you know which way to turn on arrival.

Pull away from the hillside and then turn toward it to turn around so you don't lose it as a visual reference.

Navigation/Pilotage Objectives

Choose the correct answer from those provided when presented with multiple-choice questions regarding various navigation/pilotage techniques.

Accomplish in accordance with established grading standards as contained in the instructor test guide.

Presented with incomplete statements concerning navigation/pilotage techniques write the response which best completes the statement.

Responses must meet established grading standards as contained in the instructor test guide and satisfy instructor judgement.

Given a scenario which includes applicable aircraft and weather information and describes pilot actions and techniques applicable to navigation/pilotage identify and describe the incorrect actions taken and/or techniques used, if any, and describe if applicable, the correct actions and/or techniques.

All identifications of incorrect actions and/or techniques must be accomplished without error and descriptions of correct actions and/or techniques must meet established grading standards, as contained in the instructor test guide and satisfy instructor judgement.

During a flight scenario in a simulated operational environment demonstrate various navigation/pilotage techniques as required. All techniques demonstrated must meet established grading standards contained in the instructor test guide and satisfy instructor judgement.

Unvalidated Information Collected on Mountain Flying and General and Specific Pass Flying

> NOTE: The information presented here represents only the unvalidated information collected from the initial Alaskan interviews. In the next phase of training program development, selected Alaskan pilots will be used to validate and expand this preliminary data about mountain flying and general and specific pass flying.

Mountain Flying Techniques

Don't cross perpendicular to a ridgeline. Fly parallel to look over and cross at a 45 degree angle.

Don't climb out of a downdraft. You will stall when you hit the updraft.

Don't stay on the windward side of a mountain.

An aft center of gravity is important because it raises the stall speed.

Learn to identify lenticular clouds. Look at the aircraft crab angle and blowing snow. Always fly the upwind side of the mountain.

To figure out the updrafts in a valley, fly on the sunny side.

If mountains begin to sink behind the mountain in front of you, you will hit that mountain. If the mountains behind are rising you will clear it.

Cornices on a mountain point toward the downwind side.

General Pass Flying

In a pass when the wind is on the left, fly on the right side so you can turn around into the wind.

Reduce your airspeed.

Fly the center of the pass. Start your turn slow and add full power once started.

Fly on the right side. Airspeed should be about 80 Knots with about 20 degrees of flaps. Turn on your landing lights.

Always leave yourself enough room for a 180 turn.

Don't go where you can't turn around. Slow down with flaps and be configured before your entry into the pass.

If a downdraft keeps you close to the ground in a pass you may not be able to outclimb rising terrain.

Avoid wind velocities greater than 30 knots.

How thick is the cloud layer? Is it rising as the ground rises or will it trap me up ahead?

Fly boundary on updraft side of canyon. Go slow so you can turn with a tight radius into the wind.

Approach at an angle so you have to make the minimum turn to get out.

Look at the length of the pass, the wind direction (through or across), ceiling and visibility and any combinations of these factors. Also look at the landing possibilities.

Use 10 degrees of flaps, fly slow and use the right side. Do 180 turns into the wind. Plan to go to the lift side.

Stay on the right side and make a diving left turn.

Fly by the pass at a 90 degree angle to see through. Passes are usually short and you can make a visual check.

A wingover is the best maneuver for a turnaround.

Slow to maneuvering speed usually. Best rate of climb or lower is suggested.

Follow the updraft side. Do a 180 turn if not visual.

Upwind side is less turbulent.

Check the winds aloft and the surface winds. Look for blowing snow, dust and turbulence.

Fly the right side, slow down, use flaps and make level turns.

Ride the windward side of the pass and turn into the wind.

Select one side. Smooth air can be on either side, not always on the right side.

Fly past for a look through and start a 180 turn. When into the turn look down the pass. If it isn't clear finish the 180 and get out.

You should be able to see through the pass and should have a 500 foot bottom.

Anticipate downdrafts by looking for lenticular clouds.

Fly the upwind side so you can turn into the wind.

Know the terrain VFR before going through. Have the charts handy for immediate reference.

Use the right side for traffic reasons. Have your lights on. You should have two miles visibility. Use common radio frequencies.

Don't go if the winds are greater than 25 knots.

When you have a ceiling problem you probably won't have an airflow problem.

When winds are perpendicular to the pass there will be severe turbulence.

When winds are going through the pass, head or tail winds will be O. K.

Turbulence depends on the angle of the wind relative to the pass. A head or tail wind is best. A 25 knot or greater wind across the pass creates severe turbulence.

Low pressure on one side of the pass and high pressure on the other side creates severe turbulence in the pass.

Specific Passes

Lake Clark Pass

Coming from either end when you reach the glacier if the clouds are on the deck turn around. If you can get past there the rest of the pass will be open.

Talk to Kenai radio to determine pass conditions.

The position of clouds on Mt. Susitna can help to predict the condition of Lake Clark Pass.

You need a 1200 foot ceiling.

You should have a 3500 foot minimum ceiling.

You need the ability to see through far enough to turn around. Make sure you have enough altitude to lose altitude in a turn.

The glacier dumps air into the pass. Watch for warm, moist air from either direction to be able to predict fog..

It's hard to identify the entrance. Weather is bad when the glacier spills air down. There are several 90 degree turns.

Never enter until you can see the far end.

Get a weather briefing at Big River Lakes. There is a narrow, five mile long spot on the north end; if you can't see through it do a 180.

Always turn to the east to avoid turning up the wrong pass.

Portage Pass

High and low fronts working together create wind funnels through a venturi effect resulting in roll turbulence.

Get weather information from lodge at Pontilla Lake. You should have a minimum of 5000 foot MSL clouds. Check the temperature and its duration at Farewell.

Rainy Pass

Rainy Pass is all white in the winter. You must look carefully for cues.

Rainy is the longest and most confusing pass.

When flying from east to west look for the fault line that marks the pass entrance.

Ptarmigan Pass

Can lead you too far in before you get the cues that tell you to turn around.

Merrill Pass

If Rainy and Lake Clark are down, Merrill should be down.

The position of the clouds on Mt. Susitna can predict Merrill.

At a point beyond the bend if you can see the cleavage saddle you can go through.

You need a 4500 foot ceiling.

2000 foot minimum ceiling.

From west to east you are going uphill in a whiteout condition.

Windy Pass

Call Healy for weather.

If Talkeetna is MVFR, conditions are suspect.

If you can see the hills south of Windy from the Denali Airport you can go through.

With a west wind the two valleys feeding the pass create severe turbulence.

Broad Pass

You get clouds to the deck where airway V 436 crosses the Anchorage Highway. There is a contract weather observer at Chelatna Lake Lodge.

Anaktuvuk Pass

A wide, flat pass. You can turn around anywhere in it.

Difficult to turn around in some spots. Whiteout conditions in winter, no vegetation.

It can be windy. Check the pressure gradients. If the temperature is dropping 5 degrees/1000 feet it will be smooth, 2 degrees/1000 feet it will be rough.

If the stratus layer is rough underneath the air will be rough.

Use the updrafts to get through.

Call Anaktuvuk Pass Village and Bettles to check the weather. If it is bad turn around before Hunt Fork.

Check Deadhorse, Umiat and Bettles. If any are low check for PIREPS.

Look for two old runways on the Anaktuvuk River so that you don't go up the Chandeilar River.

The river forks several times in the pass. You must be very familiar with the pass. Look for worn snowmobile tracks.

When Barter Island, Umiat and Deadhorse are down, Anaktuvuk will be questionable.

Isabell Pass

If dust is not blowing it's not too bad. Watch for upslope clouds

Atigun Pass (Dietrich)

You must be able to see thru and it has a 90 degree dogleg. Plan a 360 degree turn to the left before going through.

It is usually marginal, not VFR or IFR. You can get conflicting reports from Chandler and Atigun. Check carefully.

The summit in the middle past Dietrich Camp is 5000 + feet.

In the absence of weather information from the North Slope you should have 2000 feet between the pass base and the ceiling.

Buskin Pass

It must be VFR with a 180 turn possibility.

You must be able to see through the pass.

Check for wind/turbulence. You must be able to see through.

Sheakin Pass

It must be VFR with a 180 turn possibility.

Spirdon Pass

It must be VFR with a 180 turn possibility.

Sheratin Pass

You must be able to see through.

Check for wind/turbulence and be able to see through.

Kalsim Pass

It is a VFR pass. You must see through before entering. With a 3000 to 4000 foot cloud deck it's O. K. to go through.

Wolverine Glacier

It is 15 miles east of Moose Pass. Make a visual check and you must be able to see the other side.

You can have low clouds on one end from Prince William Sound.

Resurrection Pass

You should have a 2500 foot minimum ceiling.

Rocky Bay Pass

If you're below 800 feet you won't get through. Expect a 30 to 35 knot wind, downdrafts and turbulence.

White Pass

It must be visual. There can be a whiteout in the bowl of the pass.

Guilbeau Pass

Do a 360 at the Y in the river at the pass entrance. Then go up to the left turn and do a 360, you are now committed.

Chickaloon Pass

It is not straight. Ask for Gulkana and Palmer weather. If they are down don't go. Can get weather information at Snowshoe Lake.

There can be fog at the north end down to the ground. Going to Anchorage after Matanuska Glacier you're O.K. It can be bad between Snowshoe Lake and the glacier.

It is unpredictable due to the distance between Palmer and Gulkana FSS. The weather in between is often bad.

Howard Pass

It is used going from Kotzebue to the North Slope. Look for standing lenticulars (wind from each direction).

Thorn River Pass

It is a VFR only pass.

Harris River Pass

VFR only.

You need 700 foot or better ceiling and three to four miles visibility for Harris River Pass. In case of trouble do a 180 or land in the lake.

Twelve Mile Arm Pass

VFR only.

Check where you came from. Check the visibility to get out or get through.

Dog Salmon Pass

VFR only.

Hydaberg Pass

You must be able to see through.

Check where you came from. Check the visibility to get out or get through.

Hollis Pass

Check where you came from. Check the visibility to get out or get through.

Follow the roads. Fog/turbulence are typical conditions.

