

A CRITICAL ANALYSIS OF THE FEDERAL  
ENVIRONMENTAL IMPACT STATEMENT

by

Julian Allan Brown

Thesis submitted to the Graduate Faculty of the  
Virginia Polytechnic Institute and State University  
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

in

Environmental Sciences and Engineering

APPROVED:

Paul H. King, Chairman

Robert C. Hoehn

Kenneth L. Dickson

August, 1972

Blacksburg, Virginia

## ACKNOWLEDGMENTS

The author wishes to express his appreciation to the Environmental Protection Agency for making financial assistance available through a traineeship which made the endeavor of obtaining this degree possible and for the many enlightening governmental publications that they promptly sent upon request.

Thankfulness and sincere appreciation are expressed to Dr. Paul H. King, chairman of the graduate committee, for whom the author holds the utmost respect for his patience, encouragement, and inspiration.

Gratitude is also expressed to the other members of the author's committee, Dr. Robert C. Hoehn and Dr. Kenneth L. Dickson, for their helpful comments and critical review of the manuscript.

The author extends a special thanks to the following people and agencies who contributed to the success of the study and without whom this thesis could not have been completed: Carolina Power and Light Company, for sending the author the Environmental Impact Statement for their Brunswick Nuclear Steam Electric Plant and other pertinent material; the Council on Environmental Quality, for its contribution of valuable information; the U.S. Geological Survey, for the additional information and matrices; and the Bureau of Reclamation, for the Battelle-Columbus

"Environmental Evaluation System" and matrix.

Finally, the author wishes to express his love and thanks to his wife Gloria for her unflinching devotion, inspiration, and support in the writing of this thesis and for her fortitude in the difficult process of typing the many pages of this manuscript.

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## I. INTRODUCTION

An Environmental Impact Statement is a document which must be submitted in conjunction with much proposed federal legislation. It is also required for any project that receives or is to receive federal funding or relies on a federal lease, permit, or license for its right to operate if that project has a significant effect--a beneficial or detrimental impact--on the biosphere. The biosphere for this purpose is defined as that part of the earth from the extreme reaches of the atmosphere to the depths of the ocean, where life, no matter how sparsely located, naturally exists and for which the agency, department, or government has planned, or is planning an action or project.

An Environmental Impact Statement should cover what is in existence in the particular region before the initiation of the project and what component or components of the ecosystem of the region are to be affected. Also, the alternatives to the planned project or action and their projected impact on the ecology should be included in the Environmental Impact Statement, along with descriptions and recommendations on how to deal with particularly delicate and valuable segments of the ecosystem. Disturbance of such segments could be considered an irretrievable loss and therefore represents a very serious impact on not only the biological-natural ecology, but also the human socio-economic-

cultural ecology.

The concept and the actual requirement of the submission of Environmental Impact Statements grew out of the slow realization of man's responsibility for protecting his environment. The environment has been so subjected to man's wishes, needs, and often greed, that it is feared that in many cases the environment that man depends on for the life-giving necessities of air and water has extensively deteriorated. Thus, the final realization that man must live in harmony with his environment, culminated in the drawing up of legislation that would require many of the major offenders against the environment to account for their actions to their governmental peers and to the public. This legislation was embodied in the National Environmental Policy Act of 1969, which was the first major bill of the 1970's, signed into existence by President Nixon on January 1, 1970.

The purpose of this study is to provide a brief historical background of the events that brought about the legislation that established the requirement for submitting Environmental Impact Statements and to present a close scrutiny of the National Environmental Policy Act of 1969. A brief discussion of the future of the Environmental Impact Statement submission requirement will be included.

Finally, a case study will be done utilizing Carolina Power and Light Company's Environmental Impact Statement for a nuclear power plant in Brunswick County, North Carolina.

The recommendations established in the critical analysis of the three Environmental Impact Statement formats will be utilized in this section.

## II. HISTORY OF THE ENVIRONMENTAL MOVEMENT

The problems that technology has visited upon man, in the form of environmental degradation, have their roots in the multifaceted wants, needs, and drives of man. Greed for a profit has been singled out as a culprit, yet tax structures and the average person's stress on convenience, comfort, and consumer goods over clear skies, sparkling water, and uncluttered land have contributed more than their share to the problems of environmental pollution. To remedy some of these problems, men of government have sought to legislate a clean environment. There have been many laws and acts aimed at protecting the environment from man's depredations, but these laws and acts seem to have been either circumvented, ignored, or just plain forgotten and not enforced. An example of this neglect is the recently revived Rivers and Harbors Act of 1899.

Many serious laws, bills, and acts concerning the environment were passed around the turn of the nineteenth century. With the Industrial Revolution in full swing, men such as Henry David Thoreau, John Muir, George Perkins Marsh, Theodore Roosevelt, George Pinchot (1), and many other far-sighted conservationists and citizens began to realize that in order to achieve their industrial-socio-economic goals, they were having to make certain trade-offs with their environment. Canals, stripmining, and new cities were being pursued at nature's and man's expense. Because these men

recognized that sometimes the trade-off was unnecessary and sometimes most detrimental, farsighted citizens formed the basis for what is now termed the "Ecology Movement" through pertinent legislation.

#### Important Legislative Actions

As mentioned above, the Rivers and Harbors Act of 1899 was originally passed to prevent anyone from creating hazards and impediments to navigation. The upholding and policing actions of the law were put under the aegis of the U.S. Army Corps of Engineers. However, until its recent revival, the law was largely an obscure one. With the ecology movement and citizen action against water polluters, the law was revived, and it was established that any person who dumps refuse into navigable waters must have a permit to do so from the Army Corps of Engineers. Further, to aid citizen action, refuse was defined in court action to include polluting agents of all varieties. The law has caused a red tape and paper logjam in the Corps regional offices, but the sanctions and forms written in the law (section 411) have proven to be profitable to some private citizens while painful to offenders against the aquatic environment.(2)

In the years that followed 1899 many significant, though sometimes weak, bills and laws were passed to protect the environment. The Public Health Service Act of 1912 gave the government power to pursue investigation of pollu-

tion problems related to diseases such as typhoid, hepatitis, and others transmitted by sewage effluent being discharged in water to which man was either directly or indirectly exposed.

The Oil Pollution Act of 1924 (3) gave the government authority over those who discharged oil into coastal waters and thus control over situations that could be a threat to harbors, docks, recreational facilities, and injurious to aquatic life. As a result of interstate problems resulting from water pollution, the Water Pollution Control Act of 1948 (2) was drawn up and passed. The act established the Water Pollution Control Advisory Board and covered such topics as interstate cooperation, research, and grants for pollution control programs. In 1952, the Saline Water Conservation Act, later amended in 1961, (2) was established. Its purpose was to provide new sources of usable surface and ground water for low cost and practical utilization as municipal water supplies.

The next major piece of legislation was the Water Pollution Control Act of 1956.(3) This act provided for comprehensive water pollution control programs, research and technical assistance to states as well as grants for state water pollution control programs and sewage treatment facilities. The 1956 act also urged interdepartmental cooperation on the federal level, the adoption of uniform state laws (which did not come about), and it established a national water quality

network for collecting basic data.

The Fish and Wildlife Coordination Act, as amended in 1958 (1), set forth the principle that wildlife has the right to protection and that consideration of wildlife should be of paramount concern when water resource development is being considered.

With the advent of the sixties, came a mushrooming of pollution control bills and amendments to those laws already on the books, but which were sadly either lacking in legal bite or had serious loopholes in them. To begin the decade, the Multiple Use-Sustained Yield Act of 1960 (2) was passed, which set forth the idea that national forests were to be used for multiple purposes (recreation, range, timber, watershed, wildlife, etc.) by all and should be used so that they are not damaged or impaired for any other use at the same time. The Water Pollution Control Act Amendments of 1961 (3) increased the reach of federal enforcement to include not only interstate waters, but also, on request of the governor of a state, intrastate waters. Also, in 1961, the Oil Pollution Act (2) cleared Congress and provided for international cooperation in preventing pollution of the seas by oil.

In 1964, Congress approved the Water Resources Research Act and the Wilderness Act. (2) The former bill set up additional research and data collection centers in each state for the purpose of insuring a quality supply of water to the

people of the United States, and the later bill created a wilderness preservation system made up from federally owned areas with the purpose of protecting the vanishing wilderness of the United States.

In 1965, the passage of three more important acts was accomplished. The Water Quality Act of 1965 (3) required states to submit water quality standards and plans for their implementation. These standards were to adhere to certain federal guidelines and had to be approved by the appropriate federal agencies. Failure to comply with these laws could result in federally imposed programs. The Water Resources Planning Act of 1965 (2) established the Water Resources Council and provided for grants to the states for comprehensive watershed planning. The Solid Waste Disposal Act of 1965 (2) provided for research and development of new and improved techniques for economic solid-waste disposal and for technical and financial aid to state and local governments. It also provided impetus for the reduction of non-salvageable materials by promoting recycling of solid-wastes as usable resources.

The Clean Water Restoration Act of 1966 (2) is important in that it provides for financial aid to cities for the upgrading of existing sewage facilities and the construction of new facilities. During this same period the Marine Resources and Engineering Development Act of 1966 (2) established sea grant colleges whose stated legislative purpose

was to further national programs in marine sciences commensurate with protecting health, property, and national security.

Finally, for the legislative year of 1966, the Department of Transportation Act (1) provided for the protection of parks, wildlife refuges, and historic sites from degradation brought about by federally approved transportation projects. Also the National Historic Act (1) required consultation and consideration of any federal action which might do harm to any historic sites or areas of importance.

The following year, 1967, saw the Clean Water Restoration Act passed.(3) The Act provided for financial aid to states for water resources projects. One of the most important pieces of legislation in 1967 dealt with air pollution. The Clean Air Act of 1967 (2) established the National Air Pollution Control Administration and set forth the goals of protecting the quality of the nation's air resources and the people's health and productivity. It also initiated research programs and granted aid to states, regions, and localities to establish air pollution control programs. Perhaps most significantly of all, this bill covered motor vehicle emission standards and thus recognized the burden that the luxury and necessity of the automobile is putting on air resources.

In 1969, a most significant piece of legislation concerning the environment received congressional approval. The National Environmental Policy Act of 1969 (2) is sometimes

called the Environmental Bill of Rights because it sets forth the principle that all persons have the right to enjoy a healthful environment, and that these same persons have a responsibility to work toward preserving and improving the environment. Congress also established the requirements for submission of Environmental Impact Statements in section 102-(2)C of the Act. This requirement, in essence, says that those who received federal funds are responsible for reporting how they employ these funds with regard to their dealing with the environment. It finally gives the public a way of obtaining data and thus knowing who is doing what to the environment. Further details of this legislation are discussed in a subsequent section of this thesis.

Another significant step towards the abatement of water pollution was made in the Water Quality Improvement Act of 1970 (2) which provided for the issuing of permits to all parties who had effluent discharge into navigable waters; provided for the control of acid mine drainage, Great Lakes pollution, oil pollution, and water pollution caused by sea-going vessels. It also provided for training grants and scholarships to institutions of higher learning for studying the operation and maintenance of treatment facilities.

Also in 1970, the watchdog of the environment and the administrator-coordinator of most pollution control programs, the Environmental Protection Agency, was established. Very soon, this agency was to become controversial and unliked

by environmentalists, industry, and other governmental agencies.

A further act was passed called the Environmental Education Act of 1970.(2) This law directs the Commissioner of Education to set up educational programs for studying the environment and encouraging the educational pursuit of a quality environment for all persons.

