NRC LICENSING PROCESS

GREGORY G. HOFER, P.E.
SUPERVISING ENGINEER
NUCLEAR OPERATIONS AND SAFETY GROUP
May 1995

Raytheon
Engineers & Constructors
Raytheon Nuclear Inc.
Two World Trade Center
New York NY 10048-0752

Prepared for the
U.S. Department of Energy
Office of Fusion Energy
and for the
University of California - San Diego
Fusion Energy Research Program
Under DOE Contract No. DE-FC03-95ER554299
and under UCSD Subcontract No. 1008-7479

DISCLAIMER

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

APPENDIX

INTRODUCTION

If one assumes that the Nuclear Regulatory Commission (NRC) will be responsible for licensing commercial fusion power plants, the next question is how will the NRC license these plants? This report will discuss the historical licensing process and the "one-step" licensing process used for fission power plants and from these, extrapolate to what the fusion licensing process could be like.

WHO'S WHO AND WHAT'S WHAT

As they say at sporting events: "You can't tell the players without a scorecard." Therefore, provided here are brief descriptions of the groups and documents involved in the fission licensing process. In addition, Table 1 provides a list of abbreviations, acronyms and initialisms. Figure 1 provides an NRC Organization Chart.[1]

THE WHO'S

NRC Commissioners

The Chairman and the four other Commissioners are responsible for all agency functions (see Appendix A). However, they do not get involved with the safety review of the plant since they are the final step in the hearing process. When the NRC Commissioners conduct a hearing (as part of the appeal process), at their discretion these hearings can consist of written motions filed with the Commission or can be oral arguments.

---

1 This is an edited version of the NRC Organization Charts provided in NUREG-0325 ("U.S. Nuclear Regulatory Commission Organization Charts and Function Statements"). This NUREG is constantly revised. The latest version is Revision 17, dated October 3, 1994.

NRC Staff

The NRC personnel who perform the "nuts and bolts" safety review of the facility in accordance with the guidelines in the Standard Review Plans (NUREG-0800). In accordance with the Energy Reorganization Act of 1974[2], the Office of Nuclear Reactor Regulation (NRR) is responsible for the licensing of nuclear reactors. As necessary, NRR also utilizes resources in the Office of Nuclear Material Safety and Safeguards (NMSS), the Office of Nuclear Regulatory Research and the NRC Regional Offices. The 10 CFR 1 descriptions of NMSS, NRR, the Office of Nuclear Regulatory Research and the NRC Regional Offices are provided in Appendicies D, E, F and G respectively.

Applicant / Licensee

This is the official title of the entity (or entities) filing for the Construction Permit and/or Operating License. Upon receiving the Operating License the "Applicant" becomes the "Licensee."

Advisory Committee on Reactor Safeguards (ACRS)

While the ACRS has several functions (see Appendix B), their licensing function is to perform an independent (from the NRC Staff) safety review of the PSAR (Preliminary Safety Analysis Report) and the FSAR (Final Safety Analysis Report). It is important to note that the NRC Staff will not proceed to public hearings (i.e., ASLB [Atomic Safety and Licensing Board] and/or NRC Commissioners) where they may have to give expert testimony without the "blessing" of the ACRS.

---

2 Energy Reorganization Act of 1974 (Public Law 93-438, Act of October 11, 1974), Title II, § 203. In § 203, The Act states:

"There is hereby established in the Commission an Office of Nuclear Reactor Regulation under the direction of a Director of Nuclear Reactor Regulation .... Subject to the provisions of this Act, the Director of Nuclear Regulation shall perform such functions as the Commission shall delegate including ... Principal licensing and regulation of all facilities, and materials licensed under the Atomic Energy Act of 1954, as amended, associated with the construction and operation of nuclear reactors licensed under the Atomic Energy Act of 1954, as amended ...."

Atomic Safety and Licensing Board Panel (ASLBP)

From the ASLBP are drawn the Atomic Safety and Licensing Boards (ASLBs) which hear the licensing cases (see Appendix C). These cases (hearings) proceed like court cases (i.e., lawyers, witnesses, testimony, etc.). Currently, if a party to the hearings (i.e., NRC Staff, applicant, Intervenors) disagrees with the decision of the ASLB, the appeal is to the NRC Commissioners.

There used to be an intermediate step in the appeal process between the ASLB and the NRC Commissioners consisting of the Atomic Safety and Licensing Appeal Panel (ASLAP) and its Atomic Safety and Licensing Appeal Boards (ASLABs). However, the NRC disbanded the Panel and Boards in 1991 (see Federal Register 56 FR 29403, dated June 27, 1991).

Federal Courts

Upon exhausting appeals within the NRC, the next step is to the US Federal Courts. However, the Supreme Court has ruled that it is not the function of the courts to determine how federal regulators should regulate. Thus, the US Courts can only hear cases that deal with failure to follow agency procedures and/or failure to follow the requirements of applicable legislation.