Goodman Pass

From the west through Goodman look for a rectangular lake.

Duncan Pass

You need 1000 foot ceiling and two mile visibility. Winds of 25 knots are no problem. East winds at 35-40 knots create severe turbulence.

Petersburg Creek Pass

Should have 1000 foot ceiling and two mile visibility. Twenty-five knot winds are no problem. East winds at 35-40 knots create severe turbulence.

Wrangell Narrow

Should have 1000 foot ceiling and two mile visibility. Twenty-five knot winds are no problem. East winds at 35-40 knots create severe turbulence.

Helms Bay Pass

Check it out visually. It can be windy and turbulent.

Passes Up the Copper River

Passes are short and can be windy and turbulent. They must be VFR, be ready for an early 180.

Red Dog Pass

A combination of Noalak, Kivilina, Pt. Hope and Pt. Lay weather predicts the weather.

Mosquito Pass

If clouds are below 2000 feet or the winds from the northeast exceed 20 knots, go around the coast.

You should have unrestricted visibility and a ceiling of 1500 feet MSL to get through. You can do a 180 anywhere in the pass if you're not below 1500 feet.

Passes to Nelson Bay

You must know the winds. Don't go broadside; line up and be able to see through. There is no room for a 180 once you're in the pass.

Harendeen Pass

You must know the winds. Don't go broadside; line up and be able to see through. There is no room for a 180 once you're in the pass.

Chignik Pass

You must know the winds. Don't go broadside; line up and be able to see through. There is no room for a 180 once you're in the pass.

Mountain Flying and General and Specific Pass Flying Objectives

Given multiple-choice questions on mountain flying and general and specific pass flying techniques choose the response from those provided that best answers the question.
Accomplish in accordance with established grading standards as contained in the instructor test guide.

Presented with statements regarding mountain flying and general and specific pass flying techniques indicate whether the statements are true or false and briefly explain why.
True/false indications must be accomplished without error and explanations must meet established grading standards as contained in the instructor test guide and satisfy instructor judgement.

Identify the incorrect actions and/or techniques used, if any, and describe, if applicable, the correct actions and/or techniques when presented with a description of a scenario involving pilot actions and techniques with respect to mountain flying and general and specific pass flying. Applicable aircraft and weather information will be given if required.
Identification of incorrect actions and/or techniques must be accomplished without error. Descriptions of correct actions and/or techniques must meet established grading standards as contained in the instructor test guide and satisfy instructor judgement.

In a simulated operational environment demonstrate appropriate mountain flying and general and specific pass flying techniques.
All demonstrations must meet established grading standards as contained in the instructor test guide and satisfy instructor judgement.

Unvalidated Information Collected on Area Specific Flight Techniques

NOTE: The information presented here represents only the unvalidated information collected from the initial Alaskan interviews. In the next phase of training program development selected Alaskan pilots will be used to validate and expand this preliminary data about area specific flight techniques.

Area Specific Flight Techniques

Mt. McKinley

When going from the park to Mt. McKinley if the winds aloft above 12,000 feet are greater than 15 knots out of the southeast or winds aloft above 18,000 feet are 25 knots it's O.K. to go.

For general operations don't go if the clouds are within 100 feet of the 6,250 foot peak west of the airport or if lenticular clouds are present.

Dutch Harbor

When you hit turbulence at Dutch Harbor go to your alternate. Don't push it.

Bethel

When in snow climb to 1,000 feet and fly out of snow area on instruments. You can clear all terrain at 1,000 feet.

Valdez

Go to Johnston VOR. Let down on a heading of 300 to the water and run VFR to Valdez. TV camera shows visibility in narrows.

Cordova

Thirteen mile airport. Go east on airway V319 to Forat intersection, make a 180 left and intercept the ILS (aligned with Katat intersection).

North Slope

Don't take off unless you are ready to go IFR.

There are large, sudden barometric changes. You should have a radio altimeter and a slaved compass.

Kotzebue

When flying from Kotzebue to Barrow, if icing exists climb over Kotzebue. If you get ice, land at Kotzebue, if not go on to Barrow.

If you're going from Kotzebue to Anchorage and Merrill Pass or Rainy Pass is blocked divert to Windy Pass. Windy has roads, railroad and airports.

White Mountain

The frozen river is better than the airport. At breakup look for the black spot which is a cue that it's too soft to land.

Cook Inlet

The weather is better in the middle rather than the edges. You can fly VFR down the center when the shore is below minimums.

Shishmaref

Go north over the runway as low as possible and set the altimeter to zero. Fly north for one minute and do a procedure turn over the icepack. Return south to the city descending until the altimeter reads zero and look for the black spot that is the village.

Alaska Peninsula

Fly the breakers and look for contrast to determine wind patterns.

Follow the beach on the west shore. It is a landable beach and is straighter.

The west side is easier to fly. Danger is in a head-on crash.

You can encounter severe turbulence on the leeward side of the mountains.

On the eastern side you have low ceilings and no beaches on which to land. It's safe in a twin, but not single engine.

Kuskokwim River Area

There is poor visibility after heavy snow falls. You must have VFR on local rivers with willows for a reference.

East of the Kuskokwim is mountainous and you need to know where you are; west is flat and you need not be as cautious.

Most of the flying is done below 1500 feet AGL.

Alaska Range

Going west through the passes check Sparrevohn weather. If weather is O.K. you can enter.

Area Specific Flight Techniques Objectives

Choose the correct response when presented with multiple-choice questions on area specific flight techniques.
Accomplish in accordance with established grading standards as contained in the instructor test guide.

Given incomplete statements on area specific flight techniques write the response which best completes the statement.
Responses must meet established grading standards as contained in the instructor test guide and satisfy instructor judgement.

Given a scenario which includes applicable aircraft and weather information and describes pilot actions and techniques applicable to area specific flight techniques indicate the incorrect actions taken and techniques used, if any, and describe, if applicable, the correct actions and/or techniques.
All indications of incorrect actions and/or techniques must be accomplished without error. Descriptions of correct actions and/or techniques must meet established grading standards as contained in the instructor test guide and satisfy instructor judgement.

Unvalidated Information Collected on Fuel Management and Handling

NOTE: The information presented here represents only the unvalidated information collected from the initial Alaskan interviews. In the next phase of training program development, selected Alaskan pilots will be used to validate and expand this preliminary data about fuel management and handling.

Fuel Management and Handling

Always have a two-hour fuel reserve. Airports may be closed and alternates are far away.

Refuel at 1/2 tanks to avoid low fuel problems.

Fuel additives can solve problem of ice in fuel.

Never take off without full tanks.

In Kotzebue carry enough fuel for a round trip.

When flying the chain refuel at Cold Bay for extra fuel when weather is marginal at further destination.

Pay attention to your fuel supply. Fuel availability gets scarce in the winter and many operators run out.

The aircraft should have a dipstick on the cap to check fuel level before each flight. Gages are not accurate.

Pilot should make a dipstick to check partially filled tanks.

Check your own tanks. Fuel service personnel may not fill the tanks completely.

Use a flashlight to check turbine fuel.

Fuel filtering components must match. Fuel flow must match fuel filter.

After standing a fuel barrel on end, wait one hour for each foot of fuel. Never use a barrel with a broken seal.

Fuel Management and Handling Objectives

Choose the correct answer from those provided when presented with multiple-choice questions regarding fuel management and handling.
Accomplish in accordance with established grading standards as contained in the instructor test guide.

Given true/false statements concerning fuel management and handling indicate whether the statements are true or false and briefly explain why.
True/false indications must be accomplished without error and explanations must meet established grading standards as contained in the instructor test guide and satisfy instructor judgement.

Unvalidated Information Collected on Cold Weather Operatic

NOTE: The information presented here represents only the unvalidated information collected from the initial Alaskan interviews. In the next phase of training program development selected Alaskan pilots will be used to validate and expand this preliminary data about cold weather operation.

When you're in a village without heat, drain the oil while warm, drape a sleeping bag over the engine and use a catalytic heater. Warm the oil and battery, turn the prop several times and then start the engine.

If you are down, don't try to heat the aircraft with a fire. Wait for help.

On letdown slowly enrichen the mixture on leaving altitude. Slowly reduce the power (keep above 18") and to slow the aircraft bring the props back further (keep in the green).

Thaw the engine and use synthetic oil. Sometimes you can't use wing covers due to high winds. Thaw the engine controls.

Button snaps on fuel bladders can loosen. With the cap off it can suck up the bladder and indicate full tanks.

Pitot heat covers get blown off. Pitot heat must be on early to prevent freezeup.

An oil pressure drop after takeoff is common; don't panic. Check oil temperature for normal operation; the pressure will rise.

Pump up the tires to 50 to 60 PSI to tighten tires on the rim. Don't use windshield covers, they can scratch the windshield.

Don't cycle the prop on runup, it is already in low pitch. Sometimes it won't go into low after cycling.

Sometimes you have oil gage problems in the capillary tubes. Fill the tubes with diesel fuel to correct the problem.

Cold Weather Operation Objectives

Presented with multiple-choice questions on cold weather operations choose the response which best answers the question.

Accomplish in accordance with established grading standards as contained in the instructor test guide.

Given statements regarding cold weather operations, indicate whether the statements are true or false and briefly explain why. Accomplish true/false indications without error. Explanations must meet established grading standards as contained in the instructor test guide and satisfy instructor judgement.

Question Types

The remainder of this section describes the types of evaluative activities referenced by the objectives. The different test questions a student would encounter, such as multiple-choice or incomplete statement, are described as more evaluative activities like a flight scenario. Actually a complex training situation which emphasizes judgment and decision-making can be based on fairly simple evaluative activities. It is the structure of the scenario and the situation the student responds to that serves to emphasize sophisticated cognitive skills.

Multiple-Choice Questions

Multiple-choice questions require the student to choose the correct response to the question from a list of possible answers. Multiple-choice tests are easy to score because there is no chance for ambiguity in the student's answer.

Multiple-choice questions with feedback allow students to check their comprehension as they learn new information. In a testing situation multiple-choice questions are used to ensure that students understand the material before moving into complex, demanding test situations such as equipment usage or actual demonstration of skills. This results in better utilization of expensive training devices.

