U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

OFFICE OF NUCLEAR REACTOR REGULATION

2.5.3 SURFACE FAULTING

REVIEW RESPONSIBILITIES

Primary - Civil Engineering and Geosciences Branch (ECGB)

Secondary - None

I. AREAS OF REVIEW

ECGB reviews information in the applicant's Safety Analysis Report (SAR) or Early Site Evaluation Report (ESR) that addresses the existence of a potential for surface deformation that could affect the site. The technical information presented in this section of the SAR or ESR results largely from detailed surface and subsurface geological, seismological, and geophysical investigations performed in progressively greater detail within each of the areas approximately described by radii of 40 km (25 mi), 8 km (5 mi), and 1 km (0.6 mi) around the site. The following specific subjects are addressed: the geological, seismological, and geophysical investigations (subsection 2.5.3.1), geological evidence, or absence of evidence, for surface deformation (subsection 2.5.3.2), correlation of earthquakes with capable tectonic sources (subsection 2.5.3.3), ages of most recent deformations (subsection 2.5.3.4), relationship of tectonic structures in the site area to regional tectonic structures (subsection 2.5.3.5), characterization of capable tectonic sources (subsection 2.5.3.6), designations of zones of Quaternary deformation in the site region (subsection 2.5.3.7), and the potential for surface tectonic deformation at the site (subsection 2.5.3.8).

References 1 through 7 provide guidance to the ECGB reviewers in evaluating potential nuclear power plant sites. The principal regulation that will be used by ECGB to determine the scope and adequacy of the submitted geological, seismological, and geophysical information is Section 100.23, "Geologic and

Seismic Siting Factors," 10 CFR Part 100 (Ref. 2). Specific guidance for implementing this regulation can be found in Regulatory Guide 1.165, "Identification and Characterization of Seismic Sources and Determination of Safe Shutdown Earthquake Ground Motion" (Ref. 3). Guidance regarding the geotechnical engineering aspects is found in Regulatory Guide 1.132, "Site Investigations for Foundations of Nuclear Power Plants" (Ref. 4). Additional information is available to the ECGB reviewers through published and unpublished scientific literature. As the state of the art regarding the geosciences is advancing rapidly, it is the responsibility of the reviewers to stay abreast of changes by reviewing the current scientific literature on a regular basis and attending professional meetings.

II. ACCEPTANCE CRITERIA

The applicable regulations (Refs. 1 and 2) and regulatory guides (Refs. 3 - 5) and basic acceptance criteria pertinent to the areas of this section of the Standard Review Plan are:

1. General Design Criterion (GDC) 2, "Design Bases for Protection Against Natural Phenomena," in Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50. This criterion requires that the structures, systems, and components important to safety be designed to withstand the effects of earthquakes, tsunami, and seiches without loss of capability to perform their safety functions (Ref. 1).

2. Section 100.23, "Geologic and Seismic Siting Factors," of 10 CFR Part 100. This section of Part 100 requires the applicant to determine the SSE and its uncertainty, the potential for surface tectonic and nontectonic deformations, the design bases for seismically induced floods and water waves, and other design conditions (Ref. 2).

3. Regulatory Guide 1.165, "Identification and Characterization of Seismic Sources and Determination of Safe Shutdown Earthquake Ground Motion" (Ref. 3). This guide describes acceptable methods to: (1) conduct geological, seismological, and geophysical investigations of the site and region around the site, (2) identify and characterize seismic sources, (3) perform PSHA, and (4) determine the SSE for the site (see SRP Section 2.5.2.6).

4. Regulatory Guide 1.132, "Site Investigations for Foundations of Nuclear Power Plants." This guide describes programs of site investigations related to geotechnical aspects that would normally meet the needs for evaluating the safety of the site from the standpoint of the performance of foundations and earthworks under anticipated loading conditions, including earthquakes. It provides general guidance and recommendations for developing site-specific investigation programs as well as specific guidance for conducting subsurface investigations, such as borings and sampling (Ref. 4).

