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THE GENESIS OF AN ENVIRONMENTAL STATEMENT -- NUCLEAR POWER REACTOR

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INTRODUCTION

When Moses and the Israelites approached the Red Sea, God said to Moses: "I bring you some good news and some bad news. First the good news. Stretch forth your hands over the water. I will part the water and you can pass over on dry land. Now, here is the bad news: you have to prepare an environmental impact report!"

In the climate of today with the environmentalists having their say, and with a factual appraisal of past damage from careless use of our resources, the utility wishing to move ahead with solving the energy crisis by providing nuclear power plants is faced with the same "bad news" that greeted Moses -- "you have to prepare an environmental impact report."

My purpose in talking to you today is to let you know something of the process by which a Final Environmental Statement comes into existence. Not only the mechanics of the process, but also the objective and content of the Final Statement, the reviews that are made before the agency (AEC) issues the Statement, and something of the follow-on activities by which the Applicant assures the agency that it is abiding by the recommendations in the Environmental Statement.

This paper is based on work performed under U.S. Atomic Energy Commission Contract AT(45-1)-1830.

DISCLAIMER

First, we need to get a little background on the legal requirements which have come into being the last four years.

During 1969 several bills were being developed in the national legislature, all having the objective of protecting the environment from uncontrolled exploitation and irreparable damage, and to state what the nation's environmental policy actually is, or should be. One bill was introduced by Senator Jackson as S-1075. During the ensuing months of 1969 various alternative bills and amendments were offered. Finally, a version of the bill was passed by both houses and President Nixon signed the bill, Public Law 91-190, which became known as the National Environmental Policy Act of 1969, frequently abbreviated to NEPA.

"In general, the Law (1) states the responsibility of the Federal Government toward the protection of the environment, (2) directs all federal agencies to prepare impact statements for federal actions which significantly affect the quality of the environment, and (3) establishes the Council on Environmental Quality to review federal activities in light of NEPA.[F.N.]

"Public Law 91-190 consists of two parts (See Figure 1). The first part, Title I, covers the declaration of the National Environmental Policy. Section 101 (A) states that the Congress declares that it is the continuing policy of the Federal Government to use all practicable means to create and maintain conditions under which man and nature can exist in productive harmony. Section 101 (B) (see Figure 2) states that it is the continuing responsibility of the Federal Government to use all practicable means to 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 undesireable and unintended consequences;
(4) preserve important historic, cultural, and natural aspects of our national

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F.N. -- Sections quoted are from "The National Environmental Policy Act and Nuclear Power Plant Licensing," D.B. Shipler, R.F. Foster, BNWL-SA-4670, April, 1973.

N E P A

PUBLIC LAW 91-190

JANUARY 1, 1970

TITLE I — DECLARATION OF NATIONAL ENVIRONMENTAL POLICY

SEC. 101 (A) THE CONGRESS . . . DECLARES THAT IT IS THE CONTINUING POLICY OF THE FEDERAL GOVERNMENT . . . TO USE ALL PRACTICABLE MEANS . . . TO CREATE AND MAINTAIN CONDITIONS UNDER WHICH MAN AND NATURE CAN EXIST IN PRODUCTIVE HARMONY.

FIGURE 1

N E P A

SEC. 101 (B) . . . IT IS THE CONTINUING RESPONSIBILITY OF THE FEDERAL GOVERNMENT TO USE ALL PRACTICABLE MEANS . . . TO COORDINATE FEDERAL PLANS, FUNCTIONS, PROGRAMS, AND RESOURCES TO THE END THAT . . .

(1) — EACH GENERATION IS TRUSTEE

(2) — HEALTHFUL, PRODUCTIVE, ESTHETIC SURROUNDINGS

(3) — WIDEST RANGE OF BENEFICIAL USES
— WITHOUT UNDESIRABLE -- CONSEQUENCES

(4) — PRESERVE HISTORIC, CULTURAL AND NATURAL ASPECTS OF NATIONAL HERITAGE,
— MAINTAIN -- AN ENVIRONMENT WHICH SUPPORTS A VARIETY OF INDIVIDUAL CHOICES.

(5) — BALANCE BETWEEN POPULATION AND RESOURCE USE

(6) — ENHANCE RENEWABLE RESOURCES
— RECYCLING

FIGURE 2

heritage and maintain, whenever 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 depleted resources.