THE WHAT'S

Application

This is the formal document which states that the Applicant is requesting a Construction Permit and an Operating License to build and operate a nuclear facility. The material required in the application is discussed in 10 CFR 50.33.

Filing of the Application is not the first contact the Applicant has with the NRC. There are usually several meetings that take place between the NRC and the Applicant to "scope out" the licensing schedule.

Antitrust Review

As required by 10 CFR 50.33a and 10 CFR 50, Appendix L, the Applicant must provide the Attorney General with information so that the Justice Department can undertake an Antitrust Review. The Application is usually not submitted until the Antitrust Review is successfully completed.

Docket

Upon acceptance of the Application, the Application is "Docketed" and a "Docket Number" is given to the Application. It is by Docket Number that the NRC files **all** its information (i.e., correspondence, hearing minutes, Inspection Reports, etc.) about a specific facility.

Limited Work Authorization (LWA)

This permit allows work to begin (i.e., clearing and grubbing) at the plant site. Usually the LWA lets work proceed to the point of pouring the first nuclear concrete (i.e., the concrete walls, floors and ceilings that make up nuclear safety related structures). Thus, the LWA allows construction work to proceed while awaiting completion of the Construction Permit (CP) approval process.

Issuance of the LWA requires acceptance of the CP-Final Environmental Impact Statement (CP-FEIS) by the ASLB (see Figure 2). The LWA allows the Applicant to proceed with construction at their own risk if the CP is not granted (i.e., the site must be returned to its preconstruction state). The reason the hold point is the pouring of the first nuclear concrete is that while most concrete is easy to demolish, it is not so for nuclear concrete. Nuclear concrete slabs are usually very thick and contain a significant amount of steel reinforcing bars ("rebars") and removal requires significant, time effort and cost. Therefore the Applicant can excavate for the nuclear buildings and layout the rebar for the nuclear foundations, but nuclear concrete cannot be poured until the CP is issued.

Construction Permit (CP)

This is the document that allows construction to proceed from the LWA to completion of the plant. Note that the Applicant doesn't need an LWA only a CP. However, with the cost of borrowed money accumulating (i.e., bond interest), the Applicant usually wants to start construction as soon as possible.

Operating License (OL)

This is the document that allows the plant to begin operation and start making money for the Applicant (now called the "Licensee"). The hold point between CP and OL for a fission plant is that an OL allows the plant to put fuel assemblies into the water.

Safety Analysis Report (SAR)

The Preliminary SAR (PSAR) and the Final SAR (FSAR) are the documents produced by the Applicant for the NRC. The PSAR is reviewed by the NRC during the CP process and the FSAR is reviewed by the NRC during the OL process. The format and content of the PSAR and the FSAR are based on Regulatory Guide 1.70 ("Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)") and on NUREG-0800 ("Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)").

Safety Evaluation Report (SER)

The NRC Staff documents its review of a PSAR or an FSAR in an SER and its supplements (SSERs). A separate SER and its SSERs are developed for the PSAR and for the FSAR for a given facility.

Environmental Report (ER)

The National Environmental Policy Act of 1969 requires the NRC to perform an environmental assessment of the plant during its licensing process. In order to provide this assessment the NRC requires the Applicant to submit an ER which provides the NRC with the information necessary to perform the environmental assessment. The format and content of the ER is based on Regulatory Guide 4.2 ("Preparation of Environmental Reports for Nuclear Power Stations"). Currently ERs are produced with the PSAR (i.e., the CP-ER) and with the FSAR (i.e., the OL-ER).

Environmental Impact Statement (EIS)

The environmental assessment produced by the NRC as a result of reviewing the ER is the EIS (see 10 CFR 51). The NRC first issues a Draft EIS (DEIS) for comment. Upon conclusion of the comment period, the NRC issues a Final EIS (FEIS) which includes responses to the comments made on the DEIS . Currently an EIS is produced with the PSAR (i.e., the CP-DEIS and CP-FEIS) and an EIS is produced with the FSAR (i.e., the OL-DEIS and OL-FEIS).

THE LICENSING PROCESS

All US fission plants were designed, constructed and operated under the two-step licensing process portrayed in Figures 2 and 3. The two-step process was developed taking into account the evolution of the nuclear power industry. In the 60's and the 70's utilities were developing nuclear expertise and reactor designs were constantly revised. In addition, the detailed design of a plant was nowhere near finished at the CP stage. A plant was well into its construction before its design was finalized. Thus there could be significant changes to a plant's configuration and its staffing between its CP and OL.

However, as the industry matured, designs became more standardized, and utilities gained nuclear expertise, it became apparent that the two-step process was no longer necessary. In 1989 (Federal Register 54 FR 15372, dated April 18, 1989) , the NRC promulgated 10 CFR 52 ("Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Reactors").