5. Regulatory Guide 4.7, "General Site Suitability Criteria for Nuclear Power Stations." This guide discusses the major site characteristics related to public health and safety that the NRC staff considers in determining the suitability of sites for nuclear power stations (Ref. 5, also see Ref. 6).

The data and analyses presented in the SAR or ESR are acceptable if, as a minimum, they describe and document the information required by Reference 2, show that the methods described in Reference 3 or comparable methods were employed, and conform to the format suggested in Reference 7. The GeoRef data base (American Geological Institute, Falls Church, Virginia) and other data bases, such as the American Petroleum Institute Data Base (accessible through RECON system) have been used by the staff in past licensing activities as relevant guides to judge whether or not all of the current pertinent references have been consulted. The staff also uses the Department of Energy's RECON/Energy data base; State geological maps and accompanying texts; U.S. Geological Survey 7.5 and 15 minute topographic and geologic quadrangle maps; aerial photographs from Federal agencies such as the National Aeronautics and Space Administration, the U.S. Department of Agriculture, the U.S. Geological Survey, and the U.S. Forest Service; satellite imagery such as Landsat and Skylab; and References 10 and 11.

Specific criteria necessary to meet the relevant requirements of the Commission regulations identified above are described in the following paragraphs. If the information that satisfies these criteria is presented in other sections of Chapter 2.5, it may be cross-referenced and not repeated in this section.

Subsection 2.5.3.1 Geological, Seismological, and Geophysical Investigations. In meeting the requirements of References 1 and 2 and the positions of References 3 and 4, this subsection is considered acceptable if the discussions of the Quaternary tectonics, structural geology, stratigraphy, geochronological methods used, paleoseismology, and geological history of the site are complete, compare well with studies conducted by others in the same area, and are supported by detailed investigations performed by the applicant. For coastal and inland sites near large bodies of water, similar detailed investigations are to be conducted, and the information is to be provided in the SAR or ESR regarding offshore geology and seismology as well as onshore. In some instances it may be possible to identify an onshore projection of the offshore fault or fold of concern, or a tectonic structure that is analogous to it at an onshore location. It is acceptable to the staff, along with other investigations of the specific feature, to investigate the more remote, accessible exposure to learn the nature of the potentially hazardous offshore or buried fault and apply it to the local structure (Refs. 3 and 11). Site and regional maps and profiles constructed at scales adequate to illustrate clearly the surficial and bedrock geology, structural geology, topography, and the relationship of the safety-related foundations of the nuclear power plant to these features should have been included in the SAR or ESR.

Subsection 2.5.3.2 Geological Evidence, or Absence of Evidence, for Surface Deformation. In meeting the requirements of References 1, 2, and 3, this subsection is acceptable if sufficient surface and subsurface information is provided and supported by detailed investigations, either to confirm the absence of surface tectonic deformation (i.e., faulting) or, if present, to demonstrate the age of its most recent displacement and ages of previous displacements. If tectonic deformation is present in the site vicinity, it must be defined as to geometry, amount and sense of displacement, recurrence rate, and age of latest movement. In addition to geological evidence that may indicate faulting, linear features interpreted from topographic maps, low and high altitude aerial photographs, satellite imagery, and other imagery should be documented and investigated. In order to expedite the review process, an

identification list, index, and duplicates of the remote sensing data used in the linear features study should be provided to and reviewed by the staff. Evidence for the absence of tectonic deformation is obtained by the applicant conducting site surface (geological reconnaissance and mapping, etc.) and subsurface investigations (geophysical, core borings, trenching and logging, etc.) in such detail and areal extent to ensure that undetected offsets or other deformations are not likely to exist.

In the Central and Eastern United States (CEUS), except for the New Madrid Seismic Zone, the Meers fault, and the Cheraw fault of the Colorado piedmont, earthquake generating faults either do not extend to the ground surface or there is insufficient overlying soil or rock of known or of a sufficient age to date those that do.

