





State of Utah
DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH

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EXECUTIVE SUMMARY

The Acid Deposition Technical Advisory Committee (ADTAC), was created in 1986 at the request of Governor Norman H. Bangerter to determine the status of acid deposition in Utah. The focus of the Committee, in addition to keeping abreast of acid deposition research, issues, and policy decisions, has been to define areas in Utah which may be sensitive to acid deposition and to collect baseline data in order to establish trends which may result from acid deposition.

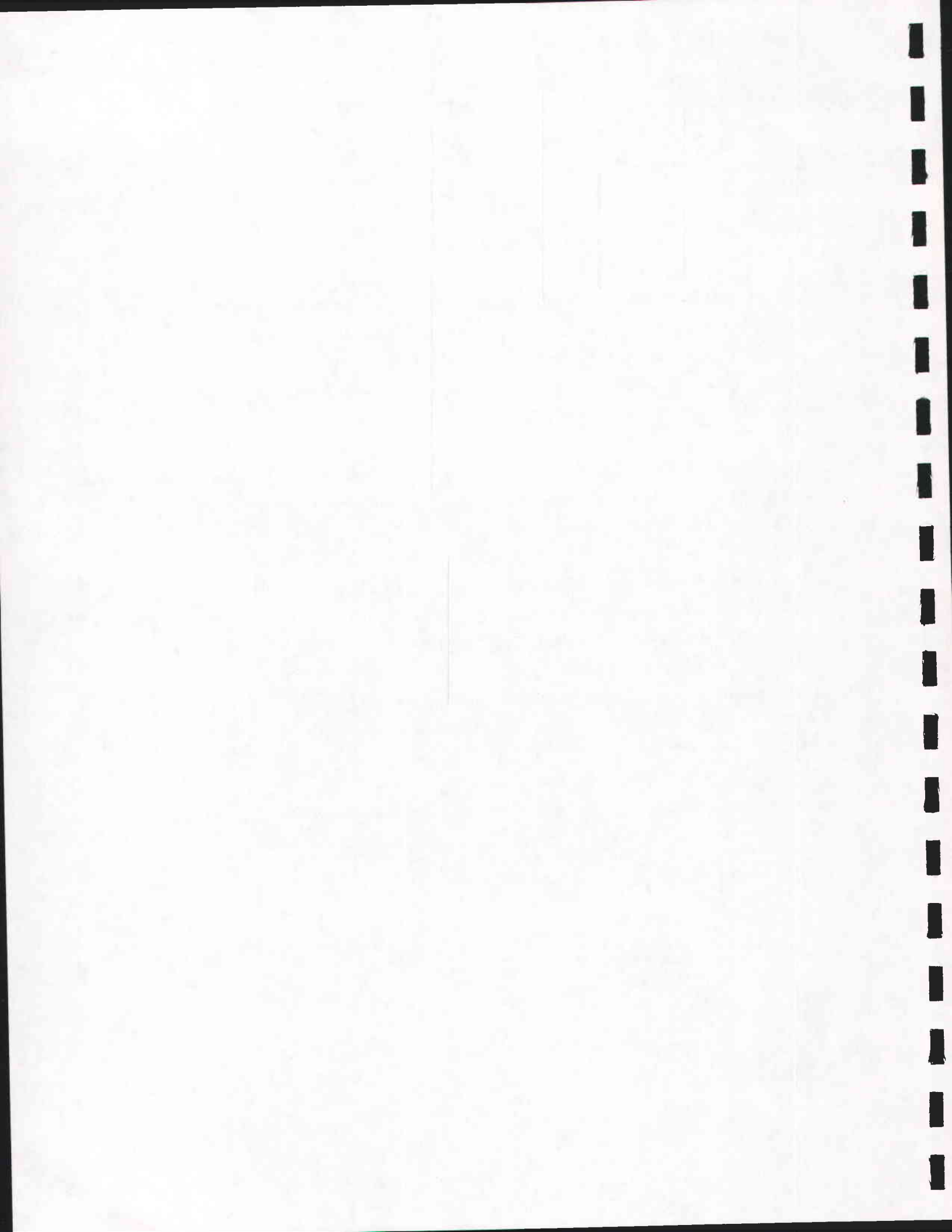
In defining areas of Utah sensitive to acid deposition, a classification of Utah's bedrock as to its acid neutralization capacity (ANC) was done. Also, a Western Lakes Survey (WLS) was conducted and the water chemistry data was used to determine the ANC of the lakes and streams sampled.

Based on bedrock ANC, the largest area found to be sensitive to acid deposition was the Uinta Mountains. Also, the ANC of the sampled lakes and streams in the Uinta Mountains was consistently low. While the Uinta lakes did not have the lowest range of ANC in the WLS, the standard deviation was so small and the mean was so low, that as a group, these lakes must be considered to be extremely sensitive. The consistent nature of low ANC values would make the Uinta lakes an ideal area for further regional studies. The WLS also verified ADTAC's contention that the Boulder Mountain lakes are also sensitive to acid deposition.

There has been a lot of work, time, and dedication put into this report. I would like to express my sincerest appreciation to all those who have participated and been involved in this project.