1970 was a prolific year for legislation. The Noise Abatement and Control Act set up the Office of Noise Abatement and Control (1), and the Resource Recovery Act of 1970 (1) expanded the Solid Waste Disposal Act of 1965 to afford greater research toward new and more economical methods of recycling and recovering valuable waste materials.

The Federal-Aid Highway Act of 1970 (1) set forth environmentally related goals in that all federally subsidized highway projects are to be reviewed in light of their environmental impacts before final decisions to go ahead with the project are reached.

Other important acts that were passed are the Wilderness Act (1), which protects designated wilderness areas from degradations, and the National Park Service Act (1) as amended, which says that park areas are to be protected and preserved for the enjoyment of future generations of visitors.

Thus it is observed that there are many comprehensive laws dealing with pollution and its control and abatement. However, only the diligent pursuit of these laws will really

move the nation to constructive solutions to its environmental pollution problems.

The enactment of future legislation can not be predicted, but there are several significant bills on the environment, its protection, and the coordination of federal departmental actions concerning the handling and protection of the environment in the picture for the very near future. With the increase in citizens' legal actions against government and private projects which were held to be detrimental to the environment, there has been a hastening in court decisions as to what is required of federal departments in environmental protection. Private citizens' legal actions have held up construction of the Alaskan oil pipeline, started proceedings to ban DDT, protected wildlife habitats in Texas and Arizona, and stopped the Corps of Engineers from constructing a dam in Arkansas. (4)

The federal administration is now proposing the Toxic Substances Control Act of 1971 (1), which would require industry to thoroughly test and certify new chemical substances before marketing them. It has moved to clean up all federal installations with respect to their effect on air and water pollution. The Senate and House have passed resolutions to establish a Joint Committee on the Environment, and a Council on Environmental Quality report has prompted the submission of the Marine Protection Act of 1971. (1) President Nixon has proposed many programs and policies as

well as the formation of new agencies to protect the environment. He has proposed charges be made on sulfur oxides and a tax on lead in gasoline to aid in air pollution control, improvement in pesticide controls, the setting up of more stringent noise pollution and ocean dumping controls, the introduction of parks and open spaces to city dwellers, expansion of wilderness areas, the advance approval by the appropriate agencies of power plant sites and transmission line pathways, the stricter controlling of surface and subsurface mining with respect to environmental effects, the founding of an Environmental Institute to study environmental problems, the institution of a twelve billion dollar water pollution abatement program, and the promotion of cooperation between nations for preserving unique areas throughout the world and for the cleaning up of global pollution problems. (1)

Man now knows that all things are interrelated and that he is a part of the biosphere. Legislation, laws, policing, and fines can help to bring about an alleviation to environmental pollution, but only through the concerted action of all persons will there be any real progress towards cleaning up the environment. Documents such as the Environmental Impact Statement are more than complicated "paper monsters"; they are a source of information to the public and a way of keeping tabs on those who would otherwise not give due consideration to the environment on which we all depend for the necessities of life.

### III. REVIEW OF THE NATIONAL ENVIRONMENTAL POLICY

#### ACT OF 1969 AND RELATED LAWS

The National Environmental Policy Act of 1969 (NEPA), Public Law 91-190 (1), (See Appendix A), was signed into existence on January 1, 1970, by President Nixon, who felt that this was the most important and significant piece of legislation concerning the environment and how it was to be regarded ever to be drawn up. As stated previously, this law has since been hailed as the "Environmental Bill of Rights" and is two-fold in its purpose. First, it sets the theme for a national policy in regards to the environment, and secondly, it lays the foundation for the establishment of the Council on Environmental Quality.

In section 101, the government recognized that growing population, urbanization-suburbanization, concentrated heavy industrialization, exploitation of resources, and accelerating technological advances brought on by man have had a profound effect on his environment. Further, it states that it is up to the Federal Government, state and local governments, and private citizens to cooperate and work towards restoring and maintaining the environment that is so important to man's general welfare for present and future generations. The Federal Government states that its duty is to guide the nation so that it may:

- (1) responsibly protect and manage the environment for each succeeding future generation;
- (2) see to it that all Americans are free to enjoy a

- healthful and pleasing environment;
- (3) pursue a course of action that will utilize the environment to the maximum for the benefit, need, and pleasure of all, with minimum or no degradation to the environment;
  - (4) maintain an environment of complexity and stability, and preserve all aspects of the national heritage (historical, natural, cultural, etc.);
  - (5) balance population growth with resource development to the end that all can enjoy a high standard of living; and
  - (6) move towards a more practical usage of natural resources through recycling depleting resources when it is at all possible.

The reason the National Environmental Policy Act is called the "Environmental Bill of Rights" is the last paragraph in section 101: "The Congress recognized that each person should enjoy a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment". (See Appendix A) This far-reaching statement gives each man, woman, and child of America, whether they are rich or poor, the right to an environment which will be conducive to physical and emotional well-being. Not only does it recognize the right of the individual to a healthy environment, but it also recognizes that the individual, whether private citizen, corporate entity, or government, is duty-bound to

protect the environment and work towards bettering and preserving the quality of the environment for future generations.

The section of this law most important to this study is section 102-(2)C, which is the basis of the Environmental Impact Statement submission requirement. In section 102, Congress directs that all other laws and policies of the United States be carried out in accordance with the policies delineated in NEPA. To do this, the various agencies of the Federal Government are to:

- (A) use an interdisciplinary approach in making plans and decisions which may exert an impact on the environment;
- (B) consult with the Council on Environmental Quality in regards to the development of methods and procedures to quantify heretofore unquantified aspects of the environment;
- (C) "include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on:
  - (1) the environmental impact of the proposed action
  - (2) any adverse environmental effects which cannot be avoided should the proposal be implemented,

- (3) alternatives to the proposed actions,
- (4) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
- (5) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Prior to making any detailed statement, the responsible Federal official is to consult with and obtain the comments of and Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved. Copies of such statements and the comments and views of the appropriate Federal, state, and local agencies, which are authorized to develop and enforce environmental standards, are to be made available to the President, the Council on Environmental Quality, and to the public as provided by section 552 of title 5, United States Code, and are to accompany the proposal through the existing agency review processes" (See Appendix A). (1) This section of the law, in effect, makes those whose actions would have a significant impact on the environment responsible for the actions they either propose or implement, and makes

them answerable not only to their peers but also to a concerned public, who is affected most, when the environment is adversely affected by a project initiated or funded by the Federal Government.

- (D) thoroughly analyze any project and its alternatives, especially those involving conflicts;
- (E) recognize, when it is consistent with the foreign policy of the United States, that environmental problems are worldwide and initiate cooperation between nations to solve them;
- (F) make information and advice concerning the protection and correct management of the environment readily available to all;
- (G) use all available ecological information in resource development; and
- (H) aid the Council on Environmental Quality, whenever possible, in its work.

In section 103, all federal agencies are to review their policies, regulations, etc., and if they are not in concurrence with the policies set forth in NEPA, they are to revamp them so that they will be. In sections 104 and 105 of this law, federal agencies are to comply with existing criteria standards. Also, NEPA is to supplement existing policies of other federal agencies as well as establishing the correct agency attitude to be assumed when dealing with the environment. (1)

Title II, sections 201-207, of NEPA deals expressedly with the formation of the Council on Environmental Quality in the executive office of the President and the establishment of an annual report on the state of the environment, called the Environmental Quality Report. The Environmental Quality Report is to be tendered to the Congress annually, July 1, by the Council on Environmental Quality. It is to cover all of the facets of the environment and the complex role man has in it. The Council on Environmental Quality is to advise the President in all matters concerning the environment and help him arrive at decisions on projects and legislation which will have a significant impact on the environment, whether presently or in the future. The Council on Environmental Quality's other duties are to gather data on environmental quality, to review programs and legislation and determine their significance in relation to the environment, to conduct research in relation to the environment, develop and recommend programs to improve the environment, document changes in the environment and attempt to determine their underlying causes. The Council on Environmental Quality is to report to the President at least once a year and make recommendations, based on current data and analyses, on the viability of legislation and programs with respect to the environment. (1)

As stated previously, the National Environmental Policy Act of 1969 (see Appendix A) is perhaps the most significant

legislation, concerning the protection and enhancement of the environment, heretofore passed. However, since the passage of NEPA, there has been other legislation, agency directives, and executive orders amplifying and expanding NEPA and the policies set forth by it.

Executive Order 11507 (4) simply instructs all federal facilities to provide leadership in the national environmental protection movement by designing or redesigning, operating, and maintaining federal installations so that they contribute minimally, and, if possible, none at all, towards the pollution of the environment, specifically the major environmental components, air and water.

Executive Order 11514 (1) issued by President Nixon on March 5, 1970, directs all Federal departments and agencies to conduct their business in such a way as to uphold the directives of section 102 of NEPA. They are to monitor the environment and develop their programs and actions in such a way so that they will not contribute to the degradation of the environment, and if possible, contribute to the enhancement of the environment. Also, they are to cooperate with the Council on Environmental Quality in all ways on matters concerning the environment and possible environmental degradation brought on by federal legislation, actions, or projects.

Reorganization Plan No. 3 (5) prepared by the President and sent to the Congress on July 9, 1970, establishes the Environmental Protection Agency. It provides for the

administrative legal base for the agency and also provides for the transferring of certain functions to the Environmental Protection Agency that had previously been scattered in other various agencies.

On April 30, 1970, the Council on Environmental Quality proposed Interim Guidelines (4) for the preparation of detailed Environmental Impact Statements. Almost one year later, on April 23, 1971, the standards and criteria required by section 102-(2)C of NEPA for the preparation of detailed Environmental Impact Statements on proposals for legislation and other major federal actions significantly affecting the environment, were incorporated in the Council of Environmental Quality's finalized Guidelines. The Guidelines are to apply to all federal agencies, unless there are previous laws that expressly forbid this compliance or otherwise make it impossible for the agency to comply with section 102-(2)C of NEPA. The agencies are to comply with the aforementioned law whenever they are proposing legislation or projects that will have a significant effect on the environment. It is seen, however, that actions or proposals made or submitted by the Environmental Protection Agency to protect the environment, are exempt from the requirements of section 102-(2)C of NEPA.

According to the Council on Environmental Quality's Guidelines, an Environmental Impact Statement is to be accompanied by all comments, whether pro or con, by Federal,

state, local agencies and by private organizations or individuals as an integral part of the Environmental Impact Statement. It is observed that the document should indicate that the proposed action or legislation complies with all existing environmental quality standards and that a systematic and interdisciplinary approach be taken in the drawing up and evaluation of the environmental impact of the proposed legislation or action. Finally, all Environmental Impact Statements must have an adequate summary accompanying them, covering all pertinent points that are discussed within the body of the primary document. (1)

Research of the Federal Register shows that the Bureau of Reclamation, U.S. Geological Survey, and the U.S. Atomic Energy Commission have issued comprehensive directives and guidelines for compliance with section 102-(2)C of NEPA in respect to the preparation and submission of Environmental Impact Statements dealing with the actions and proposed projects of the aforementioned agencies.

As noted in the previous sections, there has been a great deal of enacted legislation with farsighted goals and far-reaching effects. Some of the more important bills are the National Environmental Policy Act of 1969, Reorganization Plan Number 3 of 1970, establishing the Environmental Protection Agency, and the Clean Air Act of 1967, to name three of the more controversial pieces of legislation. While some hail these laws as splendid milestones, others refer to

them as nothing more than an unnecessary logjam of red tape of "paper monsters", especially when the topic of conversation is the Alaskan Oil Pipeline, Calvert Cliffs, Florida Barge Canal, the Everglades jetport, or Gulf Coast offshore drilling projects. Agencies such as the Federal Power Commission, the Department of Transportation, and the Atomic Energy Commission are taking potshots at the National Environmental Policy Act on the basis that the Act is causing their departments undue hardships and that the requirement of preparing Environmental Impact Statements is burdensome.