Multiple-choice questions are adaptable to a variety of media for both presentation and evaluation including workbooks, sound/slide programs with a programmable slide carrel, and computer assisted instruction (CAI).

A possible disadvantage of multiple-choice questions is that the student does not have to recall the correct answer from memory. Often the student recognizes, rather than remembers, the correct answer. This would be a disadvantage only when the nature of the information to be learned requires that the student be able to recall it from memory without aid. In this case other types of test items can be used or the student be made aware that information evaluated at one point by multiple-choice questions will later be tested in a manner that requires answering from memory.

Open-Ended - No Graphics

Some objectives utilize different types of open-ended questions to measure performance of the objectives. An open-ended question presents information to the student and requires the student to supply the answer. These open-ended questions do not require any type of graphics such as photos or drawings. Objectives utilizing open-ended questions with graphics are discussed separately as different student skills and behaviors are required, as well as different media.

Several types of open-ended questions without graphics are utilized by the objectives. These question types include:

True/False statements with explanation
Incomplete statements
Decision making based on information presented

True/False statements with an explanation present a statement which the student must identify as true or false. The student is then required (if appropriate) to write a brief explanation of why the statement is either true or false. The explanation of why a statement is true or false allows the instructor to see the reasoning behind the student's answer; it is possible that a student could correctly identify a statement as true or false, yet be mistaken in the reasons for doing so.

Incomplete statements require students to complete the partial statement(s) presented to them. The expected answer is brief, only a few words, to aid in scoring the question. Allowing longer answers results in ambiguities and makes scoring more difficult.

The third type of open-ended question without graphics utilized by the training objectives requires the student to describe their decision in response to information presented. This information can be in the form of weather information or a description of a flight scenario. The student's answer will be required to be detailed enough so the instructor can check the reasoning behind the decision made.

These types of open-ended questions have the advantage of forcing the student to recall the correct answers from memory. Except for the information presented there are no cues within the question that help the student recognize a correct answer, as in multiple-choice questions. The student must also explain the answers given or decisions reached which allow the instructor the opportunity to check the student's reasoning. This prevents a student from reaching a correct decision by using faulty reasoning. These types of questions are also a relatively inexpensive means of student evaluation since no graphics are required. The media most suitable for presenting the information needed by the student to master these objectives covers a wide range, workbooks, classroom lecture/seminar, sound/slide lessons or CAI. For evaluating performance of these objectives a written test is most appropriate due to the diversity of possible answers. Although a sophisticated CAI program can also be used, an instructor with in-depth knowledge of the material being tested is needed to resolve ambiguities that can arise in the answers given and to answer any questions the student may have. These question types can also be used by the student in a self-test format when learning new material.

Open-Ended Questions with Graphics

These objectives utilize open-ended questions which are similar to the open-ended questions discussed previously but which require graphics such as photos or drawings and also demand a different type of behavior from the student when mastery of the objective is being evaluated. The purpose of these objectives is to train the student to recognize and discriminate important visual cues. When the student is learning new information the graphics are used to point out and define these cues and when the student is tested, graphics are used to determine if the student can recognize and describe the cues in the graphics used.

These questions have the advantage of being able to actually show visual cues to the student rather than just describing them. Of course, learning and testing materials are also more expensive to produce due to the need for graphics. There is also a wide range in the price of the graphics used, from artist drawings to actual videotape footage. Open-ended questions with graphics can be used with several types of media including workbooks, sound/slide or videotape. For student self-study and self-test, workbooks would be the most appropriate media although slides and videotape could also be made available. In a testing situation the student could view a slide or videotape presentation and write the answers which would be later graded by an instructor or point out and verbally describe the cues to the instructor. Some of the objectives also require the student to recall from memory common hazards specific to a particular landing surface.

Objectives Utilizing Actual Equipment Use and A Simulated Operational Environment

These objectives require the student to use equipment, such as flight controls, to perform tasks in a simulated operational environment. This kind of objective is referred to as a "hands-on" objective because the student actually uses equipment and operates in a simulated flight environment. The purpose is to allow the student an opportunity to actually put to use the skills and knowledge learned in mastering the "classroom" type of objectives encountered in earlier phases of the training program.

The term "simulated operational environment" covers a range of devices with differing capabilities. In deciding what configuration would be most effective and efficient in terms of cost and training, the requirements of the training objectives need to be specified in detail. As the development of the training program continues, inputs from experienced Alaskan pilots will serve to specify precisely what the requirements are for training students in the performance of these hands-on objectives and for evaluating their performance.

Whatever form the simulated operational environment may take, it is a fact that the instructors working with and evaluating student performance in such a device will need to be extremely knowledgable and well trained. Detailed instructor guides are necessary to use such equipment most effectively and efficiently and to standardize instruction and evaluation.

The availability of sophisticated simulation equipment lags behind the availability of courseware such as workbooks, sound/slide programs, etc. This requires planning for an interim training program utilizing all available courseware until training hardware is available.

Training Scenarios

The tasks a pilot must accomplish to fly an aircraft comprise a complex, highly structured hierarchy of many interrelated skills and knowledge. Therefore, during training the student should at some point be placed in a situation which allows practice, performance and evaluation of those combined techniques, skills and knowledge as they occur and are needed in the real-world job environment. The goal is not to train the identified objectives wholly in isolation from each other but rather introduce each content area to the student and ensure the subject matter is mastered before bringing the student into a situation whereby the job performance tasks can be demonstrated by the student and evaluated by the instructor. These situations are comprised of many objectives previously mastered in the earlier phases of training and integrates these objectives into as near a real job situation as possible.

For purposes of the present study and the further development of an Alaskan aviation training program such a structured presentation of interrelated training objectives will be called a training scenario. These training scenarios will be selected from training objectives reflecting as closely as possible the actual demands placed upon Alaskan aviators in the performance of their duties.

A training scenario which affords the student an opportunity to actually use the skills and techniques necessary for job performance requires the use of sophisticated training equipment in order to simulate the job environment as closely as possible. Although such equipment can represent a major part of the total cost for a training program, past experience has shown that the use of aircraft simulation is much less expensive than the costs associated with the use of actual aircraft for training purposes.

The use of aircraft simulation has traditionally been associated with the training of maneuver-oriented procedures, such as a Category II approach or emergency procedures like an engine fire. The goal of an Alaskan aviation training program should be to train procedures that are unique to the Alaskan environment. Pilots in Alaska have a need for training with an emphasis on decision making skills, as well as training in following procedures. The main idea is that in most cases the decision an Alaskan pilot makes precedes and may dictate procedural operations. In the face of deteriorating weather a pilot may elect to continue at a different altitude, do a 180° turn and head back, or attempt to land at an alternate airport. It is assumed that a pilot can execute any of these maneuvers. What is crucial is which action the pilot decides to take and when he or she decides to take that action.

There is training using aircraft simulation that places emphasis on decision-making rather than procedure practice. The term used to describe such training is Line Oriented Flight Training (LOFT).

A NASA/Industry workshop, Guidelines For Line Oriented Flight Training, was held at NASA-Ames Research Center, Moffett Field, California on January 13-15, 1981. To quote from the proceedings of this workshop; "Line Oriented Flight raining (LOFT) is a developing training technology which synthesizes high fidelity aircraft simulation and high fidelity flight operational simulation to provide realistic, dynamic pilot training in a simulated line environment." The technology available today makes it possible to train, not just systems knowledge, operating skills or aircraft handling skills, but also decision-making skills. The simulated environment makes it possible for pilots to exercise these higher-order skills in a controlled, safe environment in ways that were previously accomplished only in actual aircraft operation.

The following definitions of LOFT, quoted from the workshop proceedings, illustrate its applicability for pilot training in Alaska that emphasizes the application of decision-making skills.

> LOFT is the application of line operations simulation to pilot training programs. LOFT is a combination of high fidelity aircraft simulation and high fidelity flight operation simulation.
>
> LOFT involves simulated real-world incidents unfolding in real time. Similarly, the consequences of pilot decisions and actions during a LOFT scenario will accrue and impact the remainder of the trip in a realistic manner.
>
> LOFT is casebook training. Some problems have no single, acceptable solution - handling them is a matter of judgement. LOFT is training in judgement and decision-making.
>
> LOFT is training. LOFT is a learning experience in which errors will probably be made, not a checking program in which errors are not acceptable.

The following pages present a sample LOFT scenario. The training objectives covered by the scenario are listed afterwards.

Sample Scenario

General

Single-engine float equipped aircraft (Cessna 185).

Flight from Lake Hood thru Lake Clark Pass to Illiamna Lake.

Four Passengers with hunting/fishing equipment request the charter.

Note: Pilot has option to ferry two passengers in two trips.

Weather

Takeoff - 1100' overcast, 5 mi. visibility, wind light and variable, temperature = 72°F, dewpoint = 68, barometric pressure 29.98.

Enroute - Weather information available from Kenai radio, and Big River Lakes. Pilot will encounter patchy fog which increases as flight progresses.
Lake Clark Pass - marginal visibility which decreases as flight continues thru pass.

NOTE: Difficulty of 180° maneuver dependent on aircraft gross weight.

Preflight

Before Cockpit Check - Pilot should verbally describe pre-flight activities. If not indicated that floats are to be checked, takeoff will be slow due to water in floats.

Cockpit Check - ADF inoperative.

Takeoff - Takeoff capability determined by passengers and baggage load accepted by pilot and whether floats were indicated to be checked for water.

Engine overheat approaches red line on climbout if plane is over gross weight.

Enroute - Pilot should contact enroute weather sources (Kenai, Big River Lakes) for information about Lake Clark Pass.
Decreasing visibility as flight continues through Lake Clark Pass.

Landing - Lake Illiamna - bright setting sun - glassy water.

Objectives Covered In Scenario:

Inflight adverse weather

Takeoff techniques

Enroute weather sources

Communications equipment usage

Weather prediction

Weather knowledge

Enroute navigation techniques

General pass flying techniques

Lake Clark Pass flying techniques

Go/No Go Criteria for Lake Clark Pass

Area specific flight techniques

Takeoff from lake techniques

Landing on lake techniques

Judgement of PIREP accuracy

SECTION G

COURSEWARE AND MEDIA DESCRIPTIONS

The purpose of this section is to describe the different types of instructional media that may be appropriate for presenting the information necessary for mastery of the training objectives and for evaluating student performance. A full range of training media, from workbooks to flight simulators, is presented.

