



U.S. NUCLEAR REGULATORY COMMISSION
STANDARD REVIEW PLAN
OFFICE OF NUCLEAR REACTOR REGULATION

SECTION 2.1.3

POPULATION DISTRIBUTION

REVIEW RESPONSIBILITIES

Primary - Accident Analysis Branch (AAB)

Secondary - Industrial Security and Emergency Planning Branch (ISEPB)

I. AREAS OF REVIEW

The areas of the applicant's safety analysis report (SAR) relating to the population surrounding a nuclear facility are reviewed to determine:

1. The present population (based on 1970 census data), and a comparison of the applicant's projected population growth with independent projections made by other agencies such as the Census Bureau, Bureau of Economic Analyses, Environmental Protection Agency, and local and state agencies and Councils of Government.
2. Whether population density should be a significant consideration at the construction permit (CP) stage in alternate site evaluation. Present and projected transient populations, appropriately weighted by occupancy, should be included. Computation of the site population factor (SPF) may also be included.
3. Acceptability of the specified low population zone (LPZ). Acceptability of the LPZ with respect to the probability that appropriate protective measures can be taken in behalf of the populace contained therein in the event of a serious accident will be determined by the ISEPB. Dose computations to determine compliance with the LPZ dose guidelines of 10 CFR Part 100 are described in the Standard Review Plans for SAR Section 15.
4. The distance to the nearest boundary of the closest population center (as defined in Part 100), and its relationship to the low population zone outer boundary distance. The boundary shall be determined upon consideration of population distribution, and political boundaries shall not be controlling in this determination.

II. ACCEPTANCE CRITERIA

The data on present population in the region of the site should be based on 1970 census data and are acceptable if so based and if the updated (to the year of application) population numbers check reasonably well against other independently-obtained population

USNRC STANDARD REVIEW PLAN

Standard review plans are prepared for the guidance of the Office of Nuclear Reactor Regulation staff responsible for the review of applications to construct and operate nuclear power plants. These documents are made available to the public as part of the Commission's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Standard review plans are not substitutes for regulatory guides or the Commission's regulations and compliance with them is not required. The standard review plan sections are keyed to Revision 2 of the Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants. Not all sections of the Standard Format have a corresponding review plan.

Published standard review plans will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience.

Comments and suggestions for improvement will be considered and should be sent to the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, D.C. 20545.

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data, if available; e.g., General Services Administration (GSA) or Oak Ridge National Laboratory (ORNL) population counts. The projected populations at the approximate year of plant startup and over the expected life of the plant are acceptable if they check reasonably well against independently-obtained population projections, if available; e.g., OBERS,^{1/} BEA,^{1/} or Water Resource Council.

If, at the CP stage, the population density, including weighted transient population, projected at the time of initial plant operation exceeds 500 persons per square mile averaged over any radial distance out to 30 miles (cumulative population at a distance divided by the area at that distance), or the projected population density over the lifetime of the facility exceeds 1,000 persons per square mile averaged over any radial distance out to 30 miles, special attention should be given by the staff to the consideration of alternative sites in the environmental review.

Transient population should be included for those sites where a significant number of people (other than those just passing through the area) work, reside part-time, or engage in recreational activities, and are not permanent residents of the area.

The specified low population zone is acceptable if (a) ISEP has determined that appropriate protective measures could be taken in behalf of the enclosed populace in the event of a serious accident; (b) dose computations for the outer boundary of the LPZ, as discussed in the review plans for Section 15, are within Part 100 guidelines; and (c) the nearest boundary of the closest population center (as defined in Part 100) is at least one and one third times the distance from the reactor to the outer boundary of the low population zone.

The population center distance is acceptable if there are no likely concentrations of greater than 25,000 people over the plant lifetime closer than the distance designated by the applicant as the population center distance.

III. REVIEW PROCEDURES

Selection and emphasis of various aspects of the areas covered by this review plan will be made by the reviewer on each case. The judgment on the areas to be given attention during the review is to be based on an inspection of the material presented, the similarity of the material to that recently reviewed on other plants, and whether items of special safety significance are involved.