ONE-STEP LICENSING

One-Step Licensing, or Combined Licenses in NRC parlance, is discussed in 10 CFR 52, Subpart C (§ 52.71 through § 52.103). Figures 2 and 3 are still applicable with the following changes:

- The OL Review is combined into the CP Review which ends with the issuance of a combined CP-OL

- The Applicant produces only one ER and one SAR. But the ER and SAR must contain all the information that is required for both a CP and an OL. The SAR will be periodically updated all through plant construction and plant operation.

- The NRC issues one SER (with supplements), one DEIS and one FEIS and the ACRS conducts one review of the facility.

Essentially unchanged are the Antitrust Review, the Application and the LWA.

The last significant stage is when the plant is almost ready to load fuel. The process discussed in 10 CFR 52.103 is followed:

- At least six months prior to scheduled fuel load the NRC publishes a '"Notice of Intended Operation" in the Federal Register.

- The published notice will allow at least two months for interested parties to request a hearing.

- A request for hearing will be granted only under the strict guidelines of 10 CFR 52.103(b).

- Whether or not a hearing is granted, the NRC Commissioners are required to complete the process and render a decision date.

- The NRC Commissioners can allow interim operation of the facility while the hearings are underway if there is reasonable assurance of adequate protection of the public health and safety.

FUSION POWER AND ONE-STEP LICENSING

With fission power, mature designs coupled with extensive corporate nuclear experience make one-step licensing feasible. With fusion power, however, power plant designs are still evolving and there is little to no experience in operating a fusion power plant as part of an electric utility network. Therefore, the NRC may request two-step licensing.

Fusion power will have a better chance of using one-step licensing if:

1) the detailed design of the fusion power plant is essentially complete prior to the submittal of the application, and

2) the portions of the SAR dealing with operational staffing and controls draw from experience with fusion facilities as well as other similar or related facilities.

In the end it will be the NRC's decision whether or not to accept a combined license application.

CONTESTED HEARINGS

The timeline at the bottom of Figure 3 shows potential delays in the licensing and construction of a fission power plant. However, most of these delays have little or nothing to do with licensing but rather with environmental permitting, engineering, construction and/or financing. The two delays that are licensing related are one in the same - contested hearings (i.e., one for the CP process and one for the OL process).

During one hearing the author was involved with, one of the lawyers remarked that every $1 spent resolving issues prior to the hearings probably saved $10,000 during the hearings. This is probably not far from the mark, considering bond interest, replacement power costs, hearings costs, etc.

Almost anything the Applicant says or does could be ammunition for an intervenor. While this should not paralyze into inaction anyone involved in fusion power, the impact on the hearing process should be another factor (i.e., like safety, cost, reliability, etc.) in the ongoing evaluation process.

Although it is not possible to provide a cookbook approach to handling contested hearings, some general guidelines can be provided:

Prior To Hearings

- Hire a law firm with NRC hearing experience. Many an inexperienced lawyer has gotten reprimanded by an ASLB for not following the NRC hearing rules. In addition, there are unwritten rules that an experienced lawyer knows about. It is not a good idea to annoy the judges over infractions of the rules (written or unwritten).

- Be proactive not reactive. Find out what are the real concerns and intent of the intervenors. This may not always be clear from their public positions or admitted contentions (an admitted contention is the intervenor's formal statement of concern, approved by the ASLB and/or the NRC Commissioners, that will be decided upon during the hearing process). Remember, without admitted contentions, an intervenor has no admission ticket to the hearings, and without that admission ticket, the Applicant has no reason to deal with the intervenor.

- Don't stonewall. Not only does stonewalling keep an intervenor going because they think you're hiding something, the information they're seeking will probably be handed to them as part of the hearing discovery process.

- Negotiate and compromise. It may be possible to get an intervenor to bow out of the hearings by making a design or administrative change.

  One utility got an intervenor to drop out when they increased the separation between the two transmission lines, running from the plant to the switchyard, from 120 feet to 800 feet where it crossed a rail line (the concern was a chemical train exploding and taking out both lines). This reduced the number of intervenors from two to one. It seems that the number of intervenors has more of an exponential rather than a additive effect on hearing duration.

  Another utility got their only intervenor to drop out when they made the head of the intervenor organization a member of the utility's corporate safety committee.

- Know when hearings are inescapable. Some intervenors are pure obstructionists who wish to stop you at any cost and thus cannot be reasoned with. When one has such intervenors, it's time to prepare for hearings.

<u>During Hearings</u>

- Hearings are not for the faint-of-pocketbook. Once in hearings, the phrase "Time is Money" takes on new meaning. The goal of some intervenors is to cause swquential delays and ultimately stoppage of the project. Most intervenors can operate on a shoestring since they only have to bring up issues. The Applicant has the burden of proving that the intervenor's assertions are untrue and the faster this can be proven, the sooner the hearings will be over.