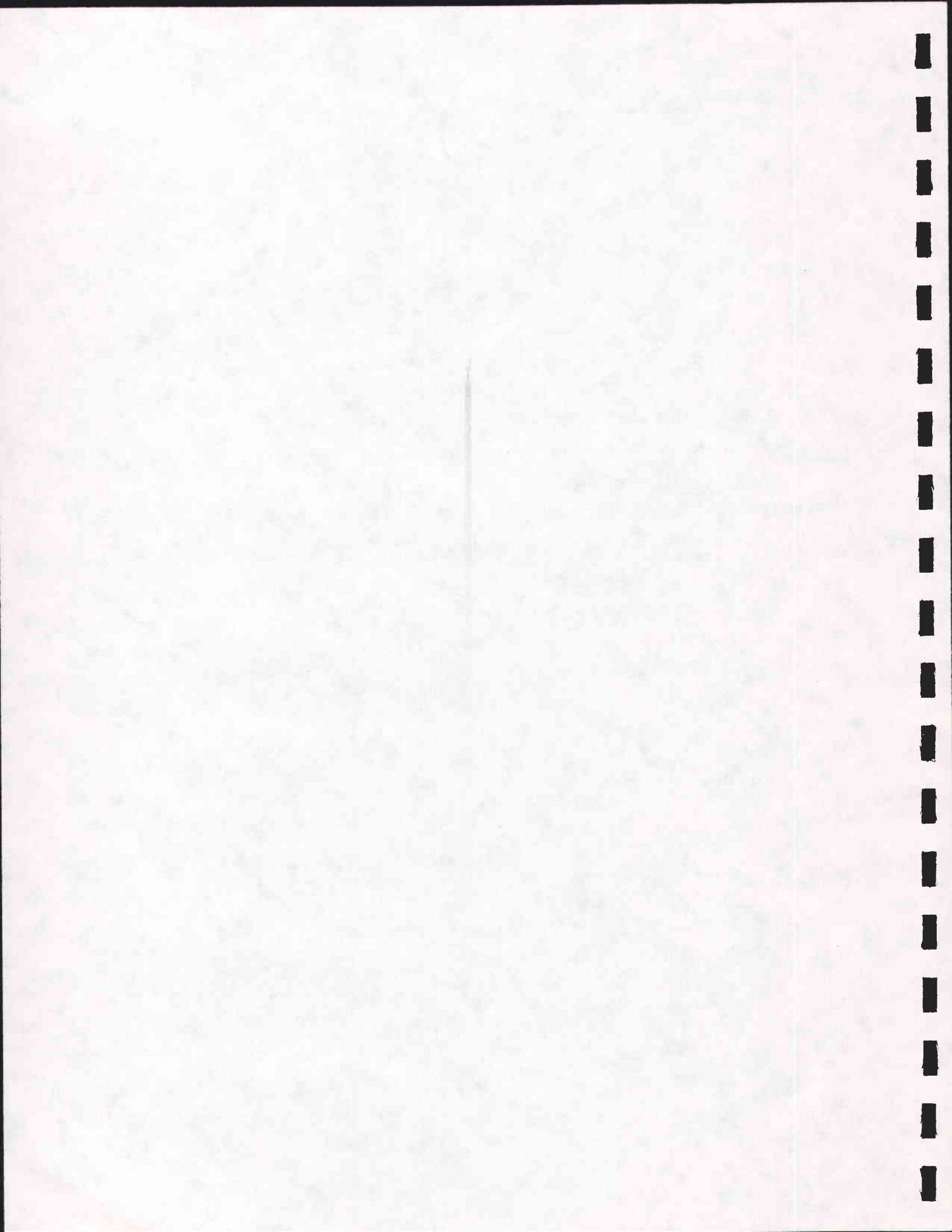
Sincerely,

F. Burnell Cordner
F. Burnell Cordner, Executive Secretary
Utah Air Conservation Committee



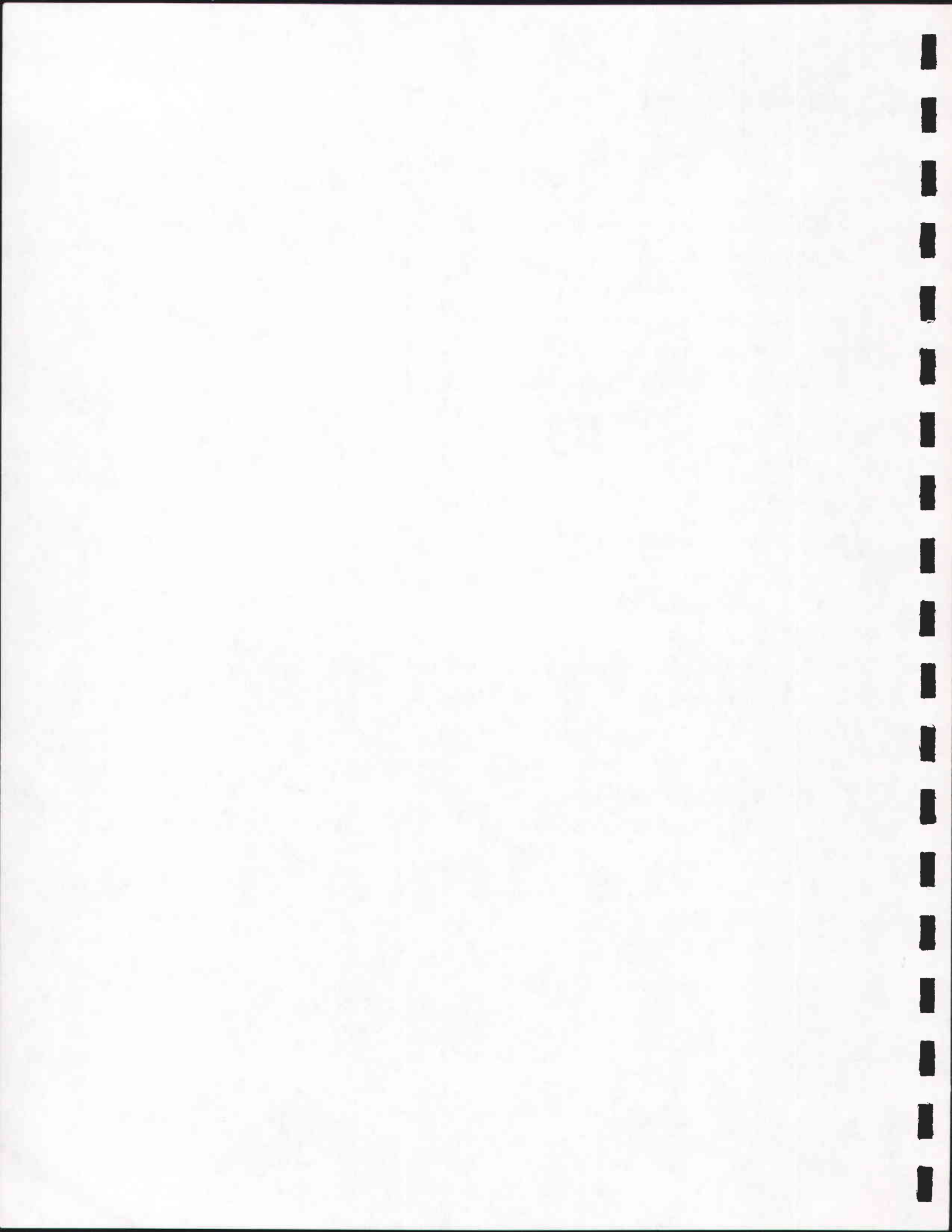
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I. ACRONYM LEGEND