It would seem that the NEPA section 102-(2)C is a "burden" in that it gives the public a new and supposedly accurate source of information on the actions of federal agencies, and in doing so makes the same federal agencies supposedly more responsive and responsible with respect to fragile ecosystems. New public awareness and actions have made many agency heads balk at having to wait until the Environmental Impact Statements have been studied and approved. The possibility of having projects either temporarily halted or never realized has caused a great deal of federal inter-departmental friction. The Atomic Energy Commission's head James Schlesinger, feels too much emphasis is placed on the preparation of Environmental Impact Statements, while necessary and important projects have to wait. Schlesinger's counterpart in the Federal Power Commission, John Nassikas, states that the halting of the Alaskan pipeline, the Gulf Coast

offshore drilling projects, and construction of certain nuclear power plants, until their environmental impacts have been fully assessed, will cause power shortages in the east and midwest.

Not only are federal officials complaining, but conservationists and environmentalists are also attacking NEPA, the Environmental Protection Agency, and the Council on Environmental Quality saying that they are being lax in the enforcement of the laws and legislation already on the books. Many of these people feel that the Environmental Protection Agency is giving way to pressure from the White House and industry in general. This conclusion may be true, but much evidence does not support these contentions; and it should be realized that the Environmental Protection Agency and the Council on Environmental Quality have not fully organized as yet and that they have already been deluged with Environmental Impact Statements, many of which are poorly prepared and voluminous, that must be studied and acted upon.

#### IV. CRITICAL COMPARISON OF THREE ENVIRONMENTAL IMPACT STATEMENT FORMATS

This section will compare and critically analyze formats for Environmental Impact Statements developed by the Atomic Energy Commission (6), the U.S. Geological Survey (7), and the Bureau of Reclamation, whose format was prepared by the Battelle Corporation. (8)

Two of the formats are similar in their use of a matrix as a summary sheet and an aid for quick review of a project. The remaining format, developed by the Atomic Energy Commission, uses a strict "report-compilation" approach to preparing an Environmental Impact Statement. The Atomic Energy Commission format is outlined in "Draft--Guide to the Preparation of Environmental Reports for Nuclear Power Plants", issued in February, 1971, and supplemented by the "Scope of Applicant's Environmental Reports with Respect to Transportation, Transmission Lines, and Accidents", issued in September, 1971. (6,9,10,11)

This "report-compilation" approach meets the requirements set forth by the Council on Environmental Quality in that it enables descriptions of a nuclear power plant's location, its primary and secondary impact on the socio-cultural-industrial composition of an area and its citizens, its impact on the bio-ecology of the flora and fauna of an area, an assessment of unavoidable adverse effects of the plant on an area,

discussion of aspects of irreversible and irretrievable commitments of resources involved with the placement of the plant in an area, and an assessment of alternatives to a plant. The Atomic Energy Commission format also provides for adequate review and comments by private persons and appropriate local, state, and Federal officials.

One major problem with the Atomic Energy Commission approach is that a document can become so voluminous and intricate that a reviewer tends to simply leaf through the pages, not really ascertaining whether it covers all aspects of a proposed plant and its impact and whether all statements and observations are backed up by sufficient study and pertinent data. With such a large document involved, there is a tendency towards skimming over important fine points in dealing with critical areas of the power plant's environmental impact. The author feels, for example, that to facilitate the review of an Environmental Impact Statement for an atomic power plant, the Radiological Accident and Hazards Report should be a separate document from the Environmental Impact Statement. The Environmental Impact Statement should cover those aspects of radioactive discharges into the water and air connected with the normal operation of the plant, but accident studies should be kept separate from the Environmental Impact Statement; however, all information concerning projects of this magnitude should be made readily available to the public.

To speed review and cut bureaucratic "red tape", a

summary of the important points relating to an atomic power plant's environmental impact should accompany the completed Environmental Impact Statement and a summary-compilation matrix should also be used in conjunction with the written summary to indicate the interaction of the plant with its surroundings. Thus, by separating the Radiological Accidents and Hazards Report from the Environmental Impact Statement and by including a brief written summary and comprehensive summary matrix covering the critical points of the environmental impact of an atomic power plant on an area, the author feels that the process of review and comment will be facilitated and hastened considerably to the benefit of all who are involved with the preparation and review of the Environmental Impact Statements.

The other two Environmental Impact Statement formats, in the author's opinion, represent a superior approach towards the drafting of Environmental Impact Statements. The U.S. Geological Survey uses a "summary-evaluation" matrix as a primary means of evaluating the environmental impact of a project and the descriptive-report method as a secondary approach. The Survey stresses the use of the matrix in "A Procedure for Evaluating Environmental Impact", Geological Survey Circular 645 (7), and points out that those areas of project interaction that are not covered by the existing 8800 matrix interactions (See Appendix B) can be included by the expansion of any of the pertinent areas on either or both of the axes of the matrix.

The U.S. Geological Survey officials and investigators employ an eight step approach in their decision making process for proposed projects that may have a significant impact on a particular segment of the biosphere. They feel that first a statement of the major objective of the proposed project should be submitted. Then the technological problems associated with achieving a desired result through the project should be thoroughly investigated, followed by an assessment of all the alternatives to the proposed project and all other alternate means of achieving the aforementioned results, for which the project is designed. Next, a report is prepared which delineates and categorizes all of the aspects of the environment before the proposed project is implemented in any way. This report may be made a part of the engineering report and may include cost-benefit studies of the proposed project and the alternatives to the project.

The sixth step in the decision process, the heart of the Survey's environment impact evaluation procedure, is the tying together and evaluation of the engineering reports and the environmental characterization reports. The proposed project's total environmental impact is assessed in terms of the project's "magnitude" and "importance" related to the scheme of existing sociological, cultural, economic, industrial, and ecological systems. Then this assessment is related to the future needs of the community or area in question. A type of cost-benefit relationship between present desires and future needs is then

weighed. The evaluation must discuss whether "important" changes in the biosphere are considered to be worth the potential sacrifice of certain aspects of the environment. These are questions that must be and are answered through the evaluation of the environmental impact of the proposed project.

The Survey recognizes that it is often difficult to subjectively analyze the "importance", and to a lesser degree, the "magnitude" of a proposed project. It insists that an interdisciplinary approach toward project evaluation be made and that each alternative to the proposed project be analyzed separately.

The Environmental Impact Statement should conclude with a summary and recommendations, based on previous discussion of the merits of each of the alternatives. Finally, a rational discussion explaining the final choice for a plan of action and the detailed plan for achieving the desired results should conclude the decision-evaluation process for compiling an Environmental Impact Statement for a proposed project. (7)

In evaluating existing facets of the environment, assessing the environmental impact of a project, and summarizing all pertinent data for the Environmental Impact Statement, the U.S. Geological Survey has developed a unique and useful graphic approach in the form of a generalized summary-evaluation matrix whose ordinate--y-axis--delineates existing environmental aspects for a given segment of the biosphere and whose abscissa--x-axis--describes the many areas of interaction a given project may effect.

The x-axis is labeled "Proposed Actions Which May Cause Environmental Impact"; and the y-axis is labeled "Existing Characteristics and Conditions of the Environment". (See Appendix B) In using this matrix the investigators pick those project actions from the x-axis which will have significant environmental impact and match these with those aspects of the existing environment from the y-axis with which the project's actions will significantly interact.

The box on the grid formed by the intersection of one of the 100 x-axis actions with one of the 80 y-axis environmental components (8800 possible interactions) is used to evaluate the "magnitude" and "importance" of the interaction on a scale from one to ten (1-10). A diagonal is drawn from the upper right-hand corner to the lower left-hand corner of the box. The "magnitude" of the action's environmental impact is rated on the one to ten basis in the upper left-hand corner of the box above the diagonal, and the "importance" of the action's environmental impact is rated on a one to ten basis in the lower right-hand corner of the box, below the diagonal. (See Appendix B) This procedure then gives the investigator and reviewer a means for determining those areas which are receiving the maximum environmental impact. Normally, interactions with ratings of five or above will involve area requiring close scrutiny, while any interaction receiving a rating of ten on either its importance or magnitude of impact will be an area of considerable concern.

An action, such as the placement of inorganic solids into a stream, might be of small volume and thus rated with a low number on the "magnitude" scale, but if the stream is already to the limits of its solids carrying capacity, then this small deposition of solids may cause excessive damage to the stream's environment. This effect would represent an action of utmost importance and thus be given a high rating on the "importance" scale. Since magnitude and importance may vary widely, close scrutiny of each highly rated interaction is desirable. Also, those interactions with moderately rated magnitude and importance should receive careful study.

As previously noted, an interdisciplinary approach, as demanded by the law, is necessary to minimize erroneous subjective evaluation. Also, the act of numerically rating each environmental interaction component allows an investigator to be as reasonably objective as is humanly possible. The majority of the written text of the Environmental Impact Statement will then be related to highly rated interactions as depicted by the summary-evaluation matrix. From this discussion of critical areas, the recommendation for a plan of action on a proposed Survey project can then be arrived at rationally and concisely. (7)

Though this is an adequate environmental impact evaluation method, the author feels that a few minor improvements in this method are in order. It is felt that a one to ten rating system is restrictive and does not allow the investi-

gator enough latitude in numerically expressing an action's impact. Therefore, it is suggested that a scale of one to thirty (1-30) be used. One to ten (1-10) would represent low values of interaction which require little special attention in the evaluation of environmental impact; eleven to twenty (11-20) would represent moderate or intermediate levels of interaction which require study but not vigorous attention in the environmental impact evaluation process; and twenty-one to thirty (21-30) would represent a highly critical and fragile area of environmental consideration, which must be studied in great detail before final disposition of the fate of a project.

After thorough research and investigation and the completion of magnitude and importance ratings in the summary-evaluation matrix, the author feels that all the boxes representing interactions should be color coded with green being used on boxes that represent no significant interaction in respect to environmental impact, yellow being used on those interactions which are of a questionable nature, though not critical in their import, and red for those interactions where the biosphere is extremely fragile or vulnerable to degradation that would be caused by the implementation of a proposed project. It is felt that color coding the matrix would enable those who must review and evaluate the Environmental Impact Statement to pinpoint fragile areas of critical consideration and generally facilitate the hastening of the govern-

mental review processes.

The third Environmental Impact Statement format studied was the Bureau of Reclamation's Environmental Impact Statement Format and Matrix, which was prepared by Battelle's Columbus Laboratories. (8) This format is perhaps the most objective, comprehensive, scientific, and wholly interdisciplinary approach to the preparation of Environmental Impact Statements available today.

The Environmental Evaluation System (EES) is divided into four major categories--Ecology, Environmental Pollution, Esthetics, and Human Interest. These categories are divided into eighteen subheadings: Ecology--species and population, habitats and communities, ecosystems (descriptive only, not numerically rated); Environmental Pollution--water pollution, air pollution, land pollution, noise pollution; Esthetics--relevance of esthetics to Bureau of Reclamation activities, land, air, water, biota, man-made objects, composition; Human Interest--educational and scientific packages, historical packages, cultures, mood, atmosphere, life patterns. (8)

The subheadings or components are broken down into seventy-eight parameters. For example, the component water pollution under the category of Environmental Pollution is evaluated by the following parameters: Basin hydrologic loss, BOD, Dissolved oxygen, Fecal coliforms, Inorganic carbon, Inorganic nitrogen, Inorganic phosphate, Pesticides, pH, Stream flow variation, Temperature, Total dissolved solids,

Toxic substances, and Turbidity. (8) To statistically relate the various parameters' relative importances to each other, a system of one thousand (1000) Importance Units has been developed with each parameter being weighed and assigned a certain numerical value based on a statistical analysis of the importance of each parameter within the total scheme of the environmental picture. Ecology is assigned 240 Parameter Importance Units; Environmental Pollution, 402 Parameter Importance Units; Esthetics, 153 Parameter Importance Units; and Human Interest, 205 Parameter Importance Units. (8)

The environmental impact of a project, that is incurred in a given category by the proposed action, is determined by the equation:

$$(EIU = PIU \times EQ)$$

Environmental Impact Units equal Parameter Importance Units times Environmental Quality (8) as measured in a specific circumstance.