- Depending on the length and location of the hearings, it may be advisable to set up a temporary, local office rather than trying to run things from the Applicant's permanent offices.

- The Applicant should be ready to use its personnel as couriers to hand-deliver critical documents as quickly as possible, rather than risk delays or loss by using courier services.

- Have the lawyers set up a mock court and have the Applicant's witnesses not only practice their testimony but also practice cross-examination defense techniques. There are not many things more horrible to watch in a hearing than your expert witness fumbling and bumbling on the stand.

TABLE 1

ABBREVIATIONS, ACRONYMS AND INITIALISMS

ACRS	Advisory Committee on Reactor Safeguards
AE	Architect Engineer
ASLAB	Atomic Safety and Licensing Appeal Board (defunct)
ASLAP	Atomic Safety and Licensing Appeal Panel (defunct)
ASLB	Atomic Safety and Licensing Board
ASLBP	Atomic Safety and Licensing Board Panel
CP	Construction Permit
DEIS	Draft Environmental Impact Statement
EIS	Environmental Impact Statement
ER	Environmental Report
FEIS	Final Environmental Impact Statement
FSAR	Final Safety Analysis Report
LWA	Limited Work Authorization
NMSS	Office of Nuclear Material Safety and Safeguards
NRC	Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
OL	Operating License
PSAR	Preliminary Safety Analysis Report
PUC	Public Utility Commission
QA	Quality Assurance
SAR	Safety Analysis Report
SER	Safety Evaluation Report
SSER	Supplemental Safety Evaluation Report (i.e., SER Supplement)

FIGURE 1
NRC ORGANIZATION CHART

(This is an edited chart. For a complete NRC Organizational Chart see NUREG-0325, Rev. 17)