Courseware

The term "courseware" refers to all printed materials and audio-visual programs required for a training system. Printed materials typically include; student workbooks, student test materials, student course guides, and instructor guides.

Student workbooks are printed training materials with supplementary maps, drawings, photos, etc. arranged to cover information relevant to the training objectives. Self-tests with answers are included to enable the student to check his/her comprehension of the material. The workbook becomes the property of the student and can serve as a useful reference and source of information after completion of the training program.

Student test materials include all written tests to be completed by students for purposes of evaluating their mastery of training objectives. Tests may also be used to evaluate student entry-level skills and to allow students credit for certain segments of the training program.

Student course guides explain the philosophy and structure of the training program's curriculum, student responsibilities for completing training, the goals and objectives for each segment of the program and a description of the purpose and use of learning aids and training devices available to the student. The course guide serves to orient the student and provide an overall view of the training program as well as informing the student of what is expected to successfully complete the course.

Instructor guides cover the entire range of instructor activities from classroom lecture to simulated flight scenarios. They provide the instructor with guidelines, objectives and evaluative criteria for all learning and testing activities and are tailored to specific course requirements. These guides ensure the effective integration of courseware materials, instructional strategies and student activities. They also function to standardize instruction and evaluation, making it possible to identify areas of the curriculum not meeting the objectives of the training program.

The materials produced for sound/slide programs are in 35mm slide format for visual presentation and 1/4 inch cassette tape for the audio portions. The slides and audio tapes are packaged in carousels and binders. The approximate 1982 cost for a sound/slide program of 160 slides and narration is $40,000. This represents the cost for producing the original program. Making copies of the original for distribution in the training system results in a much lower per unit cost.

Audio-Visual Training Equipment - Technical Description

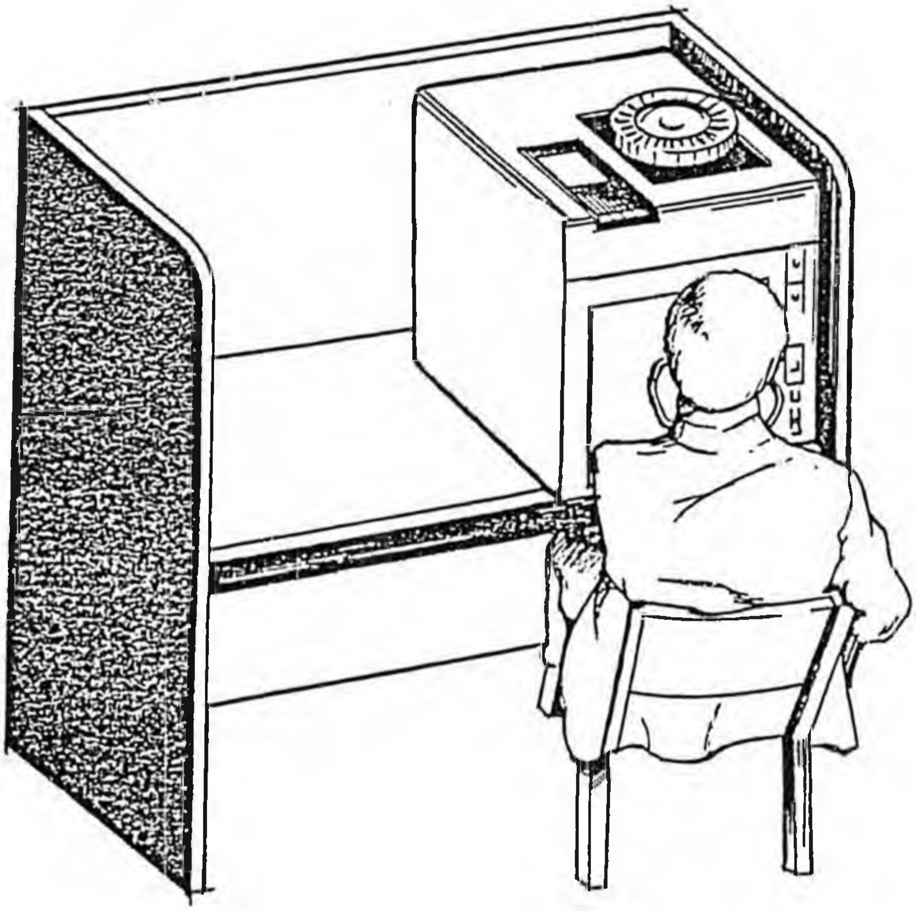
One objective of a training program designed by AATC is to integrate instructional media to provide a learning environment that is both cost and training effective. In addition to audio-visual programs for classroom use, audio-visual media can be used in a learning carrel for effective self-paced, individualized learning. Each student uses audio-visual media at an individual pace to accommodate differences in learning rates.

Learning Carrels

The learning carrel pictured in Figure G-1 is based on an AATC design. The carrels provide student desk space and house audio- visual media for individualized instruction. The approximate 1982 price for a learning carrel is $1,000.

Minicarrel Programmed Learning Unit

The Minicarrel is manufactured at our facilities and is installed in the learning carrel. The unit 1982 costs about $1,500 and is a sturdy, compact sound/slide presentation device that uses standard industrial components and plug-in electronic packages to ensure reliability and maintainability. The Minicarrel has a 13" x 13" rigid screen and accepts both horizontal and vertical slides. A reliable Kodak slide projector with an 80 or 140 slide carousel tray is used to generate an image on front surface mirrors for maximum image quality. The audiotape player has separate audio and cue tracks for maximum operational reliability.



LEARNING CARREL

Figure G-1

Dual headsets for student and instructor use are provided. The student is presented with multiple choice questions during the audiovisual presentations, and uses the built-in responder to select an answer. The student receives immediate correct/incorrect feedback following selection of an answer (Figure G-2). The Minicarrel unit can be provided by AATC for installation in the learning carrels.

Videotape

Videotape is another audio visual media that could be utilized in an Alaskan aviation program if further refinement and specification of the training objectives reveal a need for videotape and justify the cost of producing videotape. Videotape programs can be either "smart" or "dumb". A smart videotape program has the capability of interacting with the student, for example, branching to different program segments based on input from the learner. Most smart videotape programs utilize a separate microcomputer to accept student input and control program execution. A dumb videotape program merely presents audio-visual information to the student and provides little capability for interaction. It is estimated that the cost of producing videotape would be about twice that of sound/slide programs.

Videodisc

Optical videodisc technology has both advantages and disadvantages in comparison with videotape. A single videodisc has the capacity to store 54,000 color pictures. Any single frame or sequence of frames can be located by the videodisc player in less than five seconds; single frames can be selected and stepping through single frames is possible. With videotape, access time to find a sequence of frames can take from 20 to 100 seconds, it is expensive and difficult to freeze single frames, and almost impossible to step through single frames. Videotapes are editable but current videodisc technology does not allow for editing.

Videodiscs are easily interfaced with many popular microcomputers. Highly interactive and effective instruction can be

MINICARREL PROGRAMMED LEARNING UNIT

Figure G-2

designed using a videodisc under the control of the student and the computer. An industrial/educational videodisc player, a micro-computer and all the necessary hardware can be purchased in 1982 for about $5,000. However, the cost of producing a videodisc is many times that. Also, because of the cost of producing a videodisc master and the inability to edit videodisc material, certain applications do not lend themselves to this technology. Only after the content of the lesson to be taught is well defined and it is determined that the content is not subject to sudden change is videodisc a media to be considered. The technology is progressing very rapidly, however, and many changes will take place in the next few years which might make videodisc technology highly responsive to the needs of an Alaskan aviation program.

Computer Assisted Instruction and Computer Managed Instruction

Computer assisted instruction, or CAI, is the use of computers in a tutorial role; computers are used to deliver instruction and instructional content. Different types of learning activities such as drill and practice, simulations, problem solving exercises, and games can be presented via CAI. The computer can control a variety of media for the presentation of information. Through the appropriate interface a computer can control audio, slides, videotape or videodisc. A computer can select a slide or videoframe to be shown and, through the use of audio or text, describe pertinent details the student should learn to identify. In an evaluative role a CAI lesson can display information and elicit input from the learner by displaying a slide and presenting a multiple-choice question for the student to answer. This type of evaluative activity within a lesson is designed to provide the learner a means of assessing comprehension of the material presented. An actual test of the student's understanding, the results of which may dictate progress through a curriculum or prescribe remedial activities, is more the function of computer managed instruction.

Computer managed instruction, or CMI, refers to the role of the computer in managing the events which comprise a curriculum. This role encompasses lesson management and sequencing, managing and recording testing activities and prescription of remedial activities. A CMI system is actually a bookkeeping system; it keeps track of and records the result of various activities.

There are many computer systems available which are designed for CAI/CMI applications. Micro-computers costing as little as $300 can be used in some applications while more sophisticated learning programs might require equipment and software costing thousands of dollars. With the authoring systems and languages now available it is possible to program complex problem-solving scenarios which can develop and enhance a student's decision-making skills.

It follows from the definitions presented that computers can serve two different functions in an Alaskan aviation training program: as a means of presenting instruction and as a means of managing the educational activities that make up the training program.

The role that CAI and/or CMI could play in an Alaskan aviation training program is difficult to specify at this time. Two important factors need further investigation. One factor is the instructional requirements of the training objectives; that is, defining what is required to present the information to be learned. These requirements can then be matched against the capabilities of various instructional media and constraints within the training program to determine the most learning and cost effective media. The second factor needing investigation is those program constraints mentioned above that serve as input in the process of selecting instructional media. Program constraints can include operating cost limitations, the costs that customers are capable of paying and/or willing to pay for instruction and the availability of qualified instructors.

All of these have considerable impact on the media chosen for presenting information, evaluating performance, and managing and recording the instructional events within a curriculum.