This procedure gives the investigators and reviewers a means for determining those areas where trade-offs--beneficial or detrimental--between the existing environment and the desired project objectives can be decided upon. Obviously, if the trade-off is too damaging or it is observed that too much of the desirable environment in a given area has to be sacrificed for a desired objective, then the jurisdiction should either scrap the project or find an alternative method for obtaining the desired objectives.

Built into the Environmental Evaluation System is a warning system called "red flags", to alert the Bureau of "fragile" elements of the environment which could be adversely affected, perhaps beyond redemption, if the project should be implemented.

Also accompanying the evaluation system is a matrix (See Appendix C) designed to delineate the "net environmental impact" of a project, as measured in Environmental Impact Units, "red flag" areas and components of the biosphere in question, and areas where there is a need to obtain more data before a rational and objective decision on the status of the project can be determined. As mentioned before, the evaluation-summary matrix is invaluable as a tool for hastening the agency and governmental review of the project, and the matrix is an excellent approach in the use of graphics in preparing a summary for an Environmental Impact Statement.

It should be pointed out that this Environmental Evaluation System was designed for the Bureau of Reclamation's water resource projects, but the author feels that this format and specifically its associated matrix could easily be used as a general form for many other projects requiring the submission of Environmental Impact Statements.

Battelle-Columbus recognized that their Environmental Evaluation System and Matrix could be improved, especially as the science of ecology expands its frontiers. They suggest further research into improvement of the parameters of the

Environmental Evaluation System, increasing the availability of data used in determining the parameters that are used to measure environmental impact, and refining the weights and value functions in the determining of Parameter Importance Units. (8) They also point out that information on areas or parameters such as upland game birds, aquatic and terrestrial pest species, and river characteristics is difficult to obtain, and like aquatic and terrestrial species diversity, and aquatic and terrestrial food web indices, must be either researched in the field or investigators must wait until sufficient data is gathered through other research projects and efforts.

It may be observed that no one Environmental Impact Statement format is perfect, but that some fall much shorter of the avowed Council on Environmental Quality administrative demands than others. The author feels that the Bureau of Reclamation and the U.S. Geological Survey have attacked the problem of developing a suitable and utilizable Environmental Impact Statement format with skill and foresight; whereas, the Atomic Energy Commission format is inferior. It is felt that since the Environmental Impact Statement formats of the Bureau of Reclamation and the U.S. Geological Survey are readily available to anyone on request, the Atomic Energy Commission should obtain these and use them as models for developing an Environmental Impact Statement format and matrix that will meet their specialized needs. Although it is recog-

nized that a lack of departmental and agency cooperation is often a factor in slowing down the development of adequate Environmental Evaluation Systems, the author proposes that this need not be the case and looks forward to new steps taken towards directing governmental activities to a higher plateau in areas of environmental research and concern.

V. CRITICAL ANALYSIS OF THE CAROLINA POWER AND LIGHT  
COMPANY ENVIRONMENTAL IMPACT STATEMENT

A study of the Environmental Impact Statement submitted to the Atomic Energy Commission by the Carolina Power and Light Company for their Brunswick Nuclear Steam Electric Plant near Southport, North Carolina was conducted. (6) As mentioned in previous sections, the Atomic Energy Commission is constantly revamping their Environmental Impact Statement format and data requirements due to recent court reversals (i.e., Calvert Cliffs, etc.). These changes and updates can be found periodically, as they are approved, in the Federal Register under the heading of "Atomic Energy Commission" or "Environment".

The Environmental Impact Statement submitted for the Brunswick Nuclear Steam Electric Plant has ten major sections:

- Section 1 - Introduction
- Section 2 - Site and Plant Description
- Section 3 - Probable Environmental Impact of the Plant
- Section 4 - Alternatives to the Proposed Facility
- Section 5 - Environmental Effects Which Cannot be Avoided
- Section 6 - Short-Term Uses Versus Long-Term Productivity
- Section 7 - Irretrievable and Irreversible Commitments  
of Resources
- Section 8 - Radiological Accident Considerations
- Section 9 - Cost-Benefit Considerations
- Section 10- Conclusions

The Environmental Impact Statement also has a section containing additional information dealing with alternative power sources, alternative plant sites, alternative cooling methods (spray cooling ponds, mechanical and natural draft cooling towers), transmission system and alternatives to the system selected, cooling water canal and its potential impact on surrounding environs, atmospheric impact of the plant, impact of water use and disposal, monitoring programs, endangered species, and resource inventory characterization. This "eleventh-hour" section, Amendment I, was added quite some time after the initial document was prepared and submitted for approval. It is interesting that this section was about one-half the size of the original document and contains more precise technical data than the entire preliminary document, and that this information was only submitted after it was specifically asked for by the reviewers, indicating that Carolina Power and Light Company was somewhat remiss in divulging data pertinent to critical aspects of probable environmental degradation.

Herein is perhaps the heart of the entire matter: certain key agencies and companies who are required to submit Environmental Impact Statements under NEPA, are doing so quite grudgingly and are fighting the requirement to the point where federal agencies such as the Department of Transportation and the Atomic Energy Commission are encouraging legislation which would circumvent the NEPA 102-(2)C require-

ments for Environmental Impact Statement submission when these projects (interstate highways, atomic power plants, etc.) are being considered. (6)

Frequently, a document prepared by a company such as Carolina Power and Light Company will be biased in favor of their views on such things as the need for, location of, and methods of building an atomic power plant. The author feels that perhaps the authors of this particular document went overboard in not only selling the power plant, but also in selling electrical energy in general.

For example, this biased selling philosophy is set forth immediately by preliminary statements such as: "The Carolina Power and Light Company has a mandate, in common with all public utilities, to make every reasonable effort to satisfy the electric power needs of its service area" (6), or "This report has been prepared to define and illustrate the compatibility of the Brunswick Steam Electric Plant with its environs." (6) These statements, and others, present a general attitude that it has already been decided that the power plant is going to be built in a given area and that this document is going to prove that it is not at all detrimental to the segment of the biosphere in question, that it can only be good for the general plant area, the surrounding communities, and their people. This is not the purpose of an Environmental Impact Statement.

The purpose of an Environmental Impact Statement is to

present as objectively as possible all of the facts concerning a project and the alternatives to the project in such a way that a responsible decision concerning the fate of a project can be formulated. The decision should be based upon a weighing of the need and desirability of a project, its cost in terms of environmental degradation or improvement, and its effect on a given area's sociological, economic, industrial, and agricultural makeup.

Section 1 describes Carolina Power and Light Company's background in the field of nuclear power plants, their general plans for the erection and operation of the Brunswick Nuclear Steam Electric Plant, the major fields of scientific study employed in the investigation of the plant site and its environs, the responsible regulatory agencies, the major contractors for the construction and outfitting of the plant, the general geological and meteorological aspects of the plant site, general physical aspects of the plant, and construction and operative schedules. Sufficient maps, aerial photos, and location information for the plant, as required by law, are also supplied as part of Section 1. (6)

Section 2 gives a much more in-depth study of the plant site and its location, as well as a detailed description of the intended plant facilities. A more detailed investigation of the local land uses (i.e., amount of land used for agriculture, industry, and recreation) is part of this section. A study of how the potable and surface waters would be utilized

and affected was pursued. Also mentioned in this section was a continuing study of the marine biota which are of economic importance to the lower Cape Fear area.

A discussion of population density, geology, seismology, hydrology, and meteorology of the area are included, as well as a description of the plant, its reactors, coolant system, reactor control, reactor containment, refueling procedures, control building, service water intake structure, diesel generators, radwaste building and treatment system, plant stack, turbine building, cooling water canal, sewage treatment system, laboratories, and office space. Finally, included in this section is a listing to date of the permits and environmental approvals for the construction of the Brunswick Nuclear Steam Electric Plant and related facilities.(6)

In Section 3, "Probable Environmental Impact of the Plant", subsection 3.1.1., it is stated that a detailed investigation was conducted by Carolina Power and Light Company to determine the effect of the plant on public and private wells within a ten-mile radius of the plant. (6) However, the description of the work that was conducted and an adequate presentation of the research data were left out of the preliminary document. "High chloride contents"--How high?--, "maximum and minimum distance", etc., are phrases used to some extent; however, these phrases are not sufficiently supported by pertinent data and graphs. Throughout the entire document the omission of supporting data and graphs

is, in the author's opinion, the major flaw of this Environmental Impact Statement.

The effects on public water supplies of dewatering the plant site for the building excavation and the excavation of the canal and the possible effects of downwelling salt water into the Castle Hayne aquifer from the canal excavation were adequately discussed. (6)

Other topics investigated in subsection 3.1 (3.1.2.-3.1.6) are the plant and its facilities' impact on the adjoining or nearby recreational land, farm land, industrial land, historical landmarks, and archaeological activities. (6)

In subsection 3.2.1, it is stated that the plant site was originally covered with old-field vegetation and second-growth pine trees, which purportedly does not constitute a significant wildlife habitat. (6) It is felt that more data on plant and wildlife communities should be supplied for the reader to further substantiate this particular claim. In Amendment I this subject is sufficiently covered within the Carolina Power and Light Company response to the question on "Resource Inventory Characterization", part three (6), and supports their contention that the vegetation did not constitute a significant wildlife habitat.

The effects of the canal are discussed next, with mention of North Carolina's extensive estuarine waters and the plant's minimal impact on this delicate ecosystem. The total amount of marsh utilized is less than twenty-five acres for

the cooling water intake canal, and 120 acres for the cooling water discharge. Carolina Power and Light asserts that the system is already polluted from sewage discharges, and that the shellfish and shrimp must be transplanted before they are harvested; therefore, what marsh they utilize will not be important in the overall use pattern of this particular marsh area. There is, however, some question in the author's mind as to whether the committing of minor degradation on a given segment of the biosphere because it is already polluted is sound environmental reasoning. There is not enough material or data on the interruption of fresh water creek flows by the cooling water canal and the effects of the inverted siphon on the Intracoastal Waterway. The inverted siphon being a dual concrete pipeline system, each pipeline being fifteen feet in diameter and 720 feet long, that will be used to route the cooling canal water under the Intracoastal Waterway. This is designed to prevent the introduction of the heated canal effluent into the Intracoastal Waterway, and thereby prevent thermal pollution of the Intracoastal Waterway and surrounding marshes.

It is sufficient to say that not nearly enough discussion or data was supplied on the thermal discharge from the cooling water canal into the ocean and its effect on the oceanic ecosystem in this section, or, for that matter, the entire document. It is common knowledge that this factor is a thorny problem for nuclear power plants, and Carolina Power

and Light skillfully evades this issue in the preliminary document and partially in Amendment I.

Also discussed in subsection 3.2 are problems of the plant and its facilities' impact on migrating animals and fish diversion techniques (i.e., methods of dissuading larger marine life from entering the cooling water intake canal). Radiological effects of the plant are studied in great depth and detail. However, Carolina Power and Light Company asserts that the radiation that the Brunswick Nuclear Steam Electric Plant contributes is but a small percent of the natural background radiation and is negligible compared to natural and man-made radiation. This assertion could be misleading to the layman reading this document. Carolina Power and Light does not include in their discussion the fact that radiation tends to be cumulative and that the additional exposure from the Brunswick Nuclear Steam Electric Plant in conjunction with natural exposure and exposures from other man-made sources could cause problems in special instances.