The reviewer compares the SAR population data, both present (based on 1970 census) and projected, against whatever independent population data is available (e.g., GSA or ORNL population counts, OBERS population projections, U.S. Census Bureau data). Specific

^{1/}OBERS is the descriptive title of a projection program conducted by the U.S. Department of Commerce former Office of Business Economics (OBE), now renamed the Bureau of Economic Analysis (BEA), and the Economic Research Service (ERS) of the U.S. Department of Agriculture.

comparisons should be made of population projections for the approximate year of plant startup and for the expected lifetime of the plant. At the operating license stage, any new population data and projections developed since the construction permit review will be evaluated and compared with previous data. Significant discrepancies will be analyzed to determine the effect on the acceptability of the low population zone and emergency evacuation capabilities. The nearest boundary to the closest population center will be compared with the low population zone outer boundary to ensure that Part 100 guidelines are satisfied. One way of comparing with OBERS projections is as follows:

1. Determine the Bureau of Economic Analysis (BEA) economic areas which lie entirely or partially within a 50 mile radius of the proposed plant. If only a small part of any such area is within the circle, neglect it.
2. Add the 1970 population figures for all BEA areas determined in the first step, and add the BEA projected population for these areas for each of the years for which population projections are to be compared.
3. Find the growth factor for each projected year by taking the ratio of the total projected population in the BEA areas considered to the total 1970 population in those areas.
4. Tabulate, for various radii from the plant, the applicant's 1970 populations; the applicant's projected population; the projected population using the OBERS growth factors derived above; and the ratio of the OBERS projection to the applicant's projection.
5. If the applicant's projections of population growth within 50 miles are significantly less than the projections made by the above method, a more detailed examination of the bases used by the applicant should be made.

The Water Resources subregion projections can be calculated by the same method described for OBERS above. These can be used when the OBERS areas are too large to afford a good comparison.

Population data of specific towns and cities within the low population zone can be checked against population data as contained in the Department of Commerce publication, "1970 Census of Population - Characteristics of the Population."

At the CP stage, the cumulative population density is determined out to a distance of 30 miles using projected populations for the expected year of plant startup, and for the projected lifetime of the plant.^{2/} An enclosure on population density is prepared for

^{2/} Transient population, appropriately weighted for occupancy, should be included in the population data used if the transient population is unusually large or if the resident population approaches or exceeds 500 people per square mile.

the Environmental Report acceptance review memorandum, noting whether or not the density averaged over any radial distance out to 30 miles exceeds 500 people per square mile for the projected year of plant startup, or 1000 people per square mile over the projected lifetime of the plant. Documentation of this review should be provided to Environmental Projects. The SPF calculations should also be performed at this time.

For cases which just exceed or fall below the above guidelines, an examination of the particular population distribution (as reflected by the computed SPF) may be required. (SPF is a population-weighting concept used in conjunction with population density to compare uniform and nonuniform population distributions. (See Ref. 1.))

Site population is tabulated or plotted against an envelope of previously licensed site populations to determine the relative population characteristics of the proposed site. Curves showing current and projected population as a function of distance may be prepared for use in the staff's safety evaluation report (SER).

The reviewer determines that the current and projected population data for the LPZ includes transients (e.g., workers, occupants of schools, hospitals, etc., recreational facilities).

The reviewer obtains from ISEP written confirmation (buckslip) of acceptability of the LPZ with respect to their determination that there is reasonable assurance that appropriate protective measures could be taken in behalf of the people within the LPZ in the event of a serious accident.

The reviewer determines that the nearest boundary of the closest population center is at least one and one third times the distance to the outer boundary of the low population zone, considering local groupings of communities and their projected growth rates over the plant lifetime.

IV. EVALUATION FINDINGS

The reviewer verifies that sufficient information has been provided, and that his evaluation is sufficiently complete and adequate to support conclusions of the following type, to be included in the staff SER:

"The present and projected populations surrounding the site, including transients, have been reviewed and comparison with independently obtained population data confirms the applicant's estimates.

"On the basis of the specified low population zone and population center distance, and the calculated radiological consequences of design basis accidents at the outer boundary of the low population zone (Section 15), it is concluded that the low population zone and population center distance meet the guidelines of 10 CFR Part 100 and are acceptable."

V. REFERENCES

1. J. Kohler, A. Kenneke, and B. Grimes, "A Technique for Consideration of Population in Site Comparison," presented at the ANS Siting Conference, Portland, Oregon, August 1974.
2. "1972 OBERS Projections," Vol. 1-5, U.S. Water Resources Council, Washington, D.C. (1972).
3. "1970 Census of Population, Characteristics of the Population," Vol. 1, Part A, Sections 1 and 2, Bureau of the Census, U.S. Department of Commerce (1972).
4. Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants," Revision 2.

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