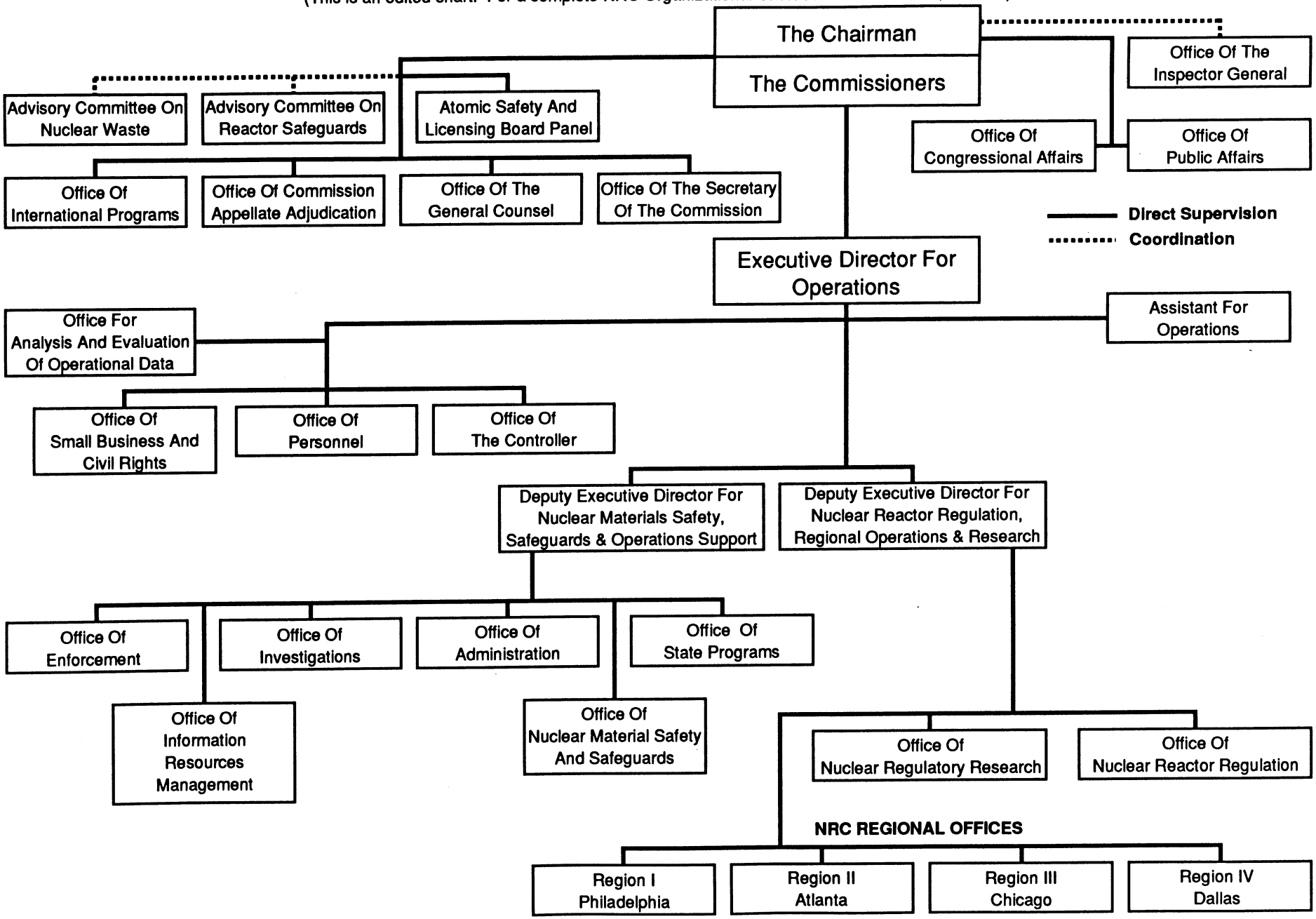
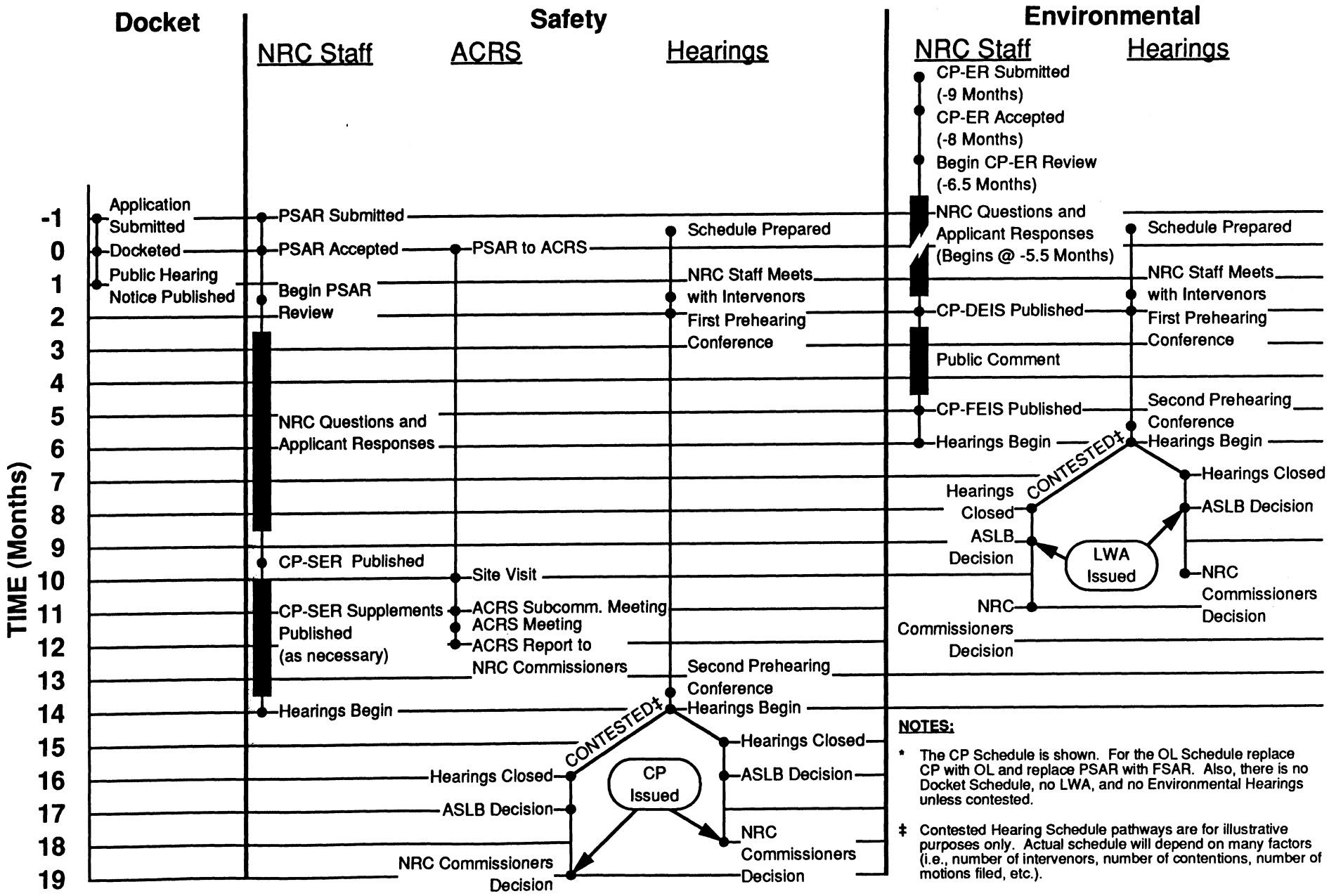