According to subsection 3.3, Carolina Power and Light is presently conducting ecological studies of the plant site and its environs. Also, they have plans to monitor the area and anticipate and alleviate any problems which might occur after the plant is in operation. A special study of the hydrology of the plant's cooling water intake and studies of the phytoplankton, zooplankton, larval fish, species of fish, and benthic organisms was conducted primarily by

Dr. B.J. Copeland and Dr. J.E. Hobbie, both of North Carolina State University.

Plant construction, excluding canal construction, will exert a short term environmental impact, and it is stated that the entire area will be landscaped and replanted. The author feels that more space should have been devoted to detailing plans for the renewal of the plant site and its environs. The very technical data on historical radiation dosages, present radiation dosages to individuals, the entire population, etc., were given too much attention at the expense of the other aspects of environmental impact such as noise and visual environmental effects. (6)

The author finds it disappointing that Carolina Power and Light chose not to detail the alternatives to this power plant in Section 4. The first sentence in Section 4 is: "There are no practical alternatives to the Brunswick Nuclear Steam Electric Plant Units 1 and 2 for supplying the rapidly growing regional needs for electrical power." (6) This statement is a prime example of the company's attitude mentioned in the preceeding pages. They claim there are no alternatives to the proposed action, then proceed to support this point of view with a great deal of data which they, not an impartial outside investigator, have amassed. Nuclear units were chosen over fossil-fired units because of their long term economic advantages.

The alternate sites are discussed in Section 4, but are

not detailed at any length. Alternate site C, a hydro-electric impoundment in central North Carolina met most of Carolina Power and Light's requirements, but it is claimed that the number of people affected by the plant would have been greater than those affected by the Brunswick plant. However, Carolina Power and Light states further that this site may be utilized in future expansion of generating capacity. Question II in Amendment I asks for all data developed for sites B and C when they were under consideration. However, Carolina Power and Light admitted that it did not develop, as directed by NEPA in 1969, cost and environmental data for these sites. (6)

Section 4 also gives the rationale for choice of the method for dissipating the waste heat of the cooling water. Five methods were considered: wet cooling towers (natural and forced draft), closed cooling systems, cooling lakes, dilution of cooling water and return to the river, and channeling the cooling water to the ocean for off-shore discharge. Wet cooling towers were not chosen, supposedly because of a lack of operating experience of water cooling towers in the United States. Closed cooling systems were not selected because of the higher expense in construction and operation. A cooling lake was eliminated because of the amount of land it would require. Thus, by a process of elimination, channelization of Cape Fear River water to the plant was the chosen method of cooling the reactor. (6)

Section 5 is a discussion of the "Environmental Effects Which Cannot Be Avoided". (6) Some of the effects, to which an entire four and one-third pages of the document are devoted, are that of the permanent loss of land and marsh required by the plant and canal, the permanent effect of the canal on the ground water, the amounts and effects of radioactive wastes and other plant wastes, effects of aquatic plant and animal mortalities from passage through the cooling water system, and the effects of the transmission lines on the land and its use.

Section 6 "Short-Term Uses Versus Long-Term Productivity" proves to be mostly propoganda supporting Carolina Power and Light's stand on constructing the power plant in Brunswick County, their reasons for building it in the first place, and a general selling of and praise for electrical energy, and its uses and benefits. (6)

Section 7 details the "Irretrievable and Irreversible Commitments of Resources"; and according to Carolina Power and Light, the only resources that are irretrievably and irreversibly committed are those materials used in the construction and operation of the power plant. (6) However, "resources" not only means those materials and time that Carolina Power and Light will invest in the construction of the atomic power plant and its related facilities, but also those natural resources that are indigenous to the segment of the biosphere in which the plant is to be situated. Some

of the marsh that will be dredged out for the canal will be permanently lost; whereas, terrestrial areas that have been utilized can be reclaimed by removing the structures built on them, replacing the earth, reforesting, and the natural process of land reclamation by wild plants and animals.

Thus, in the author's opinion, only those marsh and tidal ecosystems that are disrupted and removed are the areas of the biosphere which will probably be irretrievably and irreversibly lost. Also, the author feels that much more data and discussion should have been devoted to studying and describing these natural resources, notably the above mentioned marsh ecosystems, which will be lost, and how Carolina Power and Light plans to keep these losses at a minimum.

Section 8 is the "Radiological Accident Considerations" segment of the Environmental Impact Statement, which, as already stated in a previous section, the author feels should be a report separate from the Environmental Impact Statement. (6)

Section 9, "Cost-Benefits Considerations", is a description of how Carolina Power and Light went about making their decisions and cost analyses. However, they do not provide monetary cost breakdowns. Some cost data are found in answer to a question in Amendment I, but these data should be the main emphasis of this section. Also, Carolina Power and Light uses this section to sell again their views on

electrical energy.

Section 10, "Conclusion", is totally inadequate. It should have presented a brief summary of the Environmental Impact Statement and conclusions based on the data presented in the document. All this section, not quite one-half page, says is that Carolina Power and Light has minimized the impact of the Brunswick Nuclear Steam Electric Plant and that its construction constitutes a sound social endeavor. (6)

With the later addition of comments and further data in Amendment I, the Carolina Power and Light Company's Environmental Impact Statement adequately complies with the requirements of NEPA of 1969. Even though it can be considered adequate in its amended form, it could be improved. The document is much too biased, redundant, and repetitious. Many points of discussion are not organized and are analyzed in various degrees several times in different sections. The document should be edited for objectivity, content, organization, repetition, and length. The document is much too cumbersome and lengthy to be read with any great comprehension by all the local, state, and federal reviewers who must, by law, review, comment, and approve or disapprove the document and the project for which it is being submitted.

Also, the author feels that the Environmental Impact Statement should contain more specific and detailed information concerning that segment of the biosphere which will be affected by the cooling water canal and the thermal discharge

from the cooling water canal. The most notable elements of this segment of the biosphere that should be investigated would be the marine, terrestrial, and fresh water flora and fauna that will be affected by the above mentioned project actions.

It is recommended that the document be accompanied by a brief though comprehensive summary and some type of summary-evaluation matrix. An example of such a matrix that could be used is the U.S. Geological summary-evaluation matrix. (See Appendix B)

A rough U.S Geological Survey summary-evaluation matrix with the author's suggested revisions has been prepared (See Appendix D) to illustrate the type of summary-evaluation matrix that the author feels would facilitate the preparation of a summary for the Carolina Power and Light project and make the process of review and comment on the document a much easier task.

It is realized that the public does demand increased electrical production and that in all probability the Brunswick Nuclear Steam Electric Plant is the most practical solution that exerts the least environmental impact on the segment of the biosphere in question. However, the restive attitude of governmental agencies towards the outlining of adequate draft requirements for the preparation and submission of Environmental Impact Statements is apparent. Governmental and corporate attitudes should be reassessed and

realigned to support and comply with the spirit of environmental protection for the benefit of all persons with which the NEPA of 1969 was drafted and passed.

## VI. SUMMARY AND CONCLUSIONS

As stated in previous sections, the author feels that departmental and agency lack of cooperation and reticence on all governmental levels towards developing a generalized Environmental Impact Statement format has seriously hampered the drafting-submission-review-comment process of dealing with Environmental Impact Statements and the projects they represent. Perhaps such impediments can be overcome and the development of a generalized Environmental Impact Statement format will be realized in the near future.

The author feels that the developers of any generalized format should realize that an interdisciplinary team approach is mandatory and should be utilized in the preparation of an Environmental Impact Statement and that the size of the document should be kept to a minimum, while covering all the major points of discussion set forth in the Council on Environmental Quality guidelines for the preparation of an Environmental Impact Statement. The document should be factual and concise, dealing with specific environmental interactions. Every Environmental Impact Statement should have a written summary accompanying it. Primarily, the summary should cover those areas of environmental impact which are characterized as being fragile and easily disrupted.

In summarizing and evaluating environmental interactions, the author feels that a summary-evaluation matrix system

such as the one developed by Battelle-Columbus for the Bureau of Reclamation or the one developed by the U.S. Geological Survey should be utilized. This format would give a means for providing a quick review of an Environmental Impact Statement and aid a reviewer in his investigation of those critical and fragile areas of the environment which could sustain the most change--beneficial or detrimental--should a project be implemented. As previously noted, the Bureau of Reclamation's Environmental Impact Statement format and summary-evaluation matrix is exceptionally well-developed and could be used by most any agency with little or no alterations.

The U.S. Geological Survey's summary-evaluation matrix is easily adaptable. Its x-axis and y-axis evaluative components can be readily condensed or expanded to suit a particular situation; however, it is felt that the "magnitude" and "importance" numerical rating system should use values of one to thirty (1-30) instead of one to ten (1-10), and that the interactions should be color coded--green, yellow, and red--to indicate low, medium, and high environmental impact.

Thus it is seen that by studying the above mentioned Environmental Impact Statement formats and exerting a minimum of time and effort, any agency can prepare an Environmental Impact Statement that will be factual, concise, easily read, and understood by those who must objectively review and

comment upon a project's benefits and detriments in regards to that segment of the biosphere with which it will interact if it is implemented.

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## APPENDIX A

### THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

PUBLIC LAW 91-190, JANUARY 1, 1970

An act to establish a national policy for the environment, to provide for the establishment of a Council on Environmental Quality, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress Assembled; That this Act may be cited as the "National Environmental Policy Act of 1969".

#### Purpose

Section 2. The purposes of the Act are: To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.

#### Title I

##### Declaration of National Environmental Policy

Section 101. (a) The Congress, recognizing the profound impact of man's activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high-density urbanization, industrial

expansion, resource exploitation, and new and expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man, declares that it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.

(b) In order to carry out the policy set forth in this Act, it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may:

- (1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- (2) assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;
- (3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;

- (4) preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice;
- (5) achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and
- (6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

(c) The Congress recognizes that each person should enjoy a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment.

Section 102. The Congress authorizes and directs that, to the fullest extent possible: (1) the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this Act, and (2) all agencies of the Federal Government shall:

- (A) utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decisionmaking which may have an impact on man's environment;
- (B) identify and develop methods and procedures, in consultation with the Council on Environmental Quality

established by title II of this Act, which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations;

(C) include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on:

- (i) the environmental impact of the proposed action
- (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,
- (iii) alternatives to the proposed action
- (iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
- (v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Prior to making any detailed statement, the responsible Federal official shall consult with and obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved. Copies of such statement

and the comments and views of the appropriate Federal, State, and local agencies, which are authorized to develop and enforce environmental standards, shall be made available to the President, the Council on Environmental Quality and to the public as provided by section 552 of title 5, United States Code, and shall accompany the proposal through the existing agency review process;

- (D) study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources;
  - (E) recognize the worldwide and long-range character of environmental problems and, where consistent with the foreign policy of the United States, lend appropriate support to initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline in the quality of mankind's world environment;
  - (F) make available to States, counties, municipalities, institutions, and individuals, advice and information useful in restoring, maintaining, and enhancing the quality of the environment;
  - (G) initiate and utilize ecological information in the planning and development of resource-oriented projects;
- and

(H) assist the Council on Environmental Quality established by title II of this Act.