ADTA	-	Acid Deposition Technical Advisory Committee
ANC	-	Acid Neutralizing Capacity
AQRV	-	Air Quality Related Values
BAQ	-	Bureau of Air Quality
BLM	-	Bureau of Land Management
BWPC	-	Bureau of Water Pollution Control
DWR	-	Division of Wildlife Resources
EPA	-	Environmental Protection Agency
FLM	-	Federal Land Managers
MDL	-	Minimal detection limit
SCS	-	Soil Conservation Service
SLF	-	State Lands and Forestry
TDS	-	Total Dissolved Solids
TOC	-	Total Organic Carbon
TSS	-	Total Suspended Solids
QA	-	Quality Assurance
UACC	-	Utah Air Conservation Committee
UP&L	-	Utah Power and Light
USFS	-	United States Forest Service
USGS	-	United States Geological Survey
USU	-	Utah State University
UWPC	-	Utah Water Pollution Control Committee
WPC	-	Water Pollution Control
WRL	-	Water Research Laboratory
WLS	-	Western Lake Survey

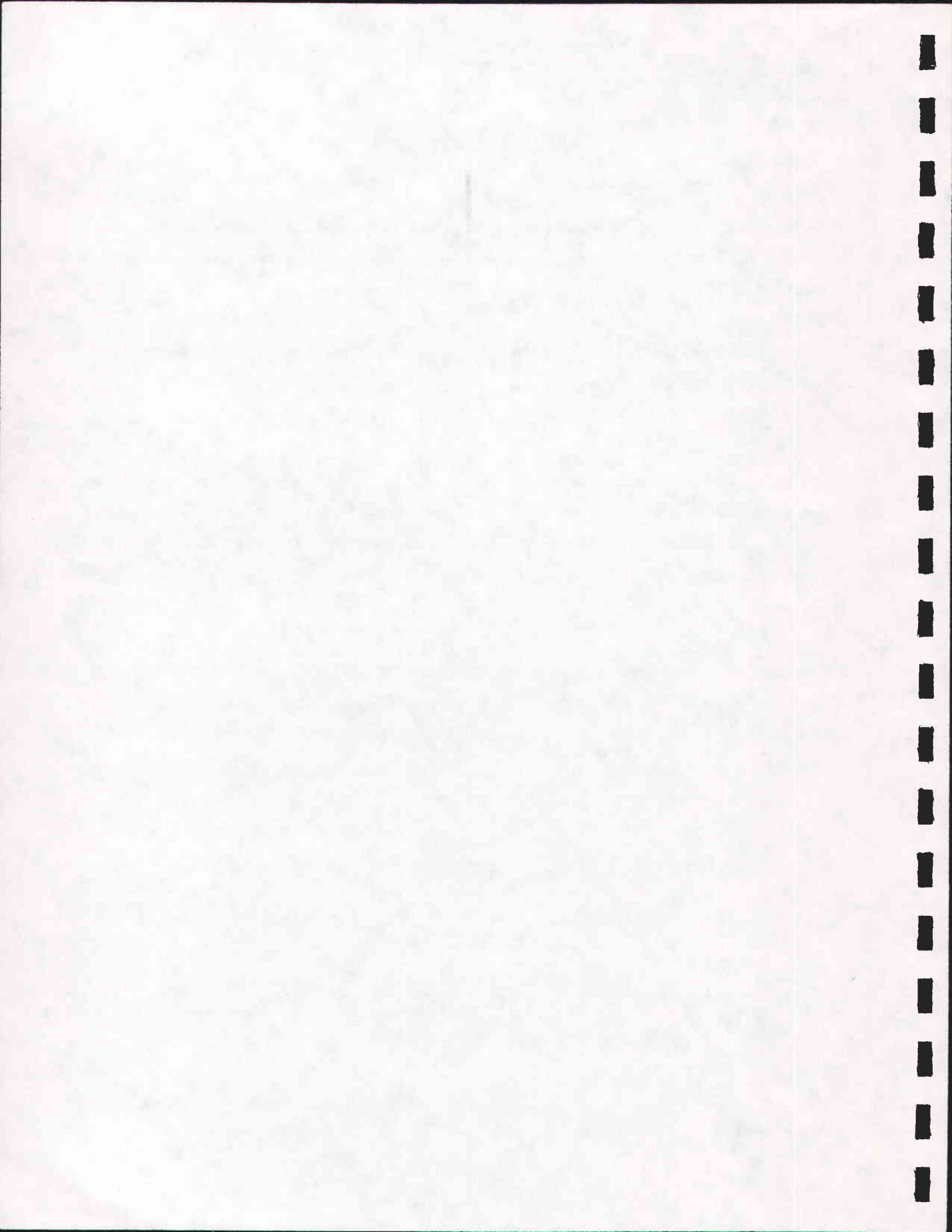


II. INTRODUCTION

Since the Acid Deposition Technical Advisory Committee's (ADTAC) inception in 1986, its members have spent many hours collecting, compiling, and disseminating information on acid deposition in Utah and in the West. Two of the most startling realizations uncovered by this committee were that: 1) in addition to the Uinta Mountains, there may be other areas in Utah which can be labeled "sensitive" to acid deposition, and 2) very little baseline data of any kind exist for these potentially "sensitive" areas, by which it could be determined whether they have been subjected to and/or affected by acid deposition.

The focus of ADTAC, in addition to keeping abreast of acid deposition research, issues, and policy decisions, has been to promote efforts to further define the areas in Utah which may be sensitive to acid deposition and to encourage the collection of baseline data necessary to establish trends which may result from acid deposition.