"Section 102 of the Act provides for the administration of the policy by the various agencies of the Federal Government. Note that the Act applies only to Federal agencies and does not apply to actions of state or local governments. Section 102 (A) requires agencies to use a systematic, interdisciplinary approach to planning and decision making and Section 102 (B) requires that the agencies identify and develop methods and procedures in consultation with the Council on Environmental Quality to insure that environmental values may be given appropriate consideration in decision making along with economic and technical considerations. Section 102 (C) (see Figure 3) requires that all agencies of the Federal Government shall include in every recommendation 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 action,

(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.

The remainder of Section 102 deals with consultation among agencies, the worldwide, long-term character of actions and availability of advice and information to state and local government agencies. Sections 103, 104 and 105 deal with internal agency actions necessary for the agencies to comply with the Act.

"The second part of the Act, Title II, establishes the Council on Environmental Quality and outlines its organization, duties and functions. The Council does not rule as to whether a proposed action is environmentally good or bad or whether a permit or license will or will not be issued. Instead, the Council is responsible only for assuring that the provisions of the act are carried

N E P A

SEC. 102 . . . THE CONGRESS . . . DIRECTS THAT . . . ALL AGENCIES OF THE FEDERAL GOVERNMENT SHALL

(C) INCLUDE IN EVERY RECOMMENDATION . . . 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

(II) UNAVOIDABLE EFFECTS

(III) ALTERNATIVES

(IV) SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

(V) IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES.

FIGURE 3

out; i.e., a full disclosure of the environmental impact of a proposed action is made by the responsible Federal official.

AEC Implementation Of NEPA[2,3]

"NEPA does not specifically refer to the licensing activities of federal agencies. However, the Atomic Energy Commission (AEC) has interpreted the licensing of nuclear power plants as 'major Federal action significantly affecting the quality of the human environment'. Therefore, NEPA has had the effect of expanding the AEC's regulatory jurisdiction previously set down by the Atomic Energy Act of 1954 as amended. The 1954 act limited the AEC jurisdiction to radiological considerations; NEPA requires the AEC to consider nonradiological environmental effects as well. In accordance with this interpretation, the AEC has assumed the responsibility, under Section 102 (c), for preparing a detailed statement on environmental considerations for each proposed nuclear power plant. The implementation of this responsibility has proven to be a formidable task and the AEC produced its initial policy and procedure statement on April 2, 1970 (see Figure 4). On May 12, the Council on Environmental Quality (CEQ) published its interim guidelines for preparation of environmental statements and on June 3 the AEC issued its revised procedures to reflect the Council's action and the new Water Quality Improvement Act of April 3.

"On December 4, 1970, the Commission issued, as an effective rule, a revised statement of policy for implementing NEPA, Chapter 10 Code of Federal Regulations Part 50 (10CFR50) Appendix D. This policy stated that (1) an environmental report prepared by the applicant would be required with each application for a construction permit or operating license; (2) that the Commission would accept state certification and permits for meeting water and air quality standards and other state controlled activities and (3) that applications received prior to March 4, 1971 would be exempt from these requirements.

"To provide some uniformity to environmental reports, the Commission issued a guide to the preparation of environmental reports in February 1971, and in April (see Figure 5) the Council issued its final guidelines. In June, the Commission issued for comments 10CFR50 Appendix I. Appendix I provides the numerical guidelines for the long-standing policy of limiting radioactive releases and radiation doses to people in the vicinity of nuclear facilities to 'as low as practicable'.

"During the first year under NEPA, the AEC had relied primarily on the Environmental Report prepared by the Applicant and on studies performed by the

AEC IMPLEMENTATION OF NEPA

1970

JANUARY	NEPA SIGNED BY PRESIDENT
MARCH	EXEC. ORDER TO CEQ FOR GUIDELINES
APRIL	AEC INITIAL POLICY AND PROCEDURES FOR DETAILED STATEMENTS
MAY	CEQ INTERIM GUIDELINES
JUNE	AEC (FOR COMMENT) REVISED PROCEDURES FOR NEPA + WATER QUALITY ACT
DECEMBER	10CFR50 APPENDIX D REVISED POLICY AND PROCEDURES • ENV. REPORT REQUIRED WITH C.P. AND O.L. • AEC TO ISSUE D.S. • STATE CERTIFICATION OK EXCEPT FOR RADIOLOGICAL • MARCH 4, 1971 GRANDFAHER CLAUSE