Flight Simulation

Training equipment with the capability of flight simulation and visual scene representation is needed to meet the training requirements of some objectives identified by the study defining Alaskan aviation training requirements and to provide the means for conducting LOFT type training exercises which address the majority of objectives covered in earlier phases of the training program. A flight simulator would be designed to train pilots in those aspects of flying that are crucial for safe operations in the Alaskan environment. This training device would require a state-of-the-art day/dusk/night computer generated imagery (CGI) system to represent features of the Alaskan terrain and weather conditions as required by the training objectives.

As the requirements for training those objectives needing flight simulation are identified and better defined, existing hardware can be matched with these requirements to provide the most cost and training effective devices.

The following pages describe a flight simulator and the support AATC offers in its design, installation and use. The CT-5 Image Generation System is described after the simulator description. The price for one simulator and visual system as described would be from $7,000,000 to $10,000,000 at 1982 prices.

AATC can provide the services, facilities, and materials necessary to accomplish the fabrication of a flight simulator and can advise on the facilities required for installation and operation. The supplies/services that can be provided include: instructor handbooks, maintenance data, acceptance test procedure (ATP), facilities requirement, progress status report, delivery plan, training for instructors and training for maintenance/operation. The instructor handbook, maintenance data and acceptance test procedure are described in the following sections.

The instructor handbook serves as a guide to the use of the flight simulator. The handbook provides information relative to the capabilities and limitations of the flight simulator, the scope of simulation, and the degree of monitoring and performance evaluation provided. It also provides the instructor with information necessary for the complete operation of the device. The instructor handbook is divided into two volumes as follows:

1. Volume I, Operation and Utilization Instructions.

   Volume I enables the instructor to familiarize newly-assigned instructors with the basic intent, description of instructor controls, operation of controls, display pages, and operational procedures. This volume will also provide procedures for placing the equipment in a power on/power off condition and boarding procedures.

2. Volume II, Flight Simulator Description and Characteristics.

   Volume II contains a functional description of the flight simulator, its operation parameters, performance features, performance tolerances, and a list of modified, simulated, and non-functional systems. In addition, the volume also describes the function of the equipment controls and indicators other than those assigned to the instructor, excluding vendor equipment. Reference is made to applicable vendor manuals for these control/indicator functions.

Maintenance data is as follows:

1. System Schematics (Engineering Sketches) and assembly schematics manual. A brief system description is included for each major flight simulator system i.e., motion system, display system, COMM/NAV system, flight system, etc.

2. Commercial equipment vendor manuals i.e., display system, computer/peripherals, power supplies, etc.

3. Facility Report

4. Acceptance Test Procedure (ATP) Report.
   The Acceptance Test Procedure (ATP) consists of system tests by sections (action vs. result) which verifies the simulation of a flight simulator representing the aircraft.

The ATP is generated by the manufacturer reflecting the data applicable to the design per contract and submitted to the customer for review. The ATP will be the document used for preliminary and final acceptance of the flight simulator.

The flight simulator consists of the following major components:

(a) Simulated Cockpit area for the pilot station only.

(b) Instructor Station area consisting of an instructor console with two Sander's (Graphic 7) CRT monitors, or equivalent, an instructor control panel with functional controls, and an alphanumeric keyboard.

(c) A 6-degree of freedom motion system (programmed for 6-degrees of freedom) consisting of a motion platform, motion control cabinet, and associated hydraulic power supply.

(d) Real-time Input/Output (I/O) System consisting of a floor located I/O cabinet and an on-board located I/O cabinet.

(e) Digital Computer Complex consisting of:

   1) One (1) SEL Model 2520 32/7780 and one (1) SEL Model 32/37 computers with (1) Megabyte MOS Memory, or equivalent.

2) 300 CPM card reader Qty (1)

3) 80 Megabyte Moving Head Disc Qty (1)

4) Mag tape unit (75 IPS, 9 TRK, 800/1600 BPI)
Qty (1) including cabinet

5) 600 LPM Line Printer Qty (1)

6) CRT Terminal, Hazeltine Model 1520, or equivalent,
Qty (1)

7) SEL HSD's For: Sander's Graphic 7, or equivalent

(f) Graphic Display System, Qty (1) including (2) Monochrome CRT Display Monitors.

(g) Cockpit Air Conditioning Unit; Thermostatically controlled.

(h) Analog Control Loading System

(i) Power Distribution Cabinet

(j) Aural Cue System

The flight simulator(s) to be furnished can be configured to reflect whatever aircraft is appropriate. For an Alaskan aviation program the aircraft simulated could be a specific or generic single engine and/or a specific or generic twin engine aircraft. The CT-5 Image Generation System has the capability of providing visuals for several simulators so that one CT-5 system could provide visual simulation for a single-engine simulator cockpit and a twin-engine simulator cockpit (though not simultaneously). The flight simulator can enable training in all aspects of flying the represented aircraft and provide the type of scenarios needed to train pilot judgement and decision making.

The aircraft cockpit and instructor station are mounted on the 6-DOF motion system which is powered by a self-contained, externally located, hydraulic power supply located outside the flight simulator room to minimize distractions. The platform for the cockpit and instructor station is mounted on the hydraulic actuators and contains the components for the control loading system.

The instructor console contains the controls, displays, and indicators used by the instructor to set up and control the training problem, introduce malfunctions, monitor trainee actions and responses, and evaluate trainee responses and performances. Two graphic CRT displays are mounted in the consoles. A function control panel and a keyboard consisting of dedicated function keys provides control over the trainer systems, such as computer, motion, communication, aural cue, mission control, setting initial conditions and other parameters, and procedures.

The instructor's CRT system consists of a graphic display system. The system is configured with two CRT displays for instructor viewing. These CRT's are controlled via a standard keyboard.

The instructor can set up and control training problems via the CRT's and keyboard. CRT pages are provided to enable the instructor to accomplish the required display/control tasks.

The CRT page types that allow the instructor to implement the various training features are:

(1) Initial Conditions - An index page with subsidiary pages each containing data for an initial condition set.

(2) Enroute Conditions - One page listing the parameters pertinent to the flight condition.

(3) Manual Malfunction - An index page and many subsidiary pages. The index page lists the subsidiary pages of manually inserted malfunctions and CB/fuse failures. The subsidiary pages contain a listing of all malfunctions or CB/fuse failures by categories. Through these pages, the instructor is able to activate or deactivate any malfunction or failure.

(4) Systems - Four alphanumeric pages describing the status of aircraft systems. The first page is devoted to the fuel; the second page is devoted to the engines and propellers; the third page is devoted to the electrical system and the fourth page is devoted to the hydraulic, air conditioning, and pressurization systems (some systems may not be appropriate for the aircraft simulated).

(5) Procedure Monitor - Several index pages and an appropriate number of subsidiary pages, each of which list the specific procedures associated with normal and emergency situations. Such pages display the sequence of student actions in response to the procedure.

AATC can submit a delivery plan for meeting the requirements of this description. The plan may be prepared based on the selected manufacturer's own format but will include as a minimum the following major milestones:

(1) Data requirement dates.

(2) Hardware preliminary design review, at manufacturer's site. This consists of one (1) day. Customer personnel will be invited to participate in the review.

(3) Computer equipment and peripherals delivery.

(4) Final hardware design review at manufacturer's site. This consists of one (1) day and is conducted as status report at assembly directory level. Customer personnel will be invited to participate in the review.

(5) Software design review at manufacturer's site, consisting of a status board on a block diagram. Customer personnel will be invited to participate in the review.

(6) Completion of hardware assembly.

(7) Completion of in-house checkout.

(8) Completion of in-house acceptance checkout.

(9) Teardown - pack

(10) Completion of installation

(11) Completion of site acceptance

(12) Completion dates for maintenance data

(13) Completion date for facility report (on-site survey required)

IMAGE GENERATION SYSTEM

The Image Generation (IG) System that at this time best meets the requirements of the Alaskan aviation training objectives is a standard, three channel, Evans & Sutherland (E&S) CT-5 Image Generator. The basic elements of the IG System are a general purpose computer system, special purpose image processor hardware, and supporting software and data bases. Inputs to the

IG originate in the Host Simulator Computer and the IG outputs video signals to the Image Presentation (display system).

The CT-5 IG system will provide various support and maintenance functions when not in training use. These functions include system calibration, system test, daily readiness tests and diagnosis, data base loading, and utility tasks associated with the management of software.

The IG system should be capable of providing visual scenes appropriate to the requirements of those training objectives which require the pilot to make decisions dependent on the recognition and interpretation of visual cues. The system can simulate the view as would be seen by the pilot in either daylight, dusk, or night under variable weather conditions. Various terrain features including hills, valleys, trees, buildings, and other objects can be provided.

The IG consists of all hardware and software necessary to generate a visual scene which is presented by the Image Presentation System to the pilot in the cab.

The IG includes, but is not restricted to, the following items:

a. General Purpose Computational System
b. Special Purpose Computer
c. Image Processing Hardware
d. Data Base Storage/Retrieval System
e. Maintenance and Control Station
f. Diagnostics
g. System Software

Data bases for the IG are designed on a separate, standalone Data Base Development Facility and then transmitted to the IG at 50K baud minimum.

The visual system has provisions for providing various weather and special effects, which enhance operational effectiveness under a variety of conditions. These effects can be provided as outlined in the following sections.

Scene Illumination

Three basic levels of scene illumination can be provided under control of the host:

a) Day
b) Dusk
c) Night

The setting of the ambient scene illumination affects the apparent brightness of polygons in the scene. The various levels are programmable during IG system initialization.

Horizon Glow

In dusk or night conditions, a horizon glow band is simulated as a general tapering of horizon brightness into the overhead sky color/brightness. This feature is effective in silhouetting three-dimentional terrain and cultural features against the horizon under good visibility conditions.

Ground Fog and Haze

The ambient visibility parameter is controllable from zero to 20 nautical miles. Ground fog can be specified to provide for a gradual transition in effective visibility between ambient visibility and the (RVR) visibility inside the ground fog. The effective visibility at a given time is based on the eye height relative to a simulated ground fog layer top. The effective visibility changes with eye height to simulate the composite effect of attenuation due to portions of the view rays that pass through the ambient visibility layer above the ground fog layer and the portions within the layer. When the eyepoint is inside the fog layer, the RVR visibility will be applied to all scene elements.