The following report outlines the activities of ADTAC during 1987, and presents the research and projects which have been undertaken as a result of ADTAC's recommendations and the commitment of private industry, private individuals, and state and local government agencies to determine the status of acid deposition in Utah.



III. ACKNOWLEDGMENTS

The Acid Deposition Technical Advisory Committee (ADTAC), formed at the request of Governor Norman H. Bangerter, was created to determine the status of acid deposition in Utah; to determine what information would be needed to complete the scientific understanding of acid deposition in Utah; and to provide technical recommendations to the Utah Air Conservation Committee and the Utah Water Pollution Control Committee on policy decisions concerning acid deposition. In accomplishing these objectives ADTAC has contributed greatly to the understanding of the problems, both real and potential, which acid deposition poses to Utah.

The reports and projects presented here have been made possible by Governor H. Bangerter, who requested the formation of a technical advisory task force to study acid deposition in Utah; by the direction and support of ADTAC; by the dedication and commitment of the staff members of many agencies, both public and private; and by the concern of the citizens of Utah about acid deposition. The time and dedication of all members who served on ADTAC is gratefully appreciated.

A great deal of credit must go to Mark Ellis, the former coordinator and chairman of ADTAC, for the success of this group. His enthusiasm, and organizational skills enabled ADTAC to make steady progress towards fulfilling its objectives. In addition to Mark Ellis's contribution to this study, acknowledgements go to Carol Revelt of the Bureau of Air Quality. Carol took over as chairman of ADTAC upon Mark's resignation from the Bureau of Air Quality. Ms. Revelt's efforts have lead to the finalization of this progress report. Both Mark and Carol have since left the state government to pursue careers in the private business sector. Their leadership and hard work are appreciated.

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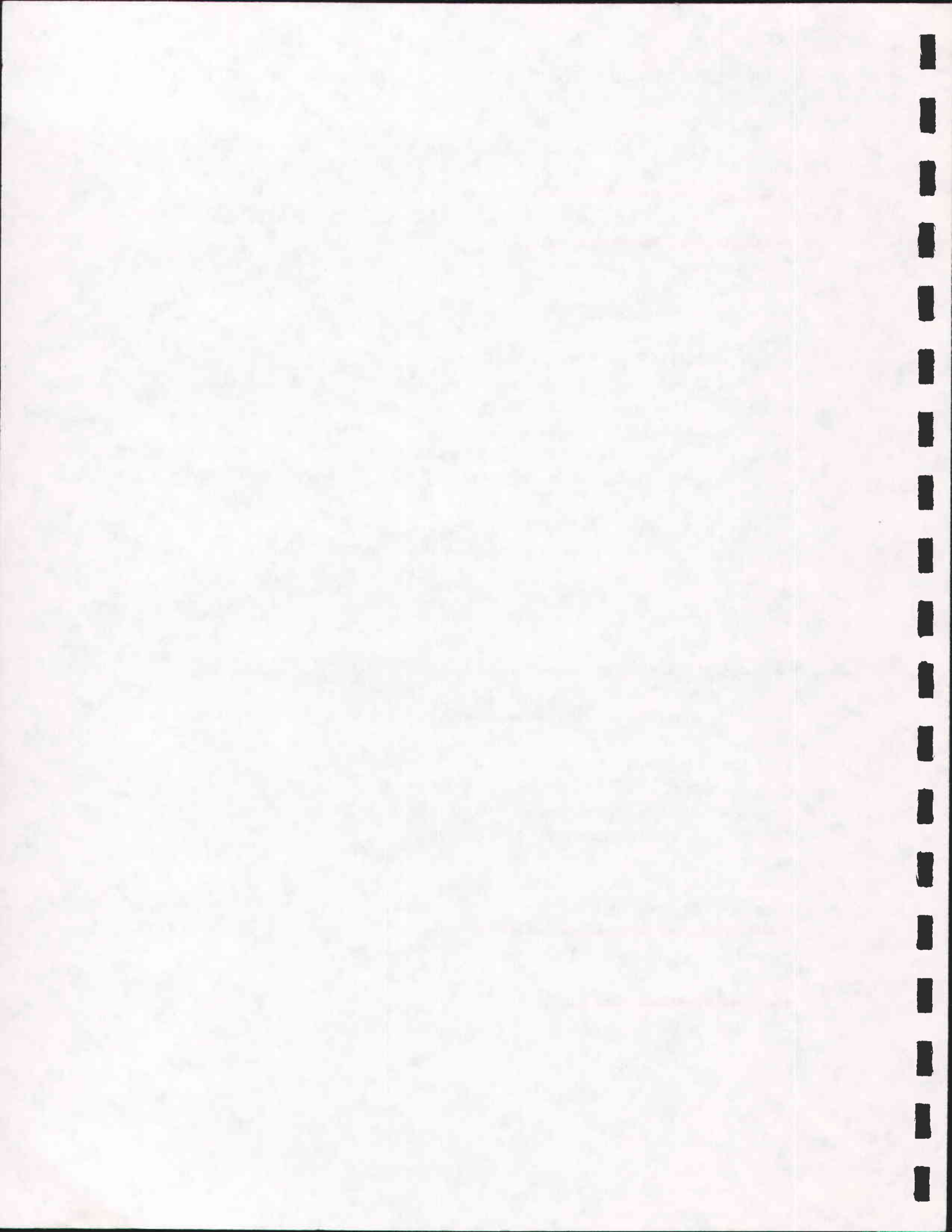
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**THE MEMBERS OF THE ACID DEPOSITION TECHNICAL ADVISORY COMMITTEE DURING 1987
ARE COMMENDED FOR THEIR SUPPORT:**

Dr. Dee Barker, Utah Air Conservation Committee
Clif Benoit, U.S. Forest Service
Rolf Doebbeling, Utah Bureau of Air Quality
Dr. Lynn Dudley, Department of Soil Science and Biometry, Utah State University
Mark Ellis, Utah Bureau of Air Quality
Dr. Mary Fleming, Wasatch Mountain Club
Emily Hall, Utah Air Conservation Committee
Ray Hall, U.S. Forest Service
Dr. Clyde Hill, University of Utah Research Institute
Eugene J. Marshall, Utah Power and Light
Jay Pitkin, Utah Bureau of Water Pollution Control
David Schen, Utah State Lands and Forestry
Dr. Doyle Stephens, U.S. Geologic Survey
Larry Svoboda, EPA Region VIII
Dr. William Wagner, U.S. Bureau of Land Management
Dr. Fred Wagner, College of Natural Resources, Utah State University
Maureen Wilson, Utah Division of Wildlife Resources
Dr. Wayne Wurtsbaugh, College of Natural Resources, Utah State University