1971

FEBRUARY	GUIDE TO THE PREPARATION OF ENVIRONMENTAL REPORTS FOR NUCLEAR POWER PLANTS (ISSUED FOR COMMENT AND INTERIM USE)

FIGURE 4

AEC IMPLEMENTATION OF NEPA

1971 (CON'T)	
APRIL	CEQ GUIDELINES
JUNE	10CFR50 APPENDIX I (ISSUED FOR COMMENTS)
JULY	"CALVERT CLIFFS" COURT DECISION
AUGUST	HEAVY USE OF AEC LABS
SEPTEMBER	10CFR50 APPENDIX D — MAJOR REVISION
1972	
JANUARY	WORKSHOP ON BENEFIT-COST GUIDELINES
MAY	GUIDE FOR INFO. ON COSTS & BENEFITS
AUGUST	GUIDE FOR PREP. OF ENV. REPORTS (ISSUED FOR COMMENTS)
1973	
JANUARY	ENVIRONMENTAL STATEMENT FOR APPENDIX I —ALAP—(ISSUED FOR COMMENTS)
FEBRUARY	10CFR50 GENERIC TREATMENT OF TRANSPORTATION
MARCH	PREPARATION OF ENVIRONMENTAL REPORTS FOR NUCLEAR POWER PLANTS—REGULATORY GUIDE 4.2

FIGURE 5

Applicant and his consultants for data upon which to prepare the Environmental Statement.

"Then early in 1971, the Calvert Cliffs Coordinating Committee (see Figure 6) brought suit against the Commission contending that the AEC should, in response to the National Environmental Policy Act, expand its independent evaluation to include all aspects of environmental impact. The case was heard before the U.S. Court of Appeals for the District of Columbia. The July decision of the court stated (1) that(see Figure 6) all licensing action taken since January 1970 would require an environmental statement (no grandfather clause), (2) that the AEC would have to conduct an independent assessment of all impacts (state certification not adequate), (3) that an analysis of benefit versus environmental cost must be made, (4) that a variety of alternatives must be considered, (5) that transportation of radioactive materials must be considered, (6) that the effect of transmission lines must also be considered, (7) that suspension of previously authorized activities must be considered pending NEPA review and (8) that Atomic Safety and Licensing Boards (ASLB) must always consider the environmental statements in decision making.

"Since the Calvert Cliffs decision, a number of major revisions in policies and procedures have occurred. Since the Atomic Energy Commission does not maintain the expertise necessary to assess all of the nonradiological impacts it had been directed to assess nor a large enough radiological staff to handle the backlog of some 70 applications, the AEC laboratories were pressed into service. By September, 10CFR50 Appendix D had been revised and major policy decisions were being made in the areas of benefit/cost analysis and evaluation of transportation of radioactive materials. In August 1972, a new guide for the preparation of environmental reports was issued for comment and in March 1973 the final guide was issued.

"The environmental statement for 10CFR50 Appendix I was issued for comment in January 1973 and is now being revised for final issuance. This one regulation is perhaps having a larger impact on nuclear facilities than any other regulation set down since NEPA. Its application will very likely lead to an acceptable method of evaluating the benefits of nuclear power and the cost to the environment."

THE "CALVERT CLIFFS" DECISION

1. NO GRANDFATHER CLAUSE
2. AEC INDEPENDENT ASSESSMENT (STATE CERTIFICATION NOT ADEQUATE)
3. ANALYSIS OF BENEFIT VERSUS ENVIRONMENTAL COST
4. ALTERNATIVES (SITES, FUEL, PLANT DESIGN)
5. TRANSPORTATION OF FUEL AND WASTES
6. TRANSMISSION SYSTEMS
7. CONSIDER SUSPENDING UNREVIEWED ACTIVITIES
8. HEARING BOARDS TO ALWAYS CONSIDER DETAILED STATEMENT

FIGURE 6

Now, with this as a background I'd like to have you put yourself in the shoes of the power utility manager, either private or public who is given the go-ahead to add a power reactor to the utility system. The usual engineering decisions must be made: capacity of the unit and other specifications, placement insofar as the power grid is concerned, schedules, sources of supply, bids for the nuclear and turbo generator units, and so on.

Besides the usual preliminaries attending a large construction venture are two extremely demanding activities. The first of these is to prepare a Preliminary Safety Analysis Report. This is a detailed explicit description of the nuclear reactor system and all the attendant steam generation systems, containment, waste heat dissipation, and all systems having any bearing on operation and safety of the plant.