Patchy Fog

Generally, under conditions of low visibility the IG is capable of simulating patchy ground fog by pseudo-randomly varying the visibility thus producing an effect similar to flying through pockets of dense fog.

Clouds

The capability of simulating overcast conditions, transitions into clouds including pseudo-random scud, reduced or zero visibility inside clouds, and display of a cloud model extending to the horizon as the eyepoint moves above the cloud tops can be provided.

Crash Detection

The visual system allows determination of aircraft collision with selected objects in the simulated environment. General collision detection is accomplished by determining if selected points associated with own ship lie inside various modeled collision volumes. The points typically would include important hull or flying surfaces and the collision volumes could include above-surface obstructions near landing area such as trees, buildings, parked vehicles or aircraft. Collisions will be detected and reported to the host within 0.5 seconds of occurrence, and the host may then initiate crash-indicative responses in the visual scene.

SECTION H

This section presents a proposal for the specification of curriculum and instructional content for an Alaskan aviation training system. Initial findings and preliminary results are discussed in reference to the ongoing development of the training program. The activities for the proposed follow-on contract are described and the deliverables specified.

General Findings

The information collected from the interviews showed that although some training requirements and the training objectives to meet those requirements were applicable to Alaskan aviation in general, the majority were specific to different geographical areas in the state and also to different types and configurations of aircraft (single engine ski, helicopter, multi-engine, float, etc.) It was also recognized that the primary emphasis of an Alaskan training system should be the development of decision-making skills on the part of the pilot rather than manipulative flying skills. For example, the training emphasis should be on when to make a 180° turn to escape adverse weather or leave a mountain pass, and include specific operational procedures to be performed on the basis of such a decision.

Preliminary Indicated Results

The study identified several factors that had to be considered in the design of an Alaskan aviation training system:

1. The primary objective of the training system should be acceptable and applicable to airmen conducting flight operations in a uniquely stressful environment due to weather, geographic, and other operational conditions.

2. The training system should be tailored to specific geographical areas of the State and to different types and configurations of aircraft.

3. Components of the training system should be accessible to pilots in the community in which they are located. This would avoid, as much as possible, pilots spending time away from their primary job to attend training in a distant geographic location.

4. The requirement for training system components for localized on-job-site training could be met by using transportable training devices and interactive audio-visual and print media. These programs should contain instructional components tailored to geographic areas and aircraft types. Instructional programs would be designed to teach specific decision-making skills and the operational procedures to be performed on the basis of such decisions. Evaluation of student performance must be made by qualified, certified airmen with extensive experience in the given geographical area using structured evaluation methods.

5. The training system should be capable of allowing the airmen to first learn the necessary discriminations and decision-making capabilities, and then apply these skills in an operational environment.
   Non-transportable training devices could be required for operational training.

6. Area training centers should be established for specific geographic regions. These training centers could be co-located with existing Community College facilities. The training system would thus permit the learning of needed decision-making skills and operational procedures through transportable media, and evaluation of student performance by designated airmen for localized job-site training. Support and administration for this training would be provided by the area training center.

7. Area training centers would be used to provide additional training, practice, and evaluation through training devices located at the regional facility. Evaluation of student performance at the area training centers would

again be made by qualified, certified airmen with extensive experience in the given geographical region using structured evaluation methods.

8. A centralized administrative facility would be required for the administration, standardization, and evaluation of area training centers and job-site training activities. This facility would probably be located in Anchorage.

PROPOSED FOLLOW-ON CONTRACT

AATC proposes to begin work on a continuation contract depending on fund availability. AATC will conduct an in-depth analysis of the Alaskan aviation training objectives, and will develop curriculum and instructional content specifications. This effort will be based upon the data obtained from the initial study discussed above. Two specific activities are proposed: analysis of training objectives and development of curriculum and instructional content specifications.

Analysis of Alaskan Aviation Training Objectives

The study for the Alaskan Aviation Safety Foundation resulted in the identification of training requirements for various geographical areas, different types of aircraft, and diverse types of operational conditions. In addition, training requirements were defined that are applicable to all Alaskan aircraft operations. These training requirements were synthesized into training objectives that included operational conditions and standards of performance.

In order to define an Alaskan aviation training system, each training objective must be translated into effective instructional components that will enable a student to meet the operational task performance standards specified in the training objective. AATC will conduct an in-depth analysis of each operational task specified in the training objectives.

Each operational task must be analyzed in terms of the specific behavior that must be learned. AATC will define the following components for operational tasks:

1. The task-related knowledge that must be learned. This knowledge includes the operational procedures, rules and concepts that must be learned.

2. The operational cues that must be perceived.

3 The decisions that must be derived from cue perception and based upon appropriate applications of learned knowledge, procedures, rules, and concepts.

4. The action that is required based upon a specific decision. These instructional components will be defined for the different operational conditions under which a task could be performed, such as different aircraft types and configurations.

Development of Curriculum and Instructional Content Specifications

An important step in the formulation of a training system is the sequencing of instructional components into instructional segments. These segments must be sequenced into curricula that are learning and cost-effective for each type of student population. AATC will accomplish the following activities:

1. Define training tracks based on geographical area and aircraft type and configuration.

2. Sequence instructional components into instructional segments.

3. Specify performance assessment methodology for instructional segments.

4. Specify specific learning activities for instructional segments.

5. Specify instructional strategies for instructional segments.

6. Generate instructional segment content specifications.

7. Sequence instructional segments into curricula for each training track.

The output of these steps will be instructional content specifications for each instructional segment, and the sequencing of instructional segments into curricula for each training track.

DELIVERABLES

The following items will be deliverable as a portion of the proposed contract as defined above.

Preliminary Specifications

AATC will deliver a description of the Alaskan Aviation Training System curriculum. AATC will provide the following document:

Curricula and Instructional Content Specifications

Curricula will be developed for each training track. The instructional segments will be specified and sequenced for each curriculum. An instructional content specification will be provided for each instruction segment.

Sample Training System Components

AATC will deliver a completely portable and self-contained component of the Alaskan aviation training system. This component will consist of the following items:

1. An audiovisual (sound/slide) program that is applicable to all Alaskan aircraft operators. A typical program would be:

Subject:	Navigation-Pilotage and Dead Reckoning Techniques
Content:	a. Approximately 160 slides with audio narration. The program will contain an instructional component of approximately 120 slides and an interactive evaluation component of approximately 40 slides.
	b. Carousels and binders for the program.
	c. Student programmed text materials for the program. These materials will include evaluation components.
	d. Instructor test evaluation guide for the program.
	e. Presentation device for audiovisual programs. This device will be a programmed learning device, using rear-screen projection with self-contained audio components. A student response feature will be included to permit correct/incorrect answer feedback to questions inserted anywhere in the program.

These deliverables will provide the basis upon which an Alaskan aviation training system can be produced.

Development Of Specified System Components and Operational Metholodogy

The development of specifications for training system components and operational methodology can be initiated at any-time after the initial specification determination activity is essentially complete. As a practical matter, however, the availability of funds probably will be the pacing factor.

Guidance of the Alaskan Aviation Safety Foundation and the Alaskan Air Carriers Association will be sought throughout the intervening time period as well as during the actual implementation. AATC will be pleased to discuss these concepts and to attempt to clarify any uncertainties at the convenience of the customer.

APPENDIX A

Company Names and Pilots Interviewed

COMPANY NAMES AND PILOTS INTERVIEWED

- Aero Tech Flight Service
  - Richard Ardaiz
- Air Logistics of Alaska
  - Les Bays
- Air North
  - Tom Olson
- Airpac, Inc.
  - Robert Horschel
- Akland Helicopters, Inc.
  - Dennis Brown
- Alaska Aeronautical Industries
  - Bruce Walker
- Alaska Air Guide
  - Gary Limage
  - Don Cogger
- Alaska Air Service
  - Frank Bauder
- Alaska Bush Carriers
  - David Klosterman
- Alaska Central Air
  - Pete Haggland
- Alaska Fisherman
  - Douglas Askerman
- Alaska Floatplane Service
  - Lynwood Marshall
- Alaska Helicopters
  - Bill Woolen
- Alaska International Airlines
  - Ralph Brumbaugh
- Alaska Island Air, Inc.
  - Lloyd Roundtree
- Alaska North Flying Service
  - Bill Aregood
- Alaska Travel Air
  - Dean Carrell
- Alyeska Air Service
  - Ken Triplett
- Anchorage Air Service
  - George Kitchen
- Anchorage Airways
  - Walt Remele
  - Ron Bernard
- Arctic Aviation
  - John Stohner
- Arctic Circle Air Service
  - Doug Bulter
- Armstrong Air Service
  - Neil Armstrong
- Audi Air
  - Walt Audi
  - Liz Pintchuck
- Aurora Air Service
  - Dennis Parrish
- Avent Co.
  - Tom Laughead
- Baker Aviation
  - Ed Kornfield
  - Joe Jackson
- Bellair, Inc.
  - Ken Bellows
- Beluga Lake Floatplane
  - Jon M. Berryman
- Bering Air Service
  - Ken Zachery
- Big Red's Flying Service
  - W. K. Bohman
- Bishop Brothers
  - Jim Bishop
- Bran Air
  - Dennis Branham
  - E. G. Branham
  - Chris Branham

COMPANY NAME AND PILOTS INTERVIEWED

- Bush Air
  - Fred Lane
- Cape Smythe
  - Bud Graham
- Central Airways
  - Dave Goocey
- Channel Flying, Inc.
  - Ken Loken
- Chisum Flying Service
  - David Clark Dechant
- Chitna Air Service
  - David Erbey
- Coastal Aviation
  - Larry Erick
- Cook Inlet Aviation, Inc.
  - Robert Vasey
- Delaire
  - Dennis Gander
- Delta Aviation
  - Charlie Adams
  - Don Cramer
- Dept. of Public Safety-Pilots
  - Roy Trembley
  - L. Samsall
- Dept. of Transportation and Public Facilities
  - Jim Moody
- Eagle Enterprises
  - Hugh Hartley
- ERA Helicopters, Inc.
- Jim Vandervoode
  - Dave Baumeister
- Evergreen Helicopters of Alaska
  - Ken Conky
  - Steve Howard
- Executive Charter Service
  - Tom Ratledge
  - Louis Green
- Flight Training Devices
  - Terry Lagone
- Flirite, Inc.
  - Ralph Wright
- Forty Mile Air Service
  - Art Werbelow
- Foster Aviation
  - Richard Foster
- Frontier Flying Service
  - Tom Ruppert
  - John Hajdukovich
- Galena Air Service
  - Norman Yaeger
- Gifford Aviation
  - Chris Holmlund
- Gordon's
  - George Jones
- Gregerson Leasing, Inc.
  - Dwight Gregerson
- Griechen Air Taxi, Inc.
  - Monte Handy
- Gulf Air Taxi
  - Pete Peterson
- Hal's Air Service, Inc.
  - Harold W. Dierich, Jr.
- Harbor Air Service, Inc.
  - Keith Knighton
- Harold's Air Service
  - Norman Sommer
  - Don Wainwright
- Hermans Air Service
  - Stan Hermans
- Homer Air, Inc.
  - Larry Thompson
- Homestead Air Service
  - Bob Tears

COMPANY NAME AND PILOTS INTERVIEWED

Hudson Air Service
Cliff Hudson

Iliaska Lodge
Ted Gerken

International Air Transport
Warren Lowry

Island Air Service
Robert Stanford

Kachemak Air Service, Inc.
Bill DeCreeft

Katmai Air Service
Ray Peterson, Jr.