Section 103. All agencies of the Federal Government shall review their present statutory authority, administrative regulations, and current policies and procedures for the purpose of determining whether there are any deficiencies or inconsistencies therein which prohibit full compliance with the purposes and provisions of the Act and shall propose to the President not later than July 1, 1971, such measures as may be necessary to bring their authority and policies into conformity with the intent, purposes, and procedures set forth in this Act.

Section 104. Nothing in section 102 or 103 shall in any way affect the specific statutory obligations of any Federal agency (1) to comply with criteria or standards of environmental quality, (2) to coordinate or consult with any other Federal or State agency, or (3) to act, or refrain from acting contingent upon the recommendations or certification of any other Federal or State agency.

Section 105. The policies and goals set forth in this Act are supplementary to those set forth in existing authorizations of Federal agencies.

## Title II

### Council on Environmental Quality

Section 201. The President shall transmit to the Congress annually beginning July 1, 1970, an Environmental Quality

Report (hereinafter referred to as the "report") which shall set forth (1) the status and condition of the major natural, manmade, or altered environmental classes of the Nation, including, but not limited to, the air, the aquatic, including marine, estuarine, and fresh water, and the terrestrial environment, including, but not limited to, the forest, dryland, wetland, range, urban, suburban, and rural environment; (2) current and foreseeable trends in the quality, management and utilization of such environments and the effects of those trends on the social, economic, and other requirements of the Nation; (3) the adequacy of available natural resources for fulfilling human and economic requirements of the Nation in the light of expected population pressures; (4) a review of the programs and activities (including regulatory activities) of the Federal Government, the State and local governments, and nongovernmental entities or individuals, with particular reference to their effect on the environment and on the conservation, development and utilization of natural resources; and (5) a program for remedying the deficiencies of existing programs and activities, together with recommendations for legislation.

Section 202. There is created in the Executive Office of the President a Council on Environmental Quality (hereinafter referred to as the "Council"). The Council shall be composed of three members who shall be appointed by the President to serve at his pleasure, by and with the advice and consent of

the Senate. The President shall designate one of the members of the Council to serve as Chairman. Each member shall be a person who, as a result of his training, experience, and attainments, is exceptionally well qualified to analyze and interpret environmental trends and information of all kinds; to appraise programs and activities of the Federal Government in the light of the policy set forth in title I of this Act; to be conscious of and responsive to the scientific, economic, social, esthetic, and cultural needs and interests of the Nation; and to formulate and recommend national policies to promote the improvement of the quality of the environment.

Section 203. The Council may employ such officers and employees as may be necessary to carry out its functions under this Act. In addition, the Council may employ and fix the compensation of such experts and consultants as may be necessary for the carrying out of its functions under this Act, in accordance with section 3109 of title 5, United States Code (but without regard to the last sentence thereof).

Section 204. It shall be the duty and function of the Council:

- (1) to assist and advise the President in the preparation of the Environmental Quality Report required by section 201;
- (2) to gather timely and authoritative information concerning the conditions and trends in the quality of the environment both in current and prospective, to analyze and interpret such information for the pur-

pose of determining whether such conditions and trends are interfering, or are likely to interfere, with the achievement of the policy set forth in title I of this Act, and to compile and submit to the President studies relating to such conditions and trends;

- (3) to review and appraise the various programs and activities of the Federal Government in the light of the policy set forth in title I of this Act for the purpose of determining the extent to which such programs and activities are contributing to the achievement of such policy, and to make recommendations to the President with respect thereto;
- (4) to develop and recommend to the President national policies to foster and promote the improvement of environmental quality to meet the conservation, social, economic, health, and other requirements and goals of the Nation;
- (5) to conduct investigations, studies, surveys, research, and analyses relating to ecological systems and environmental quality;
- (6) to document and define changes in the natural environment, including the plant and animal systems, and to accumulate necessary data and other information for a continuing analysis of these changes or trends and an interpretation of their underlying causes;

- (7) to report at least once each year to the President on the state and condition of the environment; and
- (8) to make and furnish such studies, reports thereon, and recommendations with respect to matters of policy and legislation as the President may request.

Section 205. In exercising its powers, functions, and duties under this Act, the Council shall:

- (1) consult with the Citizens' Advisory Committee on Environmental Quality established by Executive Order numbered 11472, dated May 29, 1969, and with such representatives of science, industry, agriculture, labor, conservation organizations, State and local governments and other groups, as it deems advisable; and
- (2) utilize, to the fullest extent possible, the services, facilities and information (including statistical information) of public and private agencies and organization, and individuals, in order that duplication of effort and expense may be avoided, thus assuring that the Council's activities will not unnecessarily overlap or conflict with similar activities authorized by law and performed by established agencies.

Section 206. Members of the Council shall serve full time and the Chairman of the Council shall be compensated at the rate provided for Level II of the Executive Schedule Pay Rates (5 U.S.C. 5315).

Section 207. There are authorized to be appropriated to carry out the provisions of this Act not to exceed \$300,000 for fiscal year 1970, \$700,000 for fiscal year 1971, and \$1,000,000 for each fiscal year thereafter.

Approved January 1, 1970

(See bibliography reference no. 1)