In tectonically active regions such as the Western United States, many capable tectonic sources are exposed at the ground surface and can be characterized as to their seismic potential. However, in these regions many other capable tectonic sources are buried (blind faults), and may be expressed at the surface or near surface by folding, uplift, or subsidence (including faults related to subduction zones). Investigations in these regions should take these phenomena into account. The nature of geological, seismological, and geophysical investigations will vary in detail and extent according to the geological complexity of the specific site.

Subsection 2.5.3.3 Correlation of Earthquakes with Capable Tectonic Sources. In meeting the requirements of References 1 and 2, this subsection is acceptable if all historically reported earthquakes within 40 km (25 mi) of the site are evaluated with respect to hypocenter accuracy and source origin, and if all capable tectonic sources that could, based on their orientations, extend to within 8 km (5 mi) of the site are evaluated with respect to their potential for causing surface deformation. In conjunction with these discussions, a plot of the earthquake epicenters superimposed on a map showing the local capable tectonic sources should have been provided.

Subsection 2.5.3.4 Ages of Most Recent Deformations. In meeting the requirements of References 1 and 2, this subsection is acceptable when every significant fault, or fold associated with a blind fault, any part of which is within 8 km (5 mi) of the site, is investigated in sufficient detail using geological and geophysical techniques of sufficient sensitivity to demonstrate, or allow relatively accurate estimates of, the age of most recent movement and identify geological evidence for previous displacements if it exists (Ref. 3). An evaluation of the sensitivity and resolution of the exploratory techniques used should be given.

Subsection 2.5.3.5 Relationship of Tectonic Structures in the Site Area to Regional Tectonic Structures. In meeting the requirements of References 1 and 2, this subsection is satisfied by a discussion of the structural and genetic relationship between site area faulting or other tectonic deformation and the regional tectonic framework. In regions of active tectonism it may be necessary to conduct detailed geological and geophysical investigations to assess possible structural relationships of site area faults to regional faults known to be seismically active.

Subsection 2.5.3.6 Characterization of Capable Tectonic Sources. In meeting the requirements of References 1 and 2, this subsection is acceptable when it

has been demonstrated that the investigative techniques used have sufficient sensitivity to identify all potential capable tectonic sources such as faults, or folds associated with blind faults, within 8 km (5 mi) of the site; and when the geometry, length, sense of movement, amount of total offset, amount of offset per event, age of latest and any previous displacements, recurrence, and limits of the zone are given for each capable tectonic source. Investigations are to extend at least 8 km (5 mi) beyond all plant site boundaries, including those adjacent to large bodies of water such as oceans, rivers, and lakes.

Subsection 2.5.3.7 Designation of Zones of Quaternary Deformation in the Site Region. In meeting the requirements of Reference 2, this subsection is judged acceptable if the zone designated by the applicant as requiring detailed faulting investigation is of sufficient length and breadth to include all Quaternary deformation significant to the site (Ref. 3).

Subsection 2.5.3.8 Potential for Surface Tectonic Deformation at the Site. In meeting the requirements of References 1 and 2, this subsection must be presented by the applicant if the aforementioned investigations reveal that surface displacement must be taken into account. If there is a potential for tectonically induced surface displacement at the site, it would be prudent of the applicant to abandon the site. No commercial nuclear power plant has been constructed on a known capable fault (capable tectonic source) and it is an open question as to whether it is feasible to design for tectonic surface or near-surface displacement with confidence that the integrity of the safety-related features of the plant would remain intact should displacement occur. It is, therefore, staff policy to recommend relocation of plant sites found to be located on capable faults (capable tectonic sources) as determined by the detailed faulting investigations. If in the future it becomes feasible to design for surface faulting, it will be necessary to present the design basis for surface faulting and supporting data in considerable detail.