I have before me one Preliminary Safety Analysis Report which is for the Wm. H. Zimmer Nuclear Power Station. The Applicant's license to construct a power reactor must deliver 300 copies of the PSAR to the AEC at the time of application for license. You may wish to examine these volumes to see the detail required. The format and content are explicitly described in manuals prepared by the AEC.

The second important document required of the Applicant is the Environmental Report, whose format and content were developed during the period following Calvert Cliffs decision. A final guide was issued in March, 1973, following a period made available for comment on the draft. I have here with me the Environmental Report for the Wm. H. Zimmer Nuclear Power Station. It is one or two large loose leaf binders and generally several appendices, and addenda, which keep growing throughout the licensing process. Without knowing the explicit content of the Environmental Report, you can see by its bulk that it represents a very large effort.

What is presented in the Applicant's Environmental Report?

The Table of Contents fills 3 pages and is summarized in Figure 7.

"(1) Purpose of the Proposed Facility - covers the need for power and the consequences of delay. (2) The Site - covers demography; land and water use; historic, scenic, cultural and natural landmarks; geology; hydrology, meteorology, ecology and background radiological characteristics. (3) The Plant - considers external appearance; reactor and steam-electric systems; water use; heat dis-

GUIDE TO THE PREPARATION OF ENVIRONMENTAL REPORTS FOR NUCLEAR POWER PLANTS 1973

CONTENTS

FIGURE 7

sipation systems; radwaste systems; chemical and biocide wastes, sanitary systems; radioactive materials and transmission facilities. (4) Environmental Effects of Site Preparation, Plant and Transmission Facilities Construction - considers site preparation; plant and transmission facilities construction and resources committed. (5) Environmental Effects of Plant Operations - states and evaluates the effects of heat dissipation systems; radiological impact on man and other biota; effects of chemical and biocide discharges; effects of sanitary waste discharges and effects of decommissioning and dismantling the plant. (6) Effluents and Environmental Measurements and Monitoring Programs- describes and evaluates the Applicant's preoperational and operational monitoring programs and any State and Federal programs related to the site. (7) Environmental Effects of Accidents - describes and evaluates plant accidents involving radioactivity. (8) Economic and Social Effects of Plant Construction and Operation - related the benefits and costs of plant construction and operation. (9) Alternative Energy Sources and Sites - compares and evaluates on a benefit-cost basis other energy sources and other potential sites for the plant. (10) Plant Deisgn Alternatives - analyzes and evaluates various cooling, intake, discharge, chemical treatment, biocide treatment, sanitary treatment, rad-waste treatment and transmission systems that could be used in the plant. (11) Summary Benefit-Cost Analysis - evaluates the proposed facility and alternatives in terms of benefits and economical and environmental costs.

"The process of preparing and submitting the environmental report follows the outline given in Figure 8. The Applicant studies several possible sites and by analysis selects one. He then initiates a wise variety of engineering and environmental studies to completely characterize the site. These studies nominally take about two years. With data and information in hand, the application, Preliminary Safety Analysis Report (PSAR) and Environmental Report (ER) are paepared and submitted to the AEC for a construction permit."

Action By The AEC

In compliance with federal-law (NEPA) the AEC must provide an independent assessment of the environmental impact of the proposed facility and submit to the Council on Environmental Quality a Final Environmental Statement. This Final Environmental Statement must critically review all aspects of the proposed construction and operation of the facility. The AEC has 30 days in which to review the application and reports and to decide if the material is adequately