CONTRIBUTORS TO THE 1987 ADTAC REPORT INCLUDE:

William Case, Utah Geological and Mineral Survey
Richard Denton, Utah Bureau of Water Pollution Control
Mark Ellis, formerly of the Utah Bureau of Solid and Hazardous Wastes & Utah Bureau of Air
Quality
Reid Ellis, volunteer Boy Scout
Lynn Hutchinson, Manager of Kennecott's Environmental Laboratory
Lamont Jubeck, volunteer Boy Scout
Logan Jubeck, volunteer Boy Scout
Harry Judd, Utah Bureau of Water Pollution Control
Loren Morton, Utah Bureau of Water Pollution Control
Mike Reichert, Utah Bureau of Water Pollution Control
Carol Revelt, formerly of Utah Bureau of Air Quality
Maureen Wilson, formerly of Utah Division of Natural Resources
Ray Wilson, U.S. Soil Conservation Survey--Snow Surveys
Carol Keller, Bureau of Air Quality



IV. ADTAC ACTIVITIES DURING 1987: SUMMARY AND RECOMMENDATIONS

In 1986 ADTAC recommended the following:

1. The State of Utah should become involved in the scientific study of acid deposition.
2. Monitoring must be done in sensitive and potentially sensitive areas in Utah.
3. Air pollution sources within the State should be monitored for their impact on Utah's acid contribution.
4. ADTAC or a similar technical committee should be continued in order to provide technical updates to the States policy makers

During 1987 ADTAC held meetings on January 9 and on May 23 (see the Appendix for meeting summaries) to continue the work begun in 1986 and to discuss ways to achieve the recommendations set forth during 1986. The result of these meetings and the efforts of Mark Ellis was development of the "Acid Deposition Action Plan". The plan, contained on the following pages, outlines a strategy for accomplishing the objectives set forth in 1986.

As a result of this plan the following projects were completed during 1987:

1. Staff members of the Bureau of Water Pollution Control, the Bureau of Land Management, the Division of Wildlife Resources, the Bureau of Air Quality, and three volunteer Boy Scouts, collected lake and stream samples in 10 suspected sensitive areas in Utah. These samples were analyzed by Kennecott's Environmental Laboratory under the direction of Lynn Hutchinson. Maureen Wilson, formerly of the Division of Wildlife Resources, compiled fishery data available for the lakes and streams which were sampled. Finally, members of the Bureau of Water Pollution Control, Division of Wildlife Resources, and the Bureau of Air Quality compiled and summarized these water quality data.
2. Loren Morton of the Bureau of Water Pollution Control, while adapting Norton's work on bedrock acid neutralizing capacity to Utah, wrote a paper which discusses the basis of a system and will predict acid neutralizing capacities of various rock types; and classifies may of Utah's watersheds according to their bedrock Acid Neutralizing Capacities (ANC).
3. Bill Case of the Utah Geological and Mineral Survey, in conjunction with Loren Morton's work and Norton's preliminary bedrock ANC map, created an overlay for the 1:500,000 Geologic Map of Utah, based on the acid neutralizing capacities of the bedrock geology of the State. This overlay will be available from the Utah Geological Mineral Survey as an Open File report.

4. Snow core sampling protocol was developed for sampling six sites in Utah, following the techniques used by the U.S. Forest Service in the Bridger-Teton Wilderness area. The snow core sampling program, supported by the U.S. Soil Conservation Survey - Snow Survey Program, began collecting samples in December, 1987 and continued into 1989.
5. An Air Quality Related Values Study of the High Uinta Mountains was developed by staff members of the Ashley National Forest. A visibility camera is in place at Lake Fork Mountain, and the U.S. Forest Service is attempting to negotiate the installation of other air monitoring devices near that location.
6. Members of the Bureau of Air Quality have continued to update the Acid Deposition Library and the State's emissions inventory, and to keep abreast of recent developments in acid deposition research and legislation.