INSTRUCTIONS		A. MODIFICATION OF REGIME		B. LAND TRANSFORMATION AND CONSTRUCTION		C. RESOURCE EXTRACTION		D. PROCESSING		E. LAND ALTERATION		F. RESOURCE RENEWAL		G. CHANGES IN TRAFFIC		H. WASTE EMPLACEMENT AND TREATMENT		I. CHEMICAL TREATMENT		J. ACCIDENTS		OTHERS	
		PROPOSED ACTIONS																					
1- Identify all actions (located across the top of the matrix) that are part of the proposed project.	2- Under each of the proposed actions, place a slash at the intersection with each item on the side of the matrix if an impact is possible.	3- Having completed the matrix, in the upper left-hand corner of each box with a slash, place a number from 1 to 10 which indicates the MAGNITUDE of the possible impact; 10 represents the greatest magnitude of impact and 1, the least, (no zeroes). Before each number place + if the impact would be beneficial. In the lower right-hand corner of the box place a number from 1 to 10 which indicates the IMPORTANCE of the possible impact (e. g. regional vs. local); 10 represents the greatest importance and 1, the least (no zeroes).	4- The text which accompanies the matrix should be a discussion of the significant impacts, those columns and rows with large numbers of boxes marked and individual boxes with the larger numbers.	a. Exotic flora or fauna introduction		a. Blasting and drilling		a. Farming		a. Erosion control and terracing		a. Railway		a. Ocean dumping		a. Fertilization		a. Explosions		a.		a.	
				b. Biological controls		b. Surface excavation		b. Ranching and grazing		b. Mineral resources		b. Mine sealing and waste control		b. Automobile		b. Landfill		b. Chemical dicing of highways, etc.		b. Spills and leaks		b.	
		c. Modification of habitat		c. Airports		c. Feed lots		c. Energy generation		c. Strip mining rehabilitation		c. Trucking		c. Placement of tailings, spoil and overburden		c. Chemical stabilization of soil		c. Insect control (pesticides)		c.		c.	
		d. Alteration of ground water hydrology		d. Highways and bridges		d. Dairying		d. Mineral processing		d. Landscaping		d. Shipping		d. Underground storage		d. Weed control		d.		d.		d.	
		e. Alteration of drainage		e. Roads and trails		e. Cables and lifts		e. Metallurgical industry		e. Harbor dredging		e. Aircraft		e. Junk disposal		e. Oil well flooding		e.		e.		e.	
		f. River control and flow modification		f. Railroads		f. Transmission lines, pipelines and corridors		f. Chemical industry		f. Marsh fill and drainage		f. River and canal traffic		f. Deep well emplacement		f. Municipal waste discharge including spray irrigation		f.		f.		f.	
		g. Canalization		g. Cables and lifts		g. Barriers including fencing		g. Textile industry		g. Reforestation		g. Pleasure boating		g. Cooling water discharge		g. Liquid effluent discharge		g.		g.		g.	
		h. Irrigation		h. Dams and impoundments		h. Channel dredging and straightening		h. Automobile and aircraft		h. Wildlife stocking and management		h. Trails		h. Stabilization and oxidation ponds		h. Septic tanks, commercial and domestic		h.		h.		h.	
		i. Weather modification		i. Piers, seawalls, marinas, and sea terminals		i. Channel revetments		i. Oil refining		i. Fertilization application		i. Cables and lifts		i. Stack and exhaust emission		i. Spent lubricants		i.		i.		i.	
		j. Burning		j. Dams and impoundments		j. Canals		j. Food		j. Waste recycling		j. Communication		j. Stabilization and oxidation ponds		j. Spent lubricants		j.		j.		j.	
		k. Surface or paving		k. Dams and impoundments		k. Canals		k. Food		k. Waste recycling		k. Communication		k. Stabilization and oxidation ponds		k. Spent lubricants		k.		k.		k.	
		l. Noise and vibration		l. Dams and impoundments		l. Canals		l. Food		l. Waste recycling		l. Communication		l. Stabilization and oxidation ponds		l. Spent lubricants		l.		l.		l.	
		m. Noise and vibration		m. Dams and impoundments		m. Canals		m. Food		m. Waste recycling		m. Communication		m. Stabilization and oxidation ponds		m. Spent lubricants		m.		m.		m.	
		n. Noise and vibration		n. Dams and impoundments		n. Canals		n. Food		n. Waste recycling		n. Communication		n. Stabilization and oxidation ponds		n. Spent lubricants		n.		n.		n.	
		o. Noise and vibration		o. Dams and impoundments		o. Canals		o. Food		o. Waste recycling		o. Communication		o. Stabilization and oxidation ponds		o. Spent lubricants		o.		o.		o.	
		p. Noise and vibration		p. Dams and impoundments		p. Canals		p. Food		p. Waste recycling		p. Communication		p. Stabilization and oxidation ponds		p. Spent lubricants		p.		p.		p.	
		q. Noise and vibration		q. Dams and impoundments		q. Canals		q. Food		q. Waste recycling		q. Communication		q. Stabilization and oxidation ponds		q. Spent lubricants		q.		q.		q.	
		r. Noise and vibration		r. Dams and impoundments		r. Canals		r. Food		r. Waste recycling		r. Communication		r. Stabilization and oxidation ponds		r. Spent lubricants		r.		r.		r.	
		s. Noise and vibration		s. Dams and impoundments		s. Canals		s. Food		s. Waste recycling		s. Communication		s. Stabilization and oxidation ponds		s. Spent lubricants		s.		s.		s.	
		t. Noise and vibration		t. Dams and impoundments		t. Canals		t. Food		t. Waste recycling		t. Communication		t. Stabilization and oxidation ponds		t. Spent lubricants		t.		t.		t.	
		u. Noise and vibration		u. Dams and impoundments		u. Canals		u. Food		u. Waste recycling		u. Communication		u. Stabilization and oxidation ponds		u. Spent lubricants		u.		u.		u.	
		v. Noise and vibration		v. Dams and impoundments		v. Canals		v. Food		v. Waste recycling		v. Communication		v. Stabilization and oxidation ponds		v. Spent lubricants		v.		v.		v.	
		w. Noise and vibration		w. Dams and impoundments		w. Canals		w. Food		w. Waste recycling		w. Communication		w. Stabilization and oxidation ponds		w. Spent lubricants		w.		w.		w.	
		x. Noise and vibration		x. Dams and impoundments		x. Canals		x. Food		x. Waste recycling		x. Communication		x. Stabilization and oxidation ponds		x. Spent lubricants		x.		x.		x.	
		y. Noise and vibration		y. Dams and impoundments		y. Canals		y. Food		y. Waste recycling		y. Communication		y. Stabilization and oxidation ponds		y. Spent lubricants		y.		y.		y.	
		z. Noise and vibration		z. Dams and impoundments		z. Canals		z. Food		z. Waste recycling		z. Communication		z. Stabilization and oxidation ponds		z. Spent lubricants		z.		z.		z.	
		aa. Noise and vibration		aa. Dams and impoundments		aa. Canals		aa. Food		aa. Waste recycling		aa. Communication		aa. Stabilization and oxidation ponds		aa. Spent lubricants		aa.		aa.		aa.	
		ab. Noise and vibration		ab. Dams and impoundments		ab. Canals		ab. Food		ab. Waste recycling		ab. Communication		ab. Stabilization and oxidation ponds		ab. Spent lubricants		ab.		ab.		ab.	
		ac. Noise and vibration		ac. Dams and impoundments		ac. Canals		ac. Food		ac. Waste recycling		ac. Communication		ac. Stabilization and oxidation ponds		ac. Spent lubricants		ac.		ac.		ac.	
		ad. Noise and vibration		ad. Dams and impoundments		ad. Canals		ad. Food		ad. Waste recycling		ad. Communication		ad. Stabilization and oxidation ponds		ad. Spent lubricants		ad.		ad.		ad.	
		ae. Noise and vibration		ae. Dams and impoundments		ae. Canals		ae. Food		ae. Waste recycling		ae. Communication		ae. Stabilization and oxidation ponds		ae. Spent lubricants		ae.		ae.		ae.	
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		aj. Noise and vibration		aj. Dams and impoundments		aj. Canals		aj. Food		aj. Waste recycling		aj. Communication		aj. Stabilization and oxidation ponds		aj. Spent lubricants		aj.		aj.		aj.	
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		ap. Noise and vibration		ap. Dams and impoundments		ap. Canals		ap. Food		ap. Waste recycling		ap. Communication		ap. Stabilization and oxidation ponds		ap. Spent lubricants		ap.		ap.		ap.	
		aq. Noise and vibration		aq. Dams and impoundments		aq. Canals		aq. Food		aq. Waste recycling		aq. Communication		aq. Stabilization and oxidation ponds		aq. Spent lubricants		aq.		aq.		aq.	
		ar. Noise and vibration		ar. Dams and impoundments		ar. Canals		ar. Food		ar. Waste recycling		ar. Communication		ar. Stabilization and oxidation ponds		ar. Spent lubricants		ar.		ar.		ar.	
		as. Noise and vibration		as. Dams and impoundments		as. Canals		as. Food		as. Waste recycling		as. Communication		as. Stabilization and oxidation ponds		as. Spent lubricants		as.		as.		as.	
		at. Noise and vibration		at. Dams and impoundments		at. Canals		at. Food		at. Waste recycling		at. Communication		at. Stabilization and oxidation ponds		at. Spent lubricants		at.		at.		at.	
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		av. Noise and vibration		av. Dams and impoundments		av. Canals		av. Food		av. Waste recycling		av. Communication		av. Stabilization and oxidation ponds		av. Spent lubricants		av.		av.		av.	
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		ax. Noise and vibration		ax. Dams and impoundments		ax. Canals		ax. Food		ax. Waste recycling		ax. Communication		ax. Stabilization and oxidation ponds		ax. Spent lubricants		ax.		ax.		ax.	
		ay. Noise and vibration		ay. Dams and impoundments		ay. Canals		ay. Food		ay. Waste recycling		ay. Communication		ay. Stabilization and oxidation ponds		ay. Spent lubricants		ay.		ay.		ay.	
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		bb. Noise and vibration		bb. Dams and impoundments		bb. Canals		bb. Food		bb. Waste recycling		bb. Communication		bb. Stabilization and oxidation ponds		bb. Spent lubricants		bb.		bb.		bb.	
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		bf. Noise and vibration		bf. Dams and impoundments		bf. Canals		bf. Food		bf. Waste recycling		bf. Communication		bf. Stabilization and oxidation ponds		bf. Spent lubricants		bf.		bf.		bf.	
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		bh. Noise and vibration		bh. Dams and impoundments		bh. Canals		bh. Food		bh. Waste recycling		bh. Communication		bh. Stabilization and oxidation ponds		bh. Spent lubricants		bh.		bh.		bh.	
		bi. Noise and vibration		bi. Dams and impoundments		bi. Canals		bi. Food		bi. Waste recycling		bi. Communication		bi. Stabilization and oxidation ponds		bi. Spent lubricants		bi.		bi.		bi.	
		bj. Noise and vibration		bj. Dams and impoundments		bj. Canals		bj. Food		bj. Waste recycling		bj. Communication		bj. Stabilization and oxidation ponds		bj. Spent lubricants		bj.		bj.		bj.	
		bk. Noise and vibration		bk. Dams and impoundments		bk. Canals		bk. Food		bk. Waste recycling		bk. Communication		bk. Stabilization and oxidation ponds		bk. Spent lubricants		bk.		bk.		bk.	
		bl. Noise and vibration		bl. Dams and impoundments		bl. Canals		bl. Food		bl. Waste recycling		bl. Communication		bl. Stabilization and oxidation ponds		bl. Spent lubricants		bl.		bl.		bl.	
		bm. Noise and vibration		bm. Dams and impoundments		bm. Canals		bm. Food		bm. Waste recycling		bm. Communication		bm. Stabilization and oxidation ponds		bm. Spent lubricants		bm.		bm.		bm.	
		bn. Noise and vibration		bn. Dams and impoundments		bn. Canals		bn. Food		bn. Waste recycling		bn. Communication		bn. Stabilization and oxidation ponds		bn. Spent lubricants		bn.		bn.		bn.	
		bo. Noise and vibration		bo. Dams and impoundments		bo. Canals		bo. Food		bo. Waste recycling		bo. Communication		bo. Stabilization and oxidation ponds		bo. Spent lubricants		bo.		bo.		bo.	
		bp. Noise and vibration		bp. Dams and impoundments		bp. Canals		bp. Food		bp. Waste recycling		bp. Communication		bp. Stabilization and oxidation ponds		bp. Spent lubricants		bp.		bp.		bp.	
		bq. Noise and vibration		bq. Dams and impoundments		bq. Canals		bq. Food		bq. Waste recycling		bq. Communication		bq. Stabilization and oxidation ponds		bq. Spent lubricants		bq.		bq.		bq.	
		br. Noise and vibration		br. Dams and impoundments		br. Canals		br. Food		br. Waste recycling		br. Communication		br. Stabilization and oxidation ponds		br. Spent lubricants		br.		br.		br.	
		bs. Noise and vibration		bs. Dams and impoundments		bs. Canals		bs. Food		bs. Waste recycling		bs. Communication		bs. Stabilization and oxidation ponds		bs. Spent lubricants		bs.		bs.		bs.	
		bt. Noise and vibration		bt. Dams and impoundments		bt. Canals		bt. Food		bt. Waste recycling		bt. Communication		bt. Stabilization and oxidation ponds		bt. Spent lubricants		bt.		bt.		bt.	
		bu. Noise and vibration		bu. Dams and impoundments		bu. Canals		bu. Food		bu. Waste recycling		bu. Communication		bu. Stabilization and oxidation ponds		bu. Spent lubricants		bu.		bu.		bu.	
		bv. Noise and vibration		bv. Dams and impoundments		bv. Canals		bv. Food		bv. Waste recycling		bv. Communication		bv. Stabilization and oxidation ponds		bv. Spent lubricants		bv.		bv.			

# APPENDIX C ENVIRONMENTAL EVALUATION SYSTEM

Sample Form  
 Project Location \_\_\_\_\_  
 Project Name \_\_\_\_\_  
 Dates of Evaluation \_\_\_\_\_  
 Site Evaluated \_\_\_\_\_

Evaluation Team  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Prepared for Bureau of Reclamation  
 by Battelle-Columbus  
 January 31, 1972  
 Contract 14-06-D-7182

## Ecology

### Species and Populations

	Value in EIU			Red Flags
	With Project	Without Project	Net Change	
<b>Terrestrial</b>				
(14) Browsers and grazers				
(14) Crops				
(14) Natural vegetation				
(14) Pest species				
(14) Upland game birds				
<b>Aquatic</b>				
(14) Commercial fisheries				
(14) Natural vegetation				
(14) Pest species				
(14) Sport fish				
(14) Waterfowl				
(140) Subtotal				

### Habitats and Communities

<b>Terrestrial</b>				
(12) Food web index				
(12) Land use				
(12) Rare and endangered species				
(14) Species diversity				
<b>Aquatic</b>				
(12) Food web index				
(12) Rare and endangered species				
(12) River characteristics				
(14) Species diversity				
(100) Subtotal				

### Ecosystems

Descriptive only				
(240) Ecology Total				

## Esthetics

### Land

	Value in EIU			Red Flags
	With Project	Without Project	Net Change	
(6) Geologic surface material				
(16) Relief and topographic character				
(10) Width and alignment				
(32) Subtotal				

### Air

(3) Odor and visual				
(2) Sounds				
(5) Subtotal				

### Water

(10) Appearance of water				
(16) Land and water interface				
(6) Odor and floating materials				
(10) Water surface area				
(10) Wooded and geologic shoreline				
(52) Subtotal				

### Biota

(5) Animals - domestic				
(5) Animals - wild				
(8) Diversity of vegetation types				
(5) Variety within vegetation types				
(24) Subtotal				

### Man-made Objects

(10) Man-made objects				
(10) Subtotal				

### Composition

(15) Composite effect				
(15) Unique composition				
(30) Subtotal				
(153) Esthetics Total				

## Environmental Pollution

### Water Pollution

	Value in EIU			Red Flags
	With Project	Without Project	Net Change	
(20) Basin hydrologic loss				
(25) BOD				
(31) Dissolved oxygen				
(18) Fecal coliforms				
(22) Inorganic carbon				
(25) Inorganic nitrogen				
(26) Inorganic phosphate				
(16) Pesticides				
(18) pH				
(28) Stream flow variation				
(28) Temperature				
(25) Total dissolved solids				
(14) Toxic substances				
(20) Turbidity				
(318) Subtotal				

### Air Pollution

(5) Carbon monoxide				
(5) Hydrocarbons				
(10) Nitrogen oxides				
(12) Particulate matter				
(5) Photochemical oxidants				
(10) Sulfur oxides				
(5) Other				
(52) Subtotal				

### Land Pollution

(14) Land use				
(14) Soil erosion				
(28) Subtotal				

### Noise Pollution

(4) Noise				
(4) Subtotal				
(402) Environmental Pollution Total				

## Human Interest

### Educational/Scientific Packages

	Value in EIU			Red Flags
	With Project	Without Project	Net Change	
(13) Archeological				
(13) Ecological				
(11) Geological				
(11) Hydrological				
(48) Subtotal				

### Historical Packages

(11) Architecture and styles				
(11) Events				
(11) Persons				
(11) Religions and cultures				
(11) "Western Frontier"				
(56) Subtotal				

### Cultures

(14) Indians				
(7) Other ethnic groups				
(7) Religious groups				
(28) Subtotal				

### Mood/Atmosphere

(11) Awe-inspiration				
(11) Isolation/solitude				
(4) Mystery				
(11) "Oneness" with nature				
(37) Subtotal				

### Life Patterns

(13) Employment opportunities				
(13) Housing				
(11) Social interactions				
(37) Subtotal				
(206) Human Interest Total				

	Total Ratings (EIU)			Red Flags
	With Project	Without Project	Net Change	
I. Ecology				
II. Environmental Pollution				
III. Esthetics				
IV. Human Interest				
<b>TOTAL</b>				

- I. Ecology
- II. Environmental Pollution
- III. Esthetics
- IV. Human Interest
- TOTAL**

( ) = Parameter Importance Units  
 Environmental Impact Units = Parameter Importance Units x Environmental Quality