THE APPLICANT'S ENVIRONMENTAL REPORT

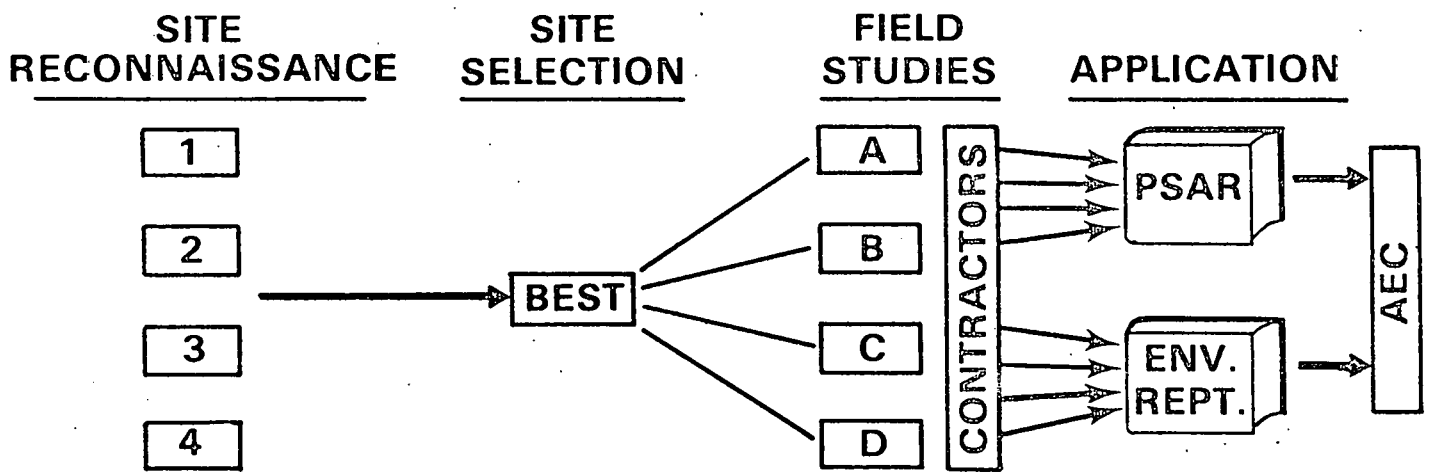

FIGURE 8

prepared. If found wanting in any substantial degree, the Environmental Report is returned to the Applicant for improvements. If no serious deficiencies are discovered, the detailed review process begins.

The review of the Environmental Report and Preparation of the Final Detailed Statement proceeds as follows:

1. Upon receipt of the application, or somewhat prior to receipt, a project manager in Environmental Projects AEC is assigned the responsibility for preparing the Final Environmental Statement.

2. One of three AEC contractor-laboratories is assigned that particular nuclear facility to provide the technical assessment and preparation of a Preliminary Draft statement which is the basic document eventually to become the Final Environmental Statement.

   The three laboratories are Oak Ridge National Laboratory, Argonne National Laboratory, and Battelle, Pacific Northwest Laboratory. A senior scientist or engineer is assigned by the Laboratory Environmental Projects Manager to be Team Leader for the nuclear facility. The Team Leader is assigned a team of six specialists in the following areas.

   1. Terrestrial Ecology
   2. Aquatic Ecology
   3. Meteorology
   4. Heat Dissipation
   5. Radiological Assessment
   6. Economics - Cost/Benefit Analysis

   It is the responsibility of the Team Leader in the Laboratory to see that his team carefully reads and assesses the information in the Applicant's Environmental Report, and each addresses his review to the section assigned. Close liaison is maintained with the AEC project manager who interfaces directly with the Applicant in all matters requiring additional information.

3. A schedule is established early making use of past experience and the urgency of the Applicant's schedule.

4. The Laboratory Team assist the AEC in the initial review of the Environmental Report and its adequacy. Issues which cannot be reconciled or assessments made by the Applicant which appear obviously shallow or have serious omissions will be causes for returning the Environmental Report to the Applicant. This process is diagrammed in Figure 9.