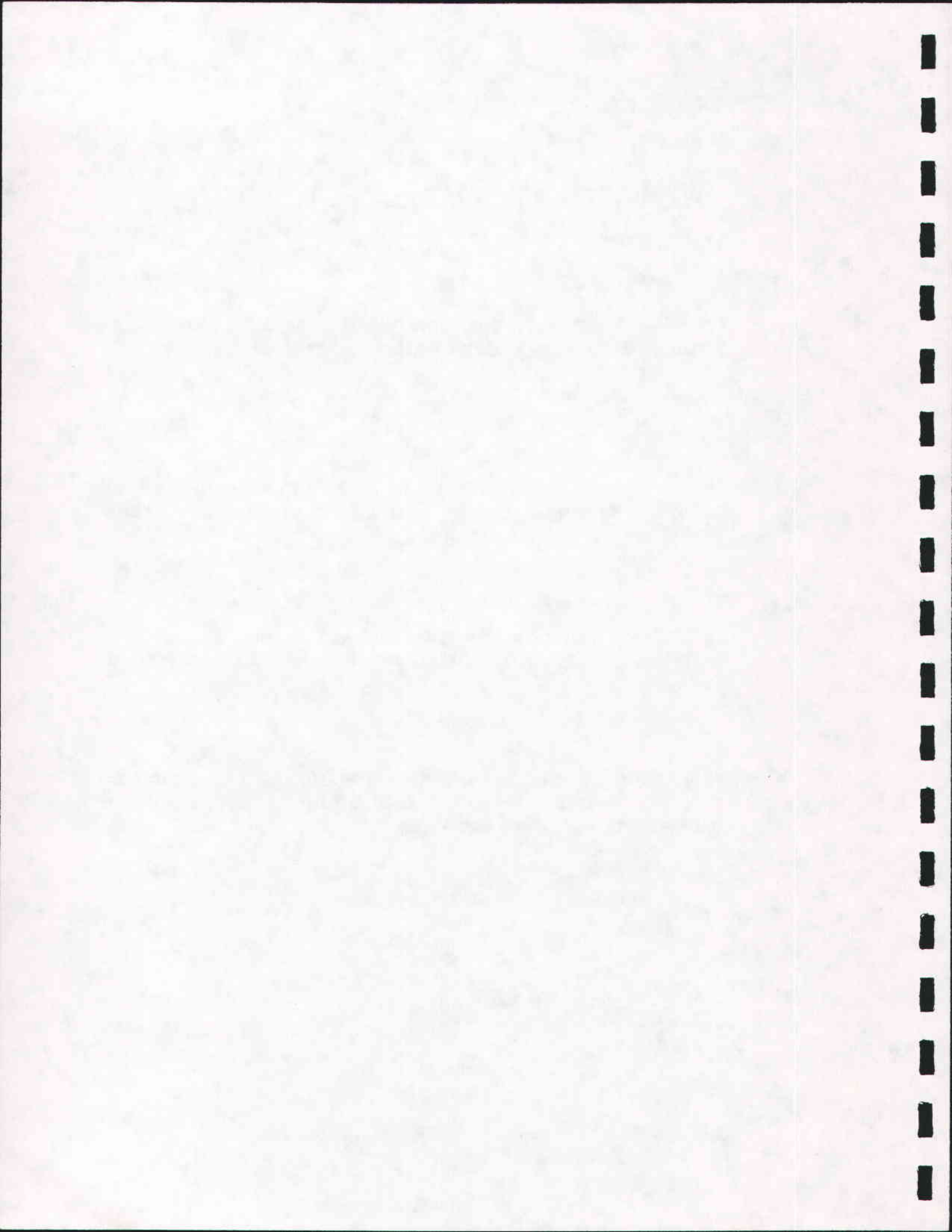
In addition to ADTAC's work, staff members of the National Park Service have drafted a proposal to study the sensitivity of cryptogamic crusts and ephemeral rock pool in the Colorado Plateau area to wet and dry air pollutants.

One of the areas in which ADTAC's efforts were not very successful was the failure to establish any high elevation acid deposition monitoring sites, which are necessary to assess acid loading rates. EPA and staff of the Ashley National Forest have discussed the possibility of locating a National Dry Deposition Monitoring Network station at Lake Fork, on the South Flank of the Uinta Mountains. The data from this site would provide valuable information for the study of acid deposition in the largest sensitive area in Utah. The need for dry deposition monitors cannot be understated because in the arid west we have no feel for that portion of acid deposition which results from dry deposition.

All-in-all, 1987 was an important year for beginning data collection and for further understanding the sensitivity of Utah to acid deposition.

ADTAC RECOMMENDATIONS FOR 1988:

- 1. The lake and stream sampling program should be continued in areas designated "sensitive" by the 1987 water chemistry data.**
- 2. Efforts should be continued to establish acid deposition sampling monitors at high elevations in sensitive areas.**
- 3. ADTAC should continue to meet on a regular basis to keep up-to-date on acid deposition research and issues.**
- 4. Interagency projects should be encouraged as much as possible in order to avoid duplication of efforts and to draw upon as many resources as possible.**





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BAQ-4343-2

Revised Draft

MEMORANDUM TO: F. Burnell Cordner, Director
THROUGH: Montie R. Keller, Environmental Health Manager
FROM: Mark T. Ellis, Environmental Health Scientist
DATE: May 7, 1987
SUBJECT: Acid Deposition Action Plan

Introduction

In response to the directive of the Air Conservation Committee, Water Pollution Control Committee, and the Wildlife Board to develop a monitoring plan consistent with the recommendations made by the Acid Deposition Technical Advisory Committee (ADTAC), the following plan has been developed. The agencies responsible for certain defined tasks, are listed with the assignments to which they have preliminarily agreed. The finalization of the assignments will come after the action plan is approved by each participating agency or industry and the responsible agent from each agency signs off on the plan.

Objectives

1. Define areas in Utah which are sensitive to acid deposition. The definition of sensitivity adopted by ADTAC is the definition used by EPA, i.e. surface water alkalinity values less than 200 ueq/l. Other criteria of sensitivity which consider soil sensitivity, proximity to heavy acid loading sources or other values, may later be used when additional definitions for sensitivity criteria are developed.
2. Areas defined as sensitive will be studied to establish the following:
 - a. the degree of sensitivity;
 - * b. the loading rate of atmospheric acids;
 - * c. the resources at risk if the buffering capacity of a sensitive watershed is lost or diminished;
 - * d. the threshold limit or annual tolerance of atmospheric acids into a sensitive watershed; and
 - * e. the watershed indicators which may be used to signal changes in the ecology, attributable to atmospheric deposition
3. The State will work with the statutory committees and industry to advocate those acid deposition bills which will do the most good for Utah.

The monitoring plan for 1987 is designed to address objectives 1 and 2a. The accomplishment of the objectives 2b through 2e (*) is dependant upon specific funding from the State Legislature, Congress, or other sources. The 1987 monitoring plan will enable the State to establish a basic sampling routine and begin the establishment of a database. By January 1988, results of the 1987 sampling year will be reported

to the three statutory committees presently involved with the issues surrounding acid deposition, i.e., Air Conservation Committee, Water Pollution Control Committee, and Wildlife Board.

The Federal Land Manager (FLM) may become involved in doing much of the work presently being proposed by the State in the monitoring portion of the action plan. Cooperation with the FLM through ADTAC will be sought to ensure that the State remains a part of monitoring efforts conducted within the State. For the monitoring that the State wishes to conduct, cooperation with the FLM will also be give through data sharing.