III. REVIEW PROCEDURES

The three-phase review procedure described in Standard Review Plan (SRP) Section 2.5.1 should be applied to assessing the potential for surface faulting. The first phase consists of an acceptance review to determine the completeness of the ESR or SAR by comparing the contents with the Criteria described in Part II, Acceptance Criteria, of this section. The second phase consists of a detailed review of the applicant's data and other independently derived information, which may result in requests for additional information. The third phase is a final review to resolve open issues and prepare a Safety Evaluation Report (SER).

The staff review procedure involves an evaluation to determine that the applicant has performed adequate investigations to fulfill the general requirements of Reference 2. Acceptable methods are described in Reference 3. Consultants or advisors may be called on to assist the staff in reviewing this section of the ESR or SAR on a case-by-case basis. On request, the advisor or consultant provides expertise in numerous earth science disciplines and occasionally is able to provide first-hand knowledge of the site. A literature search is conducted independently by the staff concerning the regional and local geology and seismology. The staff also utilizes the expertise of the U.S. Geological Survey and other Federal agencies, State

geological surveys, universities, and private industry to obtain additional, up-to-date geosciences information regarding Quaternary tectonics at the site.

According to 10 CFR 100.23, applicants are required to investigate the potential for near-surface deformation, both tectonically induced and that induced by other phenomena (Ref. 2). The steps that applicants may follow in determining the presence and extent of deformation and whether near-surface deformation (if present) represents a hazard are in Regulatory Guide 1.165 in Appendix D (Ref. 3). The area extending outward 8 km (5 mi) from the site, and the site [1 km (0.6 mi)] must be investigated by a combination of exploratory methods that should include borings, trenching, seismic profiling and other geophysical methods, geological mapping, and seismic instrumentation. The results of these explorations are cross-compared with other available data and evaluated by the staff. An important part of the staff's review effort is to compare the new information derived from these investigations or other sources with the specific data base used in the probabilistic seismic hazard analysis (PSHA) for the site (Ref. 3).

It has been the policy of the staff to encourage applicants to avoid areas that have a possibility for near-surface tectonic deformation. As the question of whether or not a surface tectonic deformation condition exists is critical in determining site suitability, this consideration is usually addressed very early in the review. The exceptions are cases in which a previously unknown fault is revealed in excavations during construction or is discovered during the course of other investigations in the area. The staff should require early in the review that it be notified by the applicant when the excavations for Seismic Category I structures are available for NRC inspection and when the detailed geological maps to be used by the staff while examining the excavations will be available. In addition, the staff should require that it be contacted immediately if a fault, not previously identified in the SAR or ESR, is found within 8 km (5 mi) of the plant.

In 10 CFR Part 52, a licensing approach is described that may be used in lieu of the 10 CFR Part 50 two-step procedure of requiring applicants to obtain a Construction Permit, followed several years later after the plant design bases have been approved by the staff, by application for an Operating License. This procedure, called combined licensing, could create a problem for the staff in that the SER will already have been written and the applicant will have a license before excavations are started. Therefore, faults discovered for the first time in the excavations will not have been evaluated by the staff. To alleviate this potential problem, there must be a commitment in the site-specific portion of the SAR for a facility to (1) notify the staff immediately if previously unknown geologic features that could represent a hazard to the plant are encountered in the excavation; (2) geologically map all excavations for Seismic Category I structures, as a minimum; and (3) notify the NRC staff when the excavations are open for examination and evaluation.

When faults are identified in the site vicinity or site area, it must be demonstrated that the faults do not have the potential to cause near-surface ground displacement (capable tectonic source) at the site. This is accomplished by determining the ages of the latest displacement on the faults, preferably by stratigraphic methods, that is, identifying strata or a stratum of datable soil or rock overlying the fault that is undeformed by the fault. Other methods include correlating the last faulting event with regional

tectonic activity of known ancient age, geomorphic evidence of age, and determining the relationship between the time of the fault rupture event and the ages of marine or fluvial terraces. Geochronological methods are discussed in References 3 and 10. Regulatory Guide 1.165 (Ref. 3) provides brief descriptions and a list of references of state-of-the-art methods and their applications, which can be used to estimate the geochronological history of geological materials associated with faults or other features.