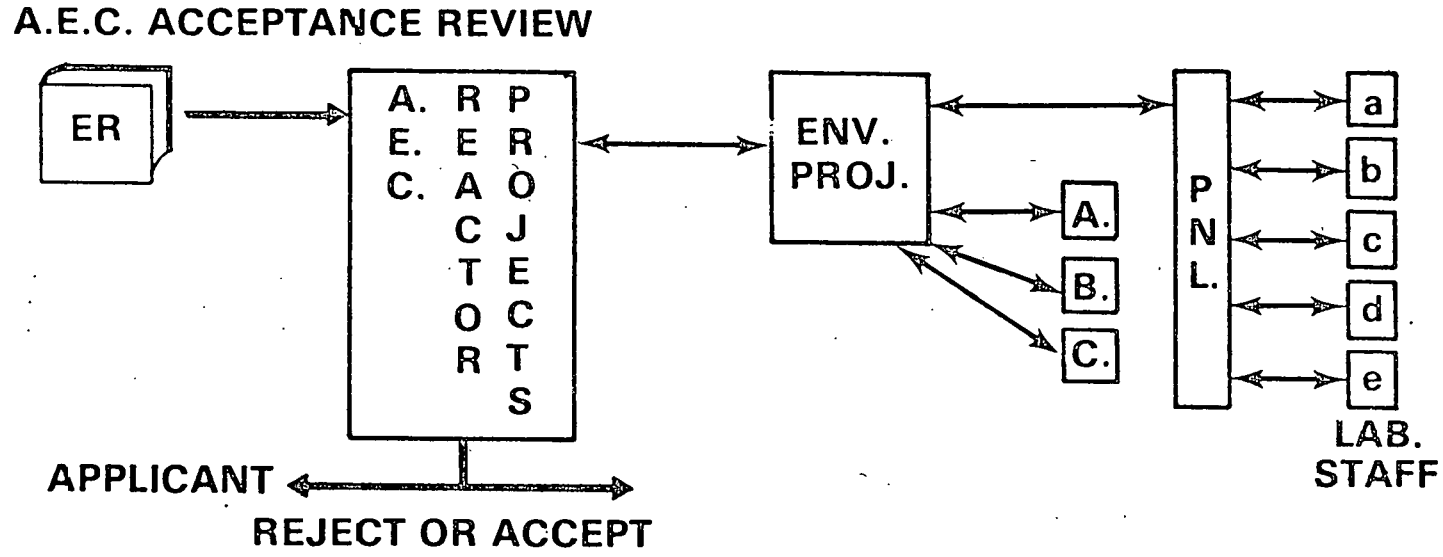
A.E.C. ACCEPTANCE REVIEW
ER
A. E. C.
REACTOR PROJECTS
ENV. PROJ.
A.
B.
C.
PNL.
a
b
c
d
e
LAB. STAFF
APPLICANT
REJECT OR ACCEPT

FIGURE 9

5. If the Environmental Report is accepted, the Laboratory team begins a detailed review and assessment of the project making use of the Applicant's data and any other information required. An initial effort is to identify all areas for which further information from the Applicant is needed. All members of the Laboratory team develop a set of questions in his area which are consolidated and formally transmitted to the Applicant by the AEC. These questions are answered formally by the Applicant, or the source where the answer can be found is provided by the Applicant.

6. The site is visited by the Laboratory team and the AEC project manager and frequently the Project Branch Chief. In addition to viewing the actual geographical features, the hydrological resources, the terrestrial and aquatic biota, the team has an opportunity to meet in conference with the Applicant, his specialists and consultants. The questions earlier transmitted form the basis for the agenda of the conference. Many issues are discussed and clarified. Any questions felt to yet require written answers to be entered in the public record are identified and given to the Applicant.

7. The Laboratory team writes a draft of the Environmental Statement. The AEC project manager provides certain sections, carefully reviews the document and has AEC specialists review sections falling within their field of competence. Legal reviews are also made at this time.

8. The AEC project manager arranges for the printing of the document, which is bound in a green paper cover and carries the title, Draft Environmental Statement.

9. The Draft Environmental Statement is sent to federal agencies for their review and comment, with a designated time limit (usually 60 days) within which their comments are to be received. Figure 10 diagrams the preparation of the Draft Statement.

10. The Agency comment letters are received and copies routed to the Laboratory team leader and the Applicant. Every question raised by the agencies must be addressed and an answer given. If major issues are raised, extensive reassessment may be necessary. In general, at this stage major issues have been addressed and extensive independent analysis performed of such major issues as thermal effects and the impact on aquatic ecology.

11. The Final Environmental Statement is drafted by the Laboratory with certain revised sections provided by the AEC projects Branch. Changes are made