Objective 3 addresses non-technical, political issues dealing with acid deposition on a regional or national scale. Pending Congressional legislation could either be detrimental or beneficial to both industry and the environment, depending upon which of the many bills becomes law. In the past, the State has come out against federal legislation which mandates a national tax to provide midwestern and eastern polluters with capital for pollution control equipment. If the impact of a national tax is of concern to Utah, perhaps it is appropriate for the State to play the role of an advocate for specific legislation which favors Utah's interests. Political advocacy on the acid deposition issue may involve the State, concerned Utah industries, and the statutory committees (Air Conservation Committee, Water Pollution Control Committee, and Wildlife Board). ADTAC should not be permitted to be involved in the political issues since it was designed to serve as a technical advisor to the State and the statutory committees. Objective 3 is appropriately addressed by the non-technical bodies. Several industries including Utah Power and Light Company, Kennecott, and Nucor Steel have been contacted concerning the ramifications of pending Congressional acid deposition bills. They have expressed the desire to present a unified voice on the issue of federal legislation, providing that larger corporate interests do not interfere with the opinions of the local industry on the matter.

Tasks

The following tasks have been negotiated with the following agencies for completion in 1987:

Bureau of Air Quality (BAQ) -

1. Serve as a clearinghouse for state and federal agencies involved in this State plan or any other acid deposition monitoring plan in Utah;
2. coordinate between agencies to ensure coverage of sensitive area monitoring assignments as agreed to in this plan;
3. provide source emissions data for ADTAC as required; and
4. report the final results obtained by the respective agencies to the Air Conservation Committee, Water Pollution Control Committee, and Wildlife Board.

Bureau of Water Pollution Control (BWPC) -

1. Collect two surface water samples from at least two sites in the spring and late summer at the following locations: Raft River, Pine Valley, Thousand Lake, and Boulder Mountains;
2. receive and interpret surface water quality data collected by BWPC and other agencies participating in this plan; BWPC will serve as the lead agency on water sampling;
3. complete spring and late summer surface water sample analyses for submittal to ADTAC by November 1, 1987; and
4. ensure analysis of water samples by the assigned laboratory.

Division of Wildlife Resources (DWR) -

1. Conduct fisheries surveys for Shadow, Rhoads, and Allred Lakes, or compile a summary of existing data verifying the fisheries data on those lakes;
2. evaluate suitable waters for conducting fisheries work in the Boulder Mountains;
3. make recommendations for suitable monitoring sites in the Boulder Mountains based upon fisheries stability;
4. data completed for the 1987 monitoring year will be submitted to BAQ for inclusion to the annual report; and
5. DWR will serve as the lead agency for aquatic and wildlife data collected by any agency.

State Lands and Forestry -

1. Collect two surface water samples for analysis (through BWPC) from two sites in the La Sal and Tushar Mountains; one sample will be taken in the spring, another in late summer.

Bureau of Land Management (BLM) -

1. Collect two surface water samples for analysis (through BWPC) from two sites in the Deep Creek and Henry Mountains; one sample will be taken in the spring, another in late summer.

U.S. Forest Service -

1. Coordinate AQRV study proposed for the Wasatch and Uinta Mountains with ADTAC, making relevant data available for inclusion into the State monitoring plan.
2. The U.S. Forest Service will serve as the lead agency for collecting and analyzing data relevant to the terrestrial ecosystem.

Utah Geological and Mineral Survey -

1. A map of Utah will be made to show the bedrock geology of the State, which may be composed of sensitive material. The map will be a 1 inch = 500,000 feet scale; the map will be completed by September 30, 1987.

U.S. Geological Survey -

1. Field alkalinity measurements will be made of watersheds designated for surface water monitoring. Field measurements will be taken at the gaging stations located uppermost in the monitored watersheds. Field data will be analyzed and turned into the BAQ by November 1, 1987 for inclusion into the annual report.
2. A soil analysis method will be recommended to typify the acid neutralizing capacity of soils located in the sensitive areas being monitored.

Soil Conservation Service -

1. Snow core sampling will be retrieved for chemical analysis (through BWPC) from two sites in the Uinta and Boulder Mountains, to be coordinated with the U.S. Forest Service. Samples will be collected at each of those sites during each snow core survey for 1988.

Utah Power and Light Company -

1. The Mirror Lake deposition monitoring site will be resumed by mid-summer 1987. Atmospheric deposition samples will be collected of wet and dry constituents. Sampling results for the 1987 collection year will not be reported until the annual report for 1988 is reported. UP&L will provide a summary of the previous three years deposition data for inclusion into the 1987 report.

Kennecott

1. Sample analysis will be provided for surface water samples for 25 sites, two samples each; one in the spring and one in late summer. Results of the analyses will be reported to BWPC by October 31, 1987 for inclusion into the 1987 monitoring report.

Any agency, industry or private researcher who conducts acid deposition research, study or monitoring is not precluded from doing so by this or any other plan now implemented. The purpose of this plan is to consolidate the resources and objectives of the several groups which are concerned about, and responsible for acid deposition, its formation, control, and effects within the State of Utah. Any data relevant to this study will be welcomed in its proper context.