Kenai Air Alaska
Tim Miller

Kenai Aviation
Robert Bielefeld

Kennedy Air Service
Gayle Ranney
Gene Eddy

Ketchikan Air Service
Mike Salazar

Ketchum Air Srvice
Ketch Ketchum

King Flying Service
Ed King

Kodiak Air Taxi
Herbert L. Downing

Kodiak Western Alaska Airlines, Inc.
Frank Humphreys

Kotzebue Tech Center
Russ Lloyd

K2 Aviation
Jim Okonek

L.A.B. Flying Service
Layton A. Bennett

Lee Air Taxi
Ellie Lee

Lee's Sea Air
Lee Staheli

Livingston Copters
Bill Zeman

Missionary Aviation & Repair Center
Fred Chambers

Maritime Helicopters
Don Fell

Mountain Aviation
Steve Hamilton

Munz Northern Airlines
Dick Galleher
Durrell McAbee
Rich Raburn

Northern Air Cargo
Bob Long

Parker Associates
Walt Parker

Peninsula Airways
George Tibbetts, Sr.
George Tibbetts, Jr.

Rainbow King Lodge

Reeve Aleutian Airways
Gary Lintner

Revilla Flying Services
Dale David Clark

Rocky Mountain Helicopters
Gene Franks

Rust's Flying Service
Hank Rust

Ryan Air Service
Boyuk Ryan

COMPANY NAME AND PILOTS INTERVIEWED

Sand Point Air Service, Inc.
George Kimball

Sea Airmotive (Anchorage)
Ted Lamb

Sea Airmotive (Bethel)
Wayne Peterson

Seaplane Pilots Association
John Pratt, Jr.

Shell Lake Enterprises
Norman Helwig

Shellenbarger Aviation
David Furber

Silvertip Lodges
Gary Archer

Skagaway Air Service
Scott Logan

South Central Air, Inc.
Bruce Clements

Southeast Alaska Airlines
Paul Breed

Southeast Skyways
David Wunsch

Southwest Airways

Sunshine Copters
Bill Merkley

Talarik Lake Lodge
Kevin Vrem
Floyd Polmateer

Talkeetna Air Taxi
Lowell Thomas, Jr.
Doug Geeting

Tanana Valley Community College
Bill Nelmes

Taquan Air Service, Inc.
Jerry Scudero

Teller Air service
Jim Johnson
Bob Blodgett

Temsco Helicopters, Inc.
Ken Eichner
Earl Walker

The Flying Machine
Brad Reed

Tikchik Lodge
Robert "Bob" Curtis

Trail Lake Flying Service
Ludwig Pfleger

Trans-Alaska Helicopters
Don Wood

Troy Air
Mark Jacobsen

Tundra Copters
Craig Fielding

Tyee Airlines, Inc.
Herman Ludwigsen

Valdez Airlines
Ron Watson

Ward Air
Larry McGee

Western Yukon Air
Edward Hoelscher

Wilbur's Flight Operations
Joe Wilbur

Wood's Air Service
Warren "Buddy" Woods

Wrangell Air Service
Don Baldwin

Wright's Air Service
Al Wright

Yute Air Alaska
Tom Tucker

INDIVIDUAL PILOTS

Tom Belleau (OAS)

Herbert Downing

Lew Earhardt

Jonathan Fritz

James Gallagher

Timothy Laporte

Leonard Mach

Charles Muhs (FSS Chief, Anch.)

Bill Overway (FAA)

Ray Peterson, Sr.

Don Rogers M.D. (FAA-AME)

Richard Roles

Lloyd Samsall

R. Tony Schultz

John Swiss

Warren Thompson (FSS-Kotzebue)

Tom Wardleigh (FAA)

Dave Werner

Richard Wien

Alden Williams

APPENDIX B

Persons Attending Meetings with Lloyd's of London Underwriters

A.A.S.F. MEETING 19TH APRIL 1982

A.A.S.F.

GAYLE ANDERSON	BOARD MEMBER, AACA
REX BISHOPP	PRESIDENT AASF
RUTH BISHOPP	ALASKA HELICOPTERS, INC
JIM DODSON	SEC/TREAS AASF
CHARLES EICHHORN	PROJECT INVEST. AATC
DR. M.K. MITCHELL	PROJECT DIRECTOR AATC

UNDERWRITERS

M.E. CHARLESWORTH	M.E. CHARLESWORTH	UNDERWRITER
D.L. CHRISTIE	SCOTTISH LION INS CO	UNDERWRITER
B. COLEMAN	COLEMAN & ORS	UNDERWRITER
E. DI SILVIO	M.E. CHARLESWORTH	ASSISTANT U/W
R.A. FLEW	DOMINION	ASSISTANT U/W
A.G. HINES	A.G. HINES	UNDERWRITER
P.J. HUBERT	N.R.F.	UNDERWRITER
P.W. MARIOTT	NORWICH UNION	ASSISTANT U/W
T. MITCHELL	A.I.V.	UNDERWRITER
R.E. MORRIS	D.L. DANN SYND	UNDERWRITER
R.J. MORSE	D. WILLIS SYND	ASSISTANT U/W
A. PAGRAM	ATMOS SYND 581	UNDERWRITER
A.E. PORTER	GUARDIAN ROYAL EXCHANGE	DEPUTY UNDERWRITER
M.B. QUIN-HARKIN	M.E. CHARLESWORTH	DEPUTY UNDERWRITER
J. SARGEANT	M.V. SPRATT & ORS	UNDERWRITER
J. TUFF	SPHERE DRAKE	UNDERWRITER
D. VALE	J.A. WHITE & ORS	DEPUTY UNDERWRITER
B.J. WILKES	GENERALI	UNDERWRITER
P. WISEMAN	SYND 802	UNDERWRITER

L.A.U.A.

B. DALBY

BROKERS

M. AUSTIN	ROBT. BRADFORD
J. BRAITHWAITE	C.T. BOWRING
P. BUTLER	STEWART WRIGHTSON
G. DERRICK	CAYZER STEEL BOWATER
R. FLACK	C.T. BOWRING
C.J. SELLENS	H.R.Q.
M. WARD	REED STENHOUSE
D. BARDER	LYON DE FALBE

A.A.S.F. MEETING 20TH APRIL 1982

A.A.S.F.

GAYLE ANDERSON	BOARD MEMBER, AACA
REX BISHOPP	PRESIDENT AASF
RUTH BISHOPP	ALASKA HELICOPTERS, INC
JIM DODSON	SEC/TREAS AASF
CHARLES EICHHORN	PROJECT INVEST. AATC
BILL FISHER	BOARD MEMBER AACA
DR. M.K. MITCHELL	PROJECT DIRECTOR AATC

UNDERWRITERS

M.E. CHARLESWORTH	M.E. CHARLESWORTH	UNDERWRITER
A.R. CROW	ENGLISH & AMERICAN	DEPUTY UNDERWRITER
D. DARK	A.G. HINES SYND 577	DEPUTY UNDERWRITER
K. DOHERTY	E.R.H. HILL & ORS	DEPUTY UNDERWRITER
P. GUINERY	J.M. POLAND	UNDERWRITER
A. HERMITAGE	K.F. ALDER	DEPUTY UNDERWRITER
T. JARVIS	BRIT. RESERVE INS	UNDERWRITER
C.R. JEFFS	AVIATION & GENERAL	UNDERWRITER
P. LYON	AVIATION & GENERAL	UNDERWRITER
G. MILLER	M.G. MILLER & ORS	UNDERWRITER
R.A. PAGRAM	ATMOS SYND 581	UNDERWRITER
M.B. QUIN-HARKIN	M.E. CHARLESWORTH	DEPUTY UNDERWRITER
H.J. ROSE	M.J. LANGTON & ORS	DEPUTY UNDERWRITER
R.F. STONE	M.E. CHARLESWORTH	
M. SUGDEN	P.W. HARDY	UNDERWRITER
E.O. WALKLIN	HUGHESDON & ORS	UNDERWRITER
D. WALLACE	SPHERE DRAKE	DEPUTY UNDERWRITER
J. WESCOTT	AVIATION & GENERAL	DEPUTY UNDERWRITER
P. WISEMAN	SYND 802	UNDERWRITER

L.A.U.A.