FIGURE 2

REPRESENTATIVE NUCLEAR FISSION POWER PLANT CONSTRUCTION PERMIT / OPERATING LICENSE SCHEDULE*

(See Table 1 for a listing of abbreviations, acronyms and initialisms)



NOTES:

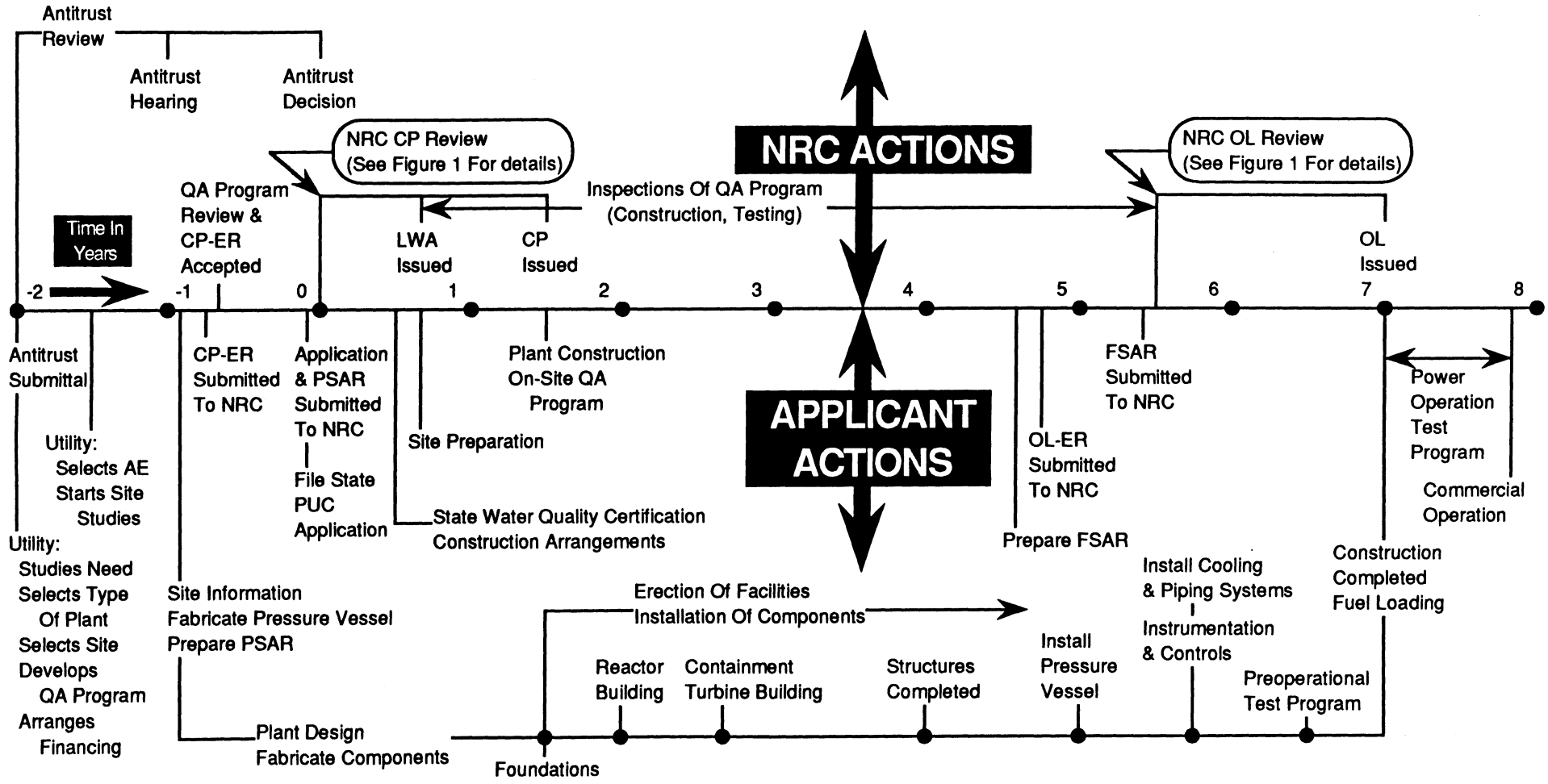
* The CP Schedule is shown. For the OL Schedule replace CP with OL and replace PSAR with FSAR. Also, there is no Docket Schedule, no LWA, and no Environmental Hearings unless contested.

‡ Contested Hearing Schedule pathways are for illustrative purposes only. Actual schedule will depend on many factors (i.e., number of intervenors, number of contentions, number of motions filed, etc.).