Issues to be Resolved

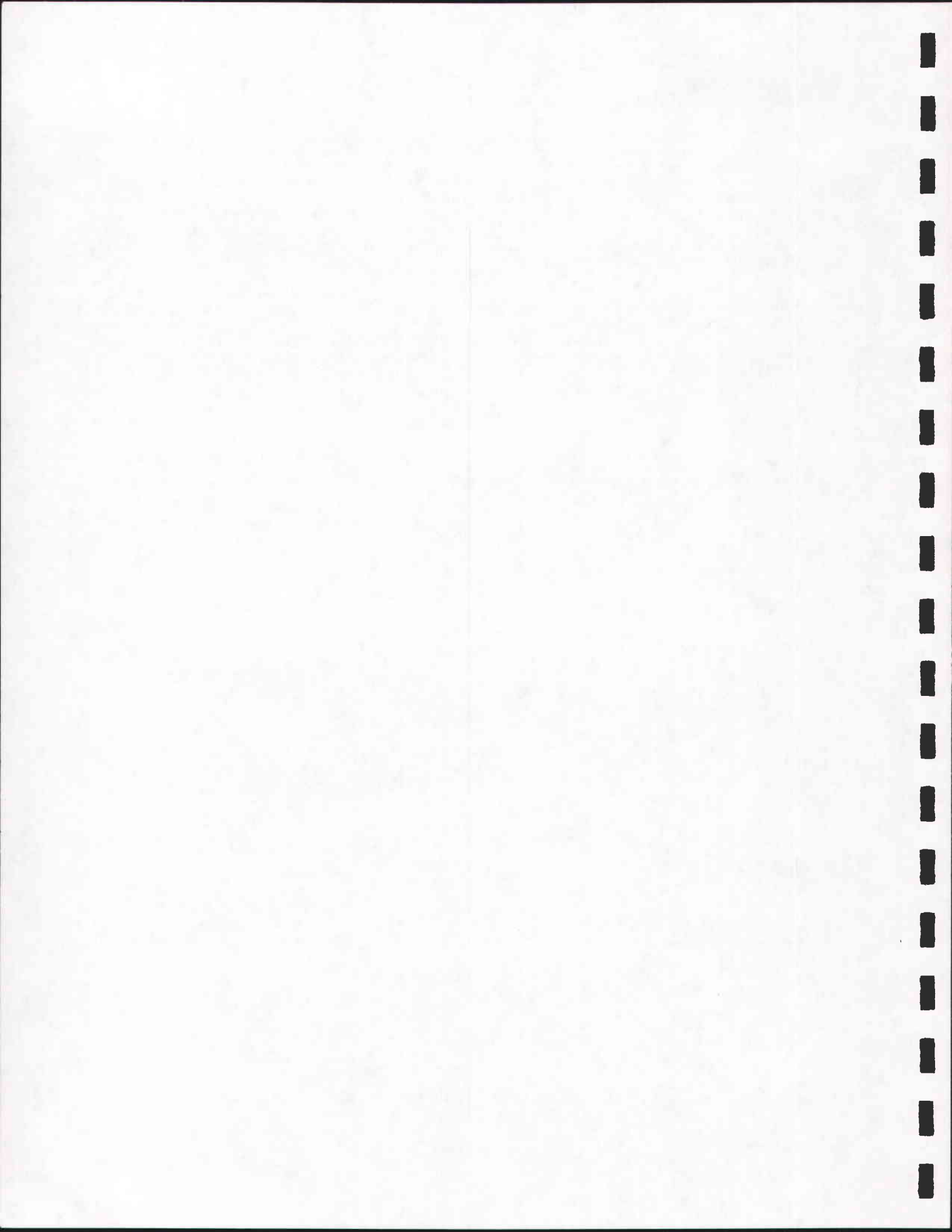
1. Sampling locations in each of the sensitive/suspected sensitive areas have not yet been chosen. A list of proposed sites (attached) from which to choose was sent to each ADTAC member. Each of the sensitive areas to be monitored will have two sites where water and soil samples will be collected, as agreed. The exact sites for monitoring will be agreed upon by May 15, 1987.
2. The acid deposition action plan is unique among activities normally conducted by the State, certainly for the Department of Health. Since this plan is not a regulatory function, the action plan presents a different function for the Department. I believe that this function is fully justified under the statutory mandate found in the Utah Code, which created the air quality laws to protect human health, environment, and industry. However, the nontraditional function proposed in this plan will require a commitment from either the Department, Division, or the Bureaus for full time commitment by involved staff, as well as the allocation of a budget in the future for the accomplishment of recommendation #1 in the 1986 ADTAC report, which was upheld by the three statutory committees. That recommendation states:

"The State of Utah should become involved in the scientific study of acid deposition. Without legitimate scientific effort to justify proposed control measures, Utah sources could be placed in the position of complying with congressional directives without independent, first-hand knowledge of real needs."

3. Worthy of note are the private organizations which are also interested in participating with the State in monitoring acid deposition in Utah, and nationwide if possible. Jeff Orth, of Rocky Mountain Research, is attempting to build a continuous water sampling device that has the capability of automatically analyzing ambient waters, and then transmitting the results to a computer for instantaneous tabulation. Such a device would be the first in the world of its kind, since Mr. Orth is thinking of having the sampler analyze for constituents which have traditionally been analyzed by bench chemistry.

4. Negotiations will continue with the Water Research Laboratory (WRL) in Logan, to have that group perform the water quality analyses on the samples collected by this program. Analysis for the waters to be sampled in the sensitive areas is more difficult due to the dilute nature of these waters. To perform these analyses, WRL will be required to purchase new equipment, capable of analyzing dilute water samples. WRL is, therefore trying to adjust its exiting budget so that the necessary equipment can be purchased. Since the WRL is research oriented, the sensitive area water monitoring project would be ideal for WRL. When and if the WRL gains the funding and capacity to perform the dilute water chemistries, it might be in the best interest of the monitoring project to arrange for sample analysis by WRL instead of the State Health Lab or Kennecott.

5. Upon the advise of Dr. Lynn Dudley, soil sampling by crews picking up water samples will not be conducted. Dr. Dudley advised in the April 23, 1987 ADTAC meeting, that soil horizons should not be mixed and that ignorance of soil strata could lead to the collection of misrepresentative samples. Arrangements for existing data to be used by ADTAC will be made with U.S. Forest Service, U.S.U. and BLM. To fill the gaps in the needed soils data, special efforts to collect accurate samples for analysis will be made.



The 1987 acid deposition action plan as proposed by the Department of Health is agreeable to the following agencies, which will perform the tasks as agreed. The following are authorized to commit to performing the previously designated tasks for the year 1987.

_____, on this date _____ 1987
F. Burnell Cordner, Director, Bureau of Air Quality

_____, on this date _____ 1987
Calvin K. Sudweeks, Director, Bureau of Water Pollution Control

_____, on this date _____ 1987
William Geer, Director, Division of Wildlife Resources

_____, on this date _____ 1987
State Lands and Forestry

_____, on this date _____ 1987
Jens Jensen, District Chief, Bureau of Land Management

_____, on this date _____ 1987
Ray Hall, Watershed Chief, U.S. Forest Service

_____, on this date _____ 1987
Genevieve Atwood, Director, Geological and Mineral Survey

_____, on this date _____ 1987
Lee Case, District Chief, U.S. Geological Survey

_____, on this date _____ 1987
Soil Conservation Service

_____, on this date _____ 1987
Utah Power and Light Company

_____, on this date _____ 1987
Kennecott