(SEE BIBLIOGRAPHY REFERENCE NO. 8)

I. EXISTING CHARACTERISTICS AND CONDITIONS OF THE ENVIRONMENT		A. PHYSICAL AND CHEMICAL CHARACTERISTICS		B. BIOLOGICAL CONDITIONS		C. CULTURAL FACTORS		D. ECOLOGICAL RELATIONSHIPS SUCH AS:		OTHERS		COMPUTATIONS		II. PROPOSED ACTIONS WHICH MAY CAUSE ENVIRONMENTAL IMPACT																																																																																																																																
														A. MODIFICATION OF REGIME													B. LAND TRANSFORMATION AND CONSTRUCTION													C. RESOURCE EXTRACTION													D. PROCESSING													E. LAND ALTERATION													F. RESOURCE RENEWAL													G. CHANGES IN TRAFFIC													H. WASTE EMPLACEMENT AND TREATMENT													I. CHEMICAL TREATMENT													J. ACCIDENTS											
INSTRUCTIONS		1. EARTH		2. WATER		3. ATMOSPHERE		4. PROCESSES		1. FLORA		2. FAUNA		1. LAND USE		2. RECREATION		3. AESTHETICS AND HUMAN INTEREST		4. CULTURAL STATUS		5. MAN-MADE FACILITIES AND ACTIVITIES		a. Salinization of water resources		b. Eutrophication		c. Disease-insect vectors		d. Food chains		e. Salinization of surficial material		f. Brush encroachment		g. Other		a.		b.																																																																																																						
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<p>1- Identify all actions (located across the top of the matrix) that are part of the proposed project.</p> <p>2- Under each of the proposed actions, place a slash at the intersection with each item on the side of the matrix if an impact is possible.</p> <p>3- Having completed the matrix, in the upper left-hand corner of each box with a slash, place a number from 1 to 30 which indicates the MAGNITUDE of the possible impact; 30 represents the greatest magnitude of impact and 1, the least, (no zeroes). Before each number place + if the impact would be beneficial. In the lower right-hand corner of the box place a number from 1 to 30 which indicates the IMPORTANCE of the possible impact (e. g. regional vs. local); 30 represents the greatest importance and 1, the least (no zeroes).</p> <p>4- The text which accompanies the matrix should be a discussion of the significant impacts, those columns and rows with large numbers of boxes marked and individual boxes with the larger numbers.</p>		<p>SAMPLE MATRIX</p> <table border="1"> <tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr> <tr><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td></tr> <tr><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td></tr> <tr><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td></tr> <tr><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td></tr> </table>		a	b	c	d	e	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	<p>LOW MEDIUM HIGH</p>		<p>PROPOSED ACTIONS</p> <p>a. Exotic flora or fauna introduction</p> <p>b. Biological controls</p> <p>c. Modification of habitat</p> <p>d. Alteration of ground cover</p> <p>e. Alteration of ground water hydrology</p> <p>f. Alteration of drainage</p> <p>g. River-control and flow modification</p> <p>h. Canalization</p> <p>i. Irrigation</p> <p>j. Weather modification</p> <p>k. Burning</p> <p>l. Surface or paving</p> <p>m. Noise and vibration</p> <p>n. Urbanization</p> <p>o. Industrial sites and buildings</p> <p>p. Airports</p> <p>q. Highways and bridges</p> <p>r. Roads and trails</p> <p>s. Railroads</p> <p>t. Cables and lifts</p> <p>u. Transmission lines, pipelines and corridors</p> <p>v. Barriers including fencing</p> <p>w. Channel dredging and straightening</p> <p>x. Channel reverts</p> <p>y. Canals</p> <p>z. Dams and impoundments</p> <p>aa. Piers, seawalls, marinas, and sea terminals</p> <p>ab. Offshore structures</p> <p>ac. Recreational structures</p> <p>ad. Blasting and drilling</p> <p>ae. Cut and fill</p> <p>af. Tunnels and underground structures</p> <p>ag. Blasting and drilling</p> <p>ah. Surface excavation</p> <p>ai. Subsurface excavation and retorting</p> <p>aj. Well drilling and fluid removal</p> <p>ak. Dredging</p> <p>al. Clear cutting and other lumbering</p> <p>am. Commercial fishing and hunting</p> <p>an. Farming</p> <p>ao. Feed lots</p> <p>ap. Dairying</p> <p>aq. Energy generation</p> <p>ar. Mineral processing</p> <p>as. Metallurgical industry</p> <p>at. Chemical industry</p> <p>au. Textile industry</p> <p>av. Automobile and aircraft</p> <p>aw. Oil refining</p> <p>ax. Food</p> <p>ay. Lumbering</p> <p>az. Pulp and paper</p> <p>ba. Product storage</p> <p>bb. Erosion control and terracing</p> <p>bc. Mine sealing and waste control</p> <p>bd. Strip mining rehabilitation</p> <p>be. Landscaping</p> <p>bf. Harbor dredging</p> <p>bg. Marsh fill and drainage</p> <p>bh. Reforestation</p> <p>bi. Wildlife stocking and management</p> <p>bj. Ground water recharge</p> <p>bk. Fertilization application</p> <p>bl. Waste recycling</p> <p>bm. Railway</p> <p>bn. Automobile</p> <p>bo. Trucking</p> <p>bp. Shipping</p> <p>bq. Aircraft</p> <p>br. River and canal traffic</p> <p>bs. Pleasure boating</p> <p>bt. Trails</p> <p>bu. Cables and lifts</p> <p>bv. Communication</p> <p>bw. Pipeline</p> <p>bx. Ocean dumping</p> <p>by. Landfill</p> <p>bz. Emplacement of tailings, spoil and overburden</p> <p>ca. Underground storage</p> <p>cb. Junk disposal</p> <p>cc. Oil well flooding</p> <p>cd. Deep well emplacement</p> <p>ce. Cooling water discharge</p> <p>cf. Municipal waste discharge including spray irrigation</p> <p>cg. Liquid effluent discharge</p> <p>ch. Stabilization and oxidation ponds</p> <p>ci. Septic tanks, commercial and domestic</p> <p>cj. Stack and exhaust emission</p> <p>ck. Spent lubricants</p> <p>cl. Fertilization</p> <p>cm. Chemical deicing of highways, etc.</p> <p>cn. Chemical stabilization of soil</p> <p>co. Weed control</p> <p>cp. Insect control (pesticides)</p> <p>cq. Explosions</p> <p>cr. Spills and leaks</p> <p>cs. Operational failure</p>													<p>COMPUTATIONS</p>																																																																																								
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<p>1. EARTH</p> <p>a. Mineral resources</p> <p>b. Construction material</p> <p>c. Soils</p> <p>d. Land form</p> <p>e. Force fields and background radiation</p> <p>f. Unique physical features</p> <p>2. WATER</p> <p>a. Surface</p> <p>b. Ocean</p> <p>c. Underground</p> <p>d. Quality</p> <p>e. Temperature</p> <p>f. Recharge</p> <p>g. Snow, ice, and permafrost</p> <p>3. ATMOSPHERE</p> <p>a. Quality (gases, particulates)</p> <p>b. Climate (micro, macro)</p> <p>c. Temperature</p> <p>4. PROCESSES</p> <p>a. Floods</p> <p>b. Erosion</p> <p>c. Deposition (sedimentation, precipitation)</p> <p>d. Solution</p> <p>e. Sorption (ion exchange, complexing)</p> <p>f. Compaction and settling</p> <p>g. Stability (slides, slumps)</p> <p>h. Stress-strain (earthquake)</p> <p>i. Air movements</p> <p>1. FLORA</p> <p>a. Trees</p> <p>b. Shrubs</p> <p>c. Grass</p> <p>d. Crops</p> <p>e. Microflora</p> <p>f. Aquatic plants</p> <p>g. Endangered species</p> <p>h. Barriers</p> <p>i. Corridors</p> <p>2. FAUNA</p> <p>a. Birds</p> <p>b. Land animals including reptiles</p> <p>c. Fish and shellfish</p> <p>d. Benthic organisms</p> <p>e. Insects</p> <p>f. Microfauna</p> <p>g. Endangered species</p> <p>h. Barriers</p> <p>i. Corridors</p> <p>1. LAND USE</p> <p>a. Wilderness and open spaces</p> <p>b. Wetlands</p> <p>c. Forestry</p> <p>d. Grazing</p> <p>e. Agriculture</p> <p>f. Residential</p> <p>g. Commercial</p> <p>h. Industrial</p> <p>i. Mining and quarrying</p> <p>2. RECREATION</p> <p>a. Hunting</p> <p>b. Fishing</p> <p>c. Boating</p> <p>d. Swimming</p> <p>e. Camping and hiking</p> <p>f. Picnicking</p> <p>g. Resorts</p> <p>3. AESTHETICS AND HUMAN INTEREST</p> <p>a. Scenic views and vistas</p> <p>b. Wilderness qualities</p> <p>c. Open space qualities</p> <p>d. Landscape design</p> <p>e. Unique physical features</p> <p>f. Parks and reserves</p> <p>g. Monuments</p> <p>h. Rare and unique species or ecosystems</p> <p>i. Historical or archaeological sites and objects</p> <p>j. Presence of misfits</p> <p>4. CULTURAL STATUS</p> <p>a. Cultural patterns (life style)</p> <p>b. Health and safety</p> <p>c. Employment</p> <p>d. Population density</p> <p>5. MAN-MADE FACILITIES AND ACTIVITIES</p> <p>a. Structures</p> <p>b. Transportation network (movement, access)</p> <p>c. Utility networks</p> <p>d. Waste disposal</p> <p>e. Barriers</p> <p>f. Corridors</p> <p>D. ECOLOGICAL RELATIONSHIPS SUCH AS:</p> <p>a. Salinization of water resources</p> <p>b. Eutrophication</p> <p>c. Disease-insect vectors</p> <p>d. Food chains</p> <p>e. Salinization of surficial material</p> <p>f. Brush encroachment</p> <p>g. Other</p> <p>OTHERS</p> <p>a.</p> <p>b.</p>																																																																																																																																														



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A CRITICAL ANALYSIS OF THE FEDERAL  
ENVIRONMENTAL IMPACT STATEMENT

by

Julian Allan Brown

ABSTRACT

The Federal Government has made many attempts to legislate environmental quality and protection. However, not until the passage of the National Environmental Protection Act of 1969 was there any means of making those who manipulate the biosphere for various purposes accountable for their actions on any segment of the biosphere. The requirement for submitting Environmental Impact Statements found in section 102-(2)C of NEPA demands accountability for what is being pursued or planned in relation to a project's environmental impact.

The Council on Environmental Quality has established guidelines for the contents of an Environmental Impact Statement. By following these guidelines, federal agencies such as the U.S. Geological Survey, the Atomic Energy Commission, and the Bureau of Reclamation have developed individualized formats for Environmental Impact Statements. These three formats were evaluated in terms of the requirements as stated in the law.

The Bureau of Reclamation uses as its format the "Environmental Evaluation System" which was prepared by Battelle-

Columbus Laboratories. The U.S. Atomic Energy Commission at present favors a "report-compilation" approach for drafting Environmental Impact Statements. The U.S. Geological Survey and the Bureau of Reclamation favor an approach that utilizes "summary-evaluation matrices" to assess the environmental impact of a proposed project or action. There is evidence that in the future more federal agencies will utilize this "summary-evaluation matrix" approach rather than a strict "report-compilation" format in drafting Environmental Impact Statements.

A case study involving a critical evaluation of the Environmental Impact Statement for the Carolina Power and Light Company's Brunswick Nuclear Steam Electric Plant near Southport, North Carolina, was conducted.