THE DRAFT ENVIRONMENTAL STATEMENT

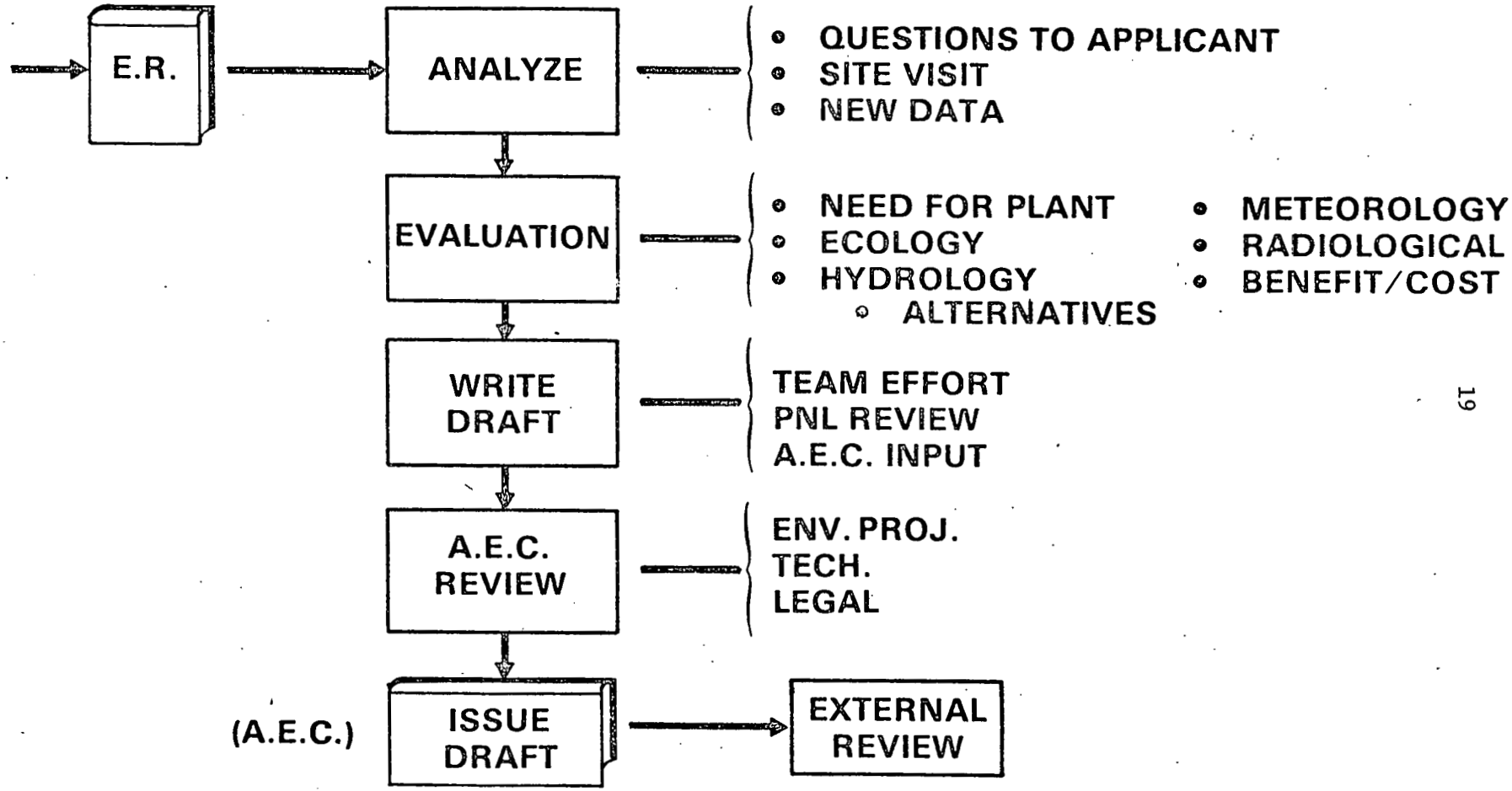

FIGURE 10

where necessary as prompted by the agency reviews and new information provided by the Applicant. The agency letters are made an appendix to the Environmental Statement as well as responses to the questions raised. The AEC issues the Final Environmental Statement, now bound as a blue-cover document. Copies are sent to the Council in Environmental Quality, certain public libraries and other depositories. Agencies also receive copies.

12. The Atomic Safety and Licensing Board (ASLB) conducts a hearing prior to their recommendation that a license be granted or withheald. The hearing is conducted by three individuals, one designated as chairman. These are not AEC employees but professionals with industrial, academic, or legal background Their function at the hearing is to receive all evidence affecting the decision regarding granting the license. Intervenors may request an opportunity to introduce evidence against the action and be represented by counsel. Individuals may also request that they may give personal statements concerning the action. The Final Environmental Statement is entered as the AEC's evidence and the Environmental Report is entered by the Applicant.

13. Following the hearings, which can take as little time as one day, or can be greatly protracted, the ASLB issues the written transcript of the Hearings. A recommendation is made for the action to be taken, either issue the license as requested, withhold issuing the license, request further assessment of the issues, or make the license conditional on certain actions to follow. Figure 11 outlines the foregoing steps.

14. The AEC issues the license. (Even at this stage the Atomic Safety and Licensing Appeal Board can object to the findings of the Atomic Safety and Licensing Board and reopen the case.)