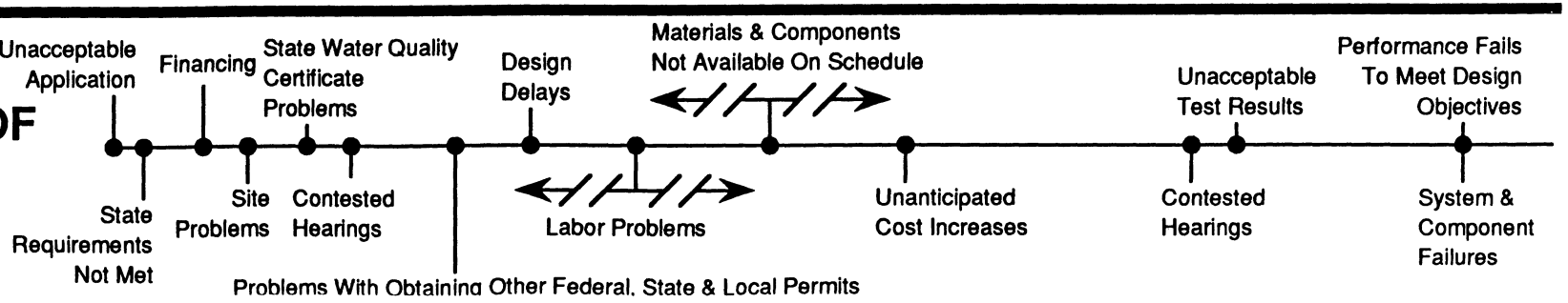
FIGURE 3

REPRESENTATIVE NUCLEAR FISSION POWER PLANT LICENSING AND CONSTRUCTION PROCESS

(See Table 1 for a listing of abbreviations, acronyms and initialisms)



SOURCES OF POTENTIAL DELAY



APPENDIX A

10 CFR 1.11 - NUCLEAR REGULATORY COMMISSION

(a) The Nuclear Regulatory Commission, composed of five members, one of whom is designated by the President as Chairman, is established pursuant to section 201 of the Energy Reorganization Act of 1974, as amended. The Chairman is the principal executive officer of the Commission, and is responsible for the executive and administrative functions with respect to appointment and supervision of personnel, except as otherwise provided by the Energy Reorganization Act of 1974, as amended, and Reorganization Plan No. 1 of 1980 (45 FR 40561); distribution of business; use and expenditures of funds (except that the function of revising budget estimates and purposes is reserved to the Commission); and appointment, subject to approval of the Commission, of heads of major administrative units under the Commission. The Chairman is the official spokesman, as mandated by the Reorganization Plan No. 1 of 1980. The Chairman has ultimate authority for all NRC functions pertaining to an emergency involving an NRC Licensee. The Chairman's actions are governed by the general policies of the Commission.

(b) The Commission is responsible for licensing and regulating nuclear facilities and materials and for conducting research in support of the licensing and regulatory process, as mandated by the Atomic Energy Act of 1954, as amended; the Energy Reorganization Act of 1974, as amended; and the Nuclear Nonproliferation Act of 1978; and in accordance with the National Environmental Policy Act of 1969, as amended, and other applicable statutes. These responsibilities include protecting public health and safety, protecting the environment, protecting and safeguarding nuclear materials and nuclear power plants in the interest of national security, and assuring conformity with antitrust laws. Agency functions are performed through standards setting and rulemaking; technical reviews and studies; conduct of public hearings; issuance of authorizations, permits, and licenses; inspection, investigation, and enforcement; evaluation of operating experience; and confirmatory research. The Commission is composed of five members, appointed by the President and confirmed by the Senate.

(c) The following staff units and officials report directly to the Commission: Atomic Safety and Licensing Board Panel, Office of the General Counsel, Office of the Secretary, Office of Commission Appellate Adjudication, Office of Licensing Support System Administrator, Office of International Programs, and other committees and boards which are authorized or established specifically by the Act. The Advisory Committee on Reactor Safeguards and the Advisory Committee on Nuclear Waste also report directly to the Commission.

(d) The Offices of Congressional Affairs and Public Affairs report directly to the Chairman.

APPENDIX B

10 CFR 1.13 - ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

The Advisory Committee on Reactor Safeguards (ACRS) was established by section 29 of the Atomic Energy Act of 1954, as amended. Consisting of a maximum of 15 members, it reviews and reports on safety studies and applications for construction permits and facility operating licenses; advises the Commission with regard to hazards of proposed or existing reactor facilities and the adequacy of proposed reactor safety standards; upon request of the Department of Energy (DOE), reviews and advises with regard to the hazards of DOE nuclear activities and facilities; reviews any generic issues or other matters referred to it by the Commission for advice. The Committee, on its own initiative, may conduct reviews of specific generic matters or nuclear facility safety-related items. The ACRS conducts studies of reactor safety research and submits reports thereon to the U.S. Congress and the NRC as appropriate.