In cases such as are described in the previous paragraph, the staff will carry out limited site observations and investigations of its own, for example, examinations of excavations. In some cases, the staff may select samples from shear zones or other materials for subsequent dating and analysis. In past investigations, applicants have often excavated trenches in the areas where major facilities are to be located for in situ testing to reduce the chance of surprises when the construction excavations are made.

Subsection 2.5.3.1 Geological, Seismological, and Geophysical Investigations. This subsection is evaluated by conducting an independent literature search and cross-comparing the results with the information submitted in the SAR or ESR. The comparison should show that the conclusions presented by the applicant are based on sound data, are consistent with the published reports of experts who have worked in the area, and are consistent with the conclusions of the staff and its advisors or consultants. If the applicant's conclusions and assumptions conflict with the literature, and the staff disagrees with the applicant's analysis and assumptions, additional investigative results to support those conclusions must be submitted to the staff for review.

Subsection 2.5.3.2 Geological Evidence, or Absence of Evidence for Surface Deformation. This subsection is evaluated by first determining, through a literature search and comparison with the applicant's data, that all evidences of tectonic deformation such as fault offset identified in the literature have been considered in the investigation. The results of the applicant's site investigations are studied and cross-compared in detail to see if there is evidence of existing or possible displacements. If such evidence is found, additional investigations such as field mapping, geophysical investigations, borings, or trenching must be carried out to demonstrate that there is no offset or to define the characteristics of the fault if it does exist. It is important to distinguish between tectonically induced near-surface deformation and deformation caused by nontectonic phenomena such as growth faulting, collapse caused by the development of karst terrane, etc. (Ref. 3).

Subsection 2.5.3.3 Correlation of Earthquakes with Capable Tectonic Sources. This subsection is reviewed in conjunction with the consideration of SRP Section 2.5.2. Historical earthquake data derived from the review of SRP Section 2.5.2 are compared with known local tectonic features and a determination is made as to whether any of these earthquakes can reasonably be associated with the local tectonic structures. This determination includes an evaluation of the hypocentral error estimates of the earthquakes. When available, the earthquake source mechanisms should be evaluated with respect to fault geometry. In addition, applicants and licensees are encouraged to evaluate the relationship of fault parameters to earthquake magnitude. These parameters may include, but are not limited to, slip rate, recurrence intervals, length, rupture area, and fault type (Ref. 11).

Subsection 2.5.3.4 Ages of Most Recent Deformation. This subsection is evaluated to determine if the times of most recent activity have been estimated for the features identified, and there is sufficient bases supporting those estimates. Much of the effort will consist of determining whether the geochronological methodologies used by the applicant are based on accepted procedures. In some cases unusual or untested age-dating techniques may have been used. When such methods are employed, the staff will require documentation of the technique. The accuracy of all age-dating techniques used in the applicant's analysis should be carefully documented. Multiple samples should be tested, and more than one dating method should be applied to each horizon that is significant in estimating the age of a paleosiesmic event. The staff may require the services of one or more consultants who have expertise in the methods used.

Subsection 2.5.3.5 Relationship of Tectonic Structures in the Site Area to Regional Tectonic Structures. This subsection is evaluated by determining through a literature search that the applicant's evaluation of the regional tectonic framework is consistent with that of recognized experts whose reports appear in the peer-reviewed published literature. The conclusions reached by the applicant should be based on sound geological principles and should explain the available geological and geophysical data. When special investigations are made to determine the structural relationship between faults that pass within 8 km (5 mi) of the site and regional faults, the resolution accuracy of the investigative techniques should be given.

Subsection 2.5.3.6 Characterization of Capable Tectonic Sources. This subsection is evaluated to determine whether a sufficiently detailed investigation has been made by the applicant to define the specific characteristics of all potential capable tectonic sources, any part of which is located within 8 km (5 mi) of the site. The structural characteristics that must be defined include length, orientation, geometry, and