CONCLUSIONS

Over the past four years a procedure has been developed and instituted by the AEC through which the requirements of the National Environmental Policy Act of 1969 are fully realized. The procedure insures an independent assessment of the Applicant's Environmental Report by Scientists and engineers in contractor laboratories, and through extensive interfacing with the Applicant, local and federal government agencies. The procedure permits intervenors as well as advocates to be heard, and finally permits an independent board to make an overall assessment of the environmental and safety issues and make recom-

THE FINAL ENVIRONMENTAL STATEMENT

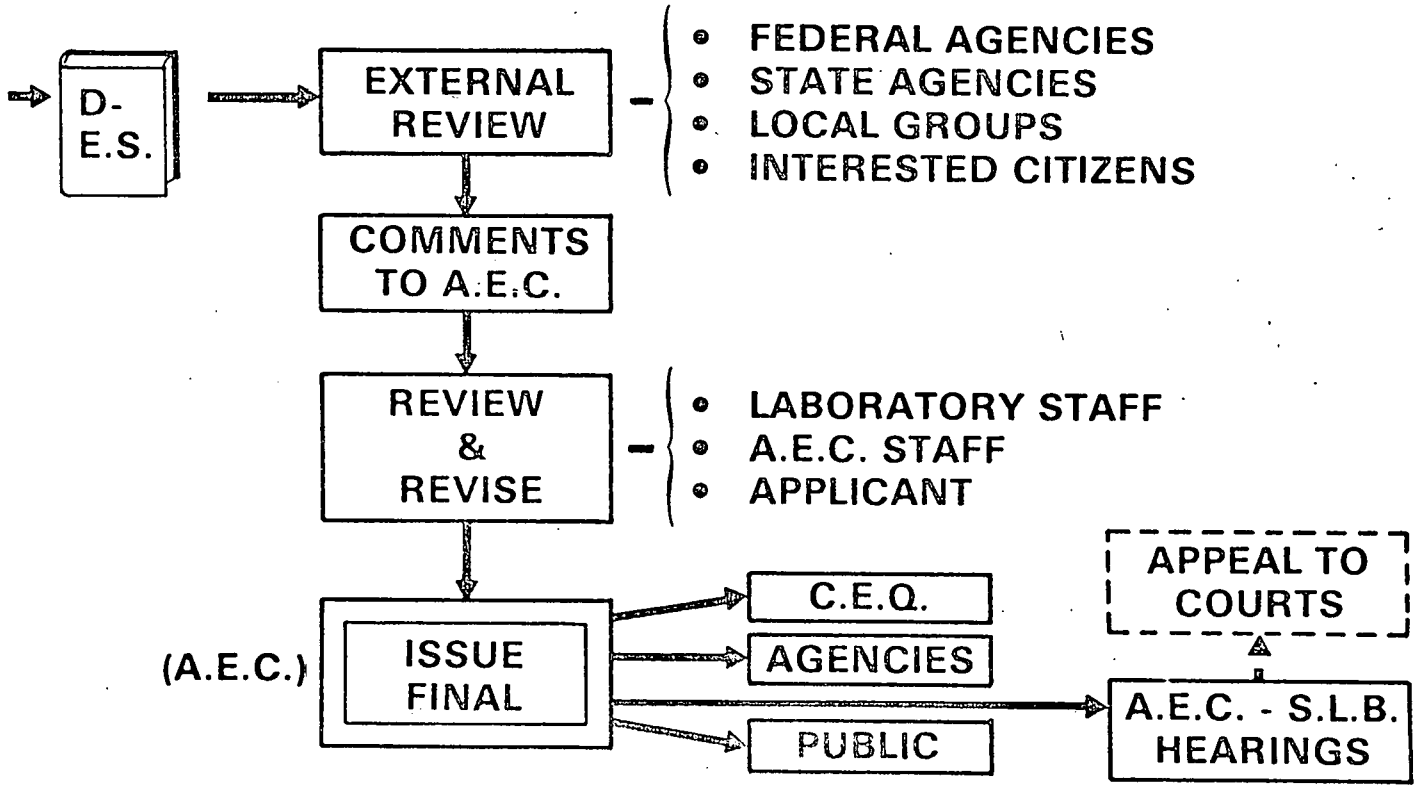

FIGURE 11

mendations to the AEC for appropriate action.

The process is time-consuming, yet assures the protection of the environment and people in the environment of the nuclear facility. Progress is being made to shorten the procedure through use of more standard reactor designs and stressing the unique features which may require unusually detailed assessment.