APPENDIX C

10 CFR 1.15 - ATOMIC SAFETY AND LICENSING BOARD PANEL

The Atomic Safety and Licensing Board Panel, established pursuant to section 191 of the Atomic Energy Act of 1954, as amended, conducts hearings for the Commission and such other regulatory functions as the Commission authorizes. The Panel is comprised of any number of Administrative Judges (full-time and part-time), who may be lawyers, physicists, engineers, and environmental scientists; and Administrative Law Judges, who hear antitrust, civil penalty, and other cases and serve as Atomic Safety and Licensing Board Chairmen. The Chief Administrative Judge develops and applies procedures governing the activities of Boards, Administrative Judges, and Administrative Law Judges and makes appropriate recommendations to the Commission concerning the rules governing the conduct of hearings. The Panel conducts all licensing and other hearings as directed by the Commission primarily through individual Atomic Safety and Licensing Boards composed of one or three Administrative Judges. Those boards are appointed by either the Commission or the Chief Administrative Judge.

APPENDIX D

10 CFR 1.42 - OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS

(a) The Office of Nuclear Material Safety and Safeguards is responsible for the public health and safety, the common defense and security, and the environment by licensing, inspection, and environmental impact assessment for all nuclear facilities and activities, and for the import and export of special nuclear materia.

(b) The Office responsibilities include —

(1) Development and implementation of NRC policy for the regulation of activities involving safety, quality, approval and inspection of the use and handling of nuclear and other radioactive materials, such as uranium recovery activities;

(2) Fuel fabrication and fuel development;

(3) Medical, industrial, academic and commercial uses of radioactive isotopes;

(4) Safeguards activities;

(5) Transportation of nuclear materials, including certification of transport containers;

(6) Out-of-reactor spent fuel storage;

(7) Safe management and disposal of low-level and high-level radioactive wastes;

(8) Planning and direction of program for financial assurance of NMSS licensees; and

(9) Management of the decommissioning of facilities and sites when their licensed functions are over.

(c) Safeguards responsibilities include —

(1) Development of overall agency policy;

(2) Monitoring and assessment of the threat environment, including liaison with intelligence agencies as appropriate; and

(3) Those licensing and review activities appropriate to deter and protect against threats of radiological sabotage and threats of theft or diversion of special nuclear material at fuel facilities and during transport.

(d) The Office identifies and takes action to control safety and safeguards issues for activities under its responsibility, including consulting and coordinating with international, Federal, State and local agencies, as appropriate.

APPENDIX E

10 CFR 1.43 - OFFICE OF NUCLEAR REACTOR REGULATION

The Office of Nuclear Reactor Regulation —

(a) Implements regulations and develops and implements policies, programs and procedures for all aspects of licensing, inspection, and safeguarding of —
   (1) Manufacturing, production and utilization facilities, except for those concerning fuel reprocessing plants and isotopic enrichment plants;
   (2) Receipt, possession, and ownership of source, byproduct, and special nuclear material used or produced at facilities licensed under 10 CFR Part 50;
   (3) Operators of such facilities;
   (4) Emergency preparedness at such facilities; and
   (5) Contractors and suppliers of such facilities.

(b) Identifies and takes action regarding conditions and licensee performance that may adversely affect public health and safety, the environment, or the safeguarding of nuclear reactor facilities;

(c) Assesses and recommends or takes action regarding incidents or accidents;

(d) Provides special assistance as required in matters involving reactor facilities exempt from licensing;

(e) Provides guidance and implementation direction to Regional Offices on reactor licensing, inspection, and safeguards programs assigned to the Region, and appraises Regional program performance in terms of effectiveness and uniformity;

(f) Performs other functions required for implementation of the reactor licensing, inspection, and safeguards programs;

(g) Performs management of the NRC allegation program; and

(h) Performs review and evaluation related to regulated facilities insurance, indemnity, and antitrust matters.

APPENDIX F

10 CFR 1.45 - OFFICE OF NUCLEAR REGULATORY RESEARCH

The Office of Nuclear Regulatory Research —

(a) Plans, recommends, and implements programs of nuclear regulatory research, standards development, and resolution of generic safety issues for nuclear power plants and other facilities regulated by the NRC;

(b) Develops and promulgates all technical regulations;

(c) Coordinates research activities within and outside the agency including appointment of staff to committees and conferences; and

(d) Coordinates NRC participation in international standards-related activities and national volunteer standards efforts, including appointment of staff to committees.

APPENDIX G

10 CFR 1.47 - NRC REGIONAL OFFICES

Each Regional Administrator executes established NRC policies and assigned programs related to inspection, enforcement, licensing, State agreements, State liasion, and emergency response within Regional boundaries set out in § 1.5(b) of this part.