K. NELSON

BROKERS

J. BERTWHISTLE	BAIN DAWES
A. FULTON	A. GIBBS SAGE
I. LEWIS	T.R. MILLER
R. MARSH	C.E. HEATH
S. RENNIE	WILLIS FABER
G. TAYLOR	WIGHAM POLAND
M. WARD	REED STENHOUSE
T. WARD	J. PLUMMER

APPENDIX C

Milestones and Timelines for Alaskan Aviation Training Analysis

MILESTONES AND TIMELINES			CALENDAR DAYS								PHASE ONE								PAGE ONE					
FOR ALASKA TRAINING ANALYSIS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
CONDUCT MEETING OF AACA SAFETY FOUNDATION BOARD		▲																						
REVIEW LIST OF ALASKAN AIR TAXI OPERATORS	△		▲																					
IDENTIFY CRITICAL AREAS AND REGIONS TO BE STUDIED			△	▲																				
PREPARE MEDIA RELEASES DESCRIBING STUDY		△		▲																				
SCHEDULE INTERVIEWS FOR FIRST TWO WEEKS			△		▲																			
TRAIN CLERICAL STAFF			△	▲																				
TRAIN STAFF IN INTERVIEW PROCEDURES				△	▲																			
PREPARE INTERVIEW QUESTIONNAIRE				△			▲																	
PREPARE CRITIQUE OF INTERVIEW FORM				△			▲																	
CONDUCT FIRST CYCLE OF INTERVIEWS IN ANCHORAGE								△	1 INTERVIEW/DAY				(14/INTERVIEWER)								▲			
CONDUCT SYNTHESIS MEETINGS FROM FIRST CYCLE INTERVIEWS									△														▲	

MILESTONES AND TIMELINES FOR ALASKA TRAINING ANALYSIS					DAYS	P.D.						PHASE ONE							PAGE TWO					
	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
CONFER WITH ENGINEERING AND PROGRAM DEVELOPMENT IN FORT WORTH AND COMP TIME AT HOME	△ TRAVEL	—	—	—	—	—	—	—	▲ TRAVEL															
PLANNING MEETINGS FOR SECOND CYCLE INTERVIEWS										▲														
ARRANGE INTRASTATE TRANSPORTATION										▲														
CONDUCT SECOND CYCLE INTERVIEWS ANCHORAGE, FAIRBANKS, JUNEAU											△	1 INTERVIEW/DAY	—	—	—	21 INTERVIEWER	—	—	—	—	—	—	—	→
TYPE DATA FROM FIRST CYCLE	△	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	▲
SECOND CYCLE SYNTHESIS MEETING IN ANCHORAGE																▲						▲		
WRITE TRAINING OBJECTIVES																△	—	—	—	—	—	—	—	→
REVIEW RESULTS OF 1ST INTERVIEWS WITH BOARD AASE.										▲														
												F	F	F	F	F	F	F	F	F	F	F	F	F

F= DAYS INTRASTATE AIR TRAVEL MAY BE REQUIRED

P.D.= PAYMENT DUE

MILESTONES AND TIMELINES

FOR ALASKA TRAINING ANALYSIS

CALENDAR DAYS

PHASE ONE

PAGE THREE

											P.D.													
	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
CONDUCT SECOND CYCLE OF INTERVIEWS ANCHORAGE, FAIRBANKS, JUNEAU (CONT)	—	—	—	—	—	—	—	▲																
CONDUCT SYNTHESIS MEETINGS				▲					▲															
MEET WITH ENGINEERING AND PROGRAM DEVELOPMENT PERSONNEL IN FORT WORTH										△ TRAVEL	—	—	—	—	—	—	—	△ TRAVEL						
MEET TO PREPARE FOR THIRD CYCLE OF INTERVIEWS																			▲					
MAKE INTRASTATE TRAVEL ARRANGEMENTS				△	—	—	—	—	▲											▲				
CONDUCT THIRD CYCLE OF INTERVIEWS -REMAINDER OF ALASKA BUSH-																					△	I	T	I ▶
MEET WITH AACA SAFETY FOUNDATION BOARD OF DIRECTORS																			▲					
WRITE TRAINING OBJECTIVES (CONT)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	▶
IDENTIFY SKILLS AND KNOWLEDGES FOR T.O.																				△	—	—	—	▶
DESCRIBE COND. AND STD. FOR EACH T.O.																					△	—	—	▶
	F	F	F	F	F	F	F	F													F	F	F	F

F = DAYS INTRASTATE AIR TRAVEL MAY BE REQUIRED

P.D. = PAYMENT DUE

CALENDAR DAYS — PHASE ONE — PAGE FOUR

MILESTONES AND TIMELINES FOR ALASKA TRAINING ANALYSIS	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
																		P.D. ↓						
CONDUCT THIRD CYCLE OF INTERVIEWS (CONT) -REMAINDER OF ALASKAN BUSH -	T	I	T		T	I	T	I	T	I	T		T	I	T	I	T	I	T		T	I	T	I ▶
SYNTHESIS MEETINGS				▲								▲								▲				
MEET WITH AACA SAFETY FOUNDATION BOARD OF DIRECTORS				▲																▲				
WRITE TRAINING OBJECTIVES (CONT)	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	▶
WRITE SKILLS AND KNOWLEDGES FOR EACH TRAINING OBJECTIVE (CONT)	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	▶
WRITE CONDITIONS AND STANDARDS FOR EACH TRAINING OBJECTIVE (CONT)	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	─	▶
MEET WITH INSURANCE UNDERWRITERS				△	─	─	─	▲																
	F	F	F		F	F	F	F	F	F	F		F	F	F	F	F	F	F		F	F	F	F

F = DAYS INTRASTATE AIR TRAVEL MAY BE REQUIRED

P.D. = PAYMENT DUE

TIMELINES AND MILESTONES FOR

ALASKA TRAINING ANALYSIS

CALENDAR DAYS PHASE ONE PAGE FIVE

	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	P.D. 120
CONDUCT THIRD CYCLE OF INTERVIEWS (CONT)	T	I	T		T	I	T	I	T	I	T		T	I	T	I	T	I	T		T	I	T	I →
SYNTHESIS MEETINGS				▲								▲								▲				
MEET WITH AACA BOARD OF DIRECTORS AND SAFETY FOUNDATION												▲												
WRITE TRAINING OBJECTIVES (CONT)																								→
WRITE SKILLS AND KNOWLEDGES FOR EACH TRAINING OBJECTIVE (CONT)																								→
WRITE CONDITIONS AND STANDARDS FOR EACH TRAINING OBJECTIVE (CONT)																								→
	F	F	F		F	F	F	F	F	F	F		F	F	F	F	F	F	F		F	F	F	F

F = DAYS INTRASTATE AIR TRAVEL MAY BE REQUIRED
P.D. = PAYMENT DUE

MILESTONES AND TIMELINES

FOR ALASKA TRAINING ANALYSIS

CALENDAR DAYS PHASE ONE PAGE SIX

	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144
CONDUCT THIRD CYCLE INTERVIEWS - REMAINDER OF ALASKAN BUSH (CONT)	T	I	T		T	I	T	I	T	I	T		T	I	T	I	T	I	T		T	I	T	I →
SYNTHESIS MEETING				▲								▲								▲				
MEET WITH AACA SAFETY FOUNDATION BOARD OF DIRECTORS												▲												
WRITE TRAINING OBJECTIVES (CONT)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	→
WRITE SKILLS AND KNOWLEDGES FOR EACH TRAINING OBJECTIVE (CONT)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	→
WRITE CONDITIONS AND STANDARDS FOR EACH TRAINING OBJECTIVE (CONT)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	→
MEET WITH INSURANCE UNDERWRITERS														△	—	—	—	—	▲					
	F	F	F		F	F	F	F	F	F	F		F	F	F	F	F	F	F		F	F	F	F

F = DAYS INTRASTATE TRAVEL MAY BE REQUIRED

MILESTONES AND TIMELINES FOR ALASKA TRAINING ANALYSIS	CALENDAR DAYS					P.D.			PHASE ONE									PAGE SEVEN						
	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168
CONDUCT THIRD CYCLE INTERVIEWS - REMAINDER OF ALASKAN BUSH (CONT)	T	I	T		T	I	T	I	T	I	T		T	I	T	I	T	I	T	▲				
SYNTHESIS MEETINGS				▲								▲								△	—	—	—	▲
MEET WITH AACA SAFETY FOUNDATION BOARD OF DIRECTORS												▲												
WRITE TRAINING OBJECTIVES (CONT)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	→
WRITE SKILLS AND KNOWLEDGES FOR EACH TRAINING OBJECTIVE (CONT)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	→
WRITE CONDITIONS AND STANDARDS FOR EACH TRAINING OBJECTIVE (CONT)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	→
	F	F	F		F	F	F	F	F	F	F		F	F	F	F	F	F	F					

F = DAYS INTRASTATE TRAVEL MAY BE REQUIRED

P.D. = PAYMENT DUE

MILESTONES AND TIMELINES FOR

ALASKA TRAINING ANALYSIS

PHASE ONE

CALENDAR DAYS

P.D.

PAGE EIGHT

	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192
MEET WITH AACA SAFETY FOUNDATION BOARD OF DIRECTORS	▲																							
MEET WITH ENGINEERING AND PROGRAM DEVELOPMENT IN FT. WORTH AND COMP TIME		△ Travel																		▲ Travel				
PREPARE SPECIFICATIONS FOR TRAINING DEVICES (ENGINEERING)								△																→
WRITE TRAINING OBJECTIVES (CONT)							▲																	
WRITE SKILLS AND KNOWLEDGES FOR EACH TRAINING OBJECTIVE (CONT)							▲																	
WRITE CONDITIONS AND STANDARDS FOR EACH TRAINING OBJECTIVE (CONT)													▲											
MEET WITH INSURANCE UNDERWRITERS																					△			▲
PREPARE FINAL REPORT														△										→

MILESTONES AND TIMELINES FOR

ALASKA TRAINING ANALYSIS

CALENDAR DAYS PHASE ONE PAGE NINE

																		P.D. ↓						
	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216
PREPARE SPECIFICATIONS FOR TRAINING DEVICES (ENGINEERING) (CONT)																		▲						
MEET WITH ENGINEERING AND PROGRAM DEVELOPMENT AS REQUIRED (CONT)																		▲						
PREPARE FINAL REPORT																		►	FINAL REPORT TO BE DELIVERED 60 DAYS AFTER CONCLUSION OF STUDY.					
REVIEW DRAFT OF FINAL REPORT WITH AASE BOARD OF DIRECTORS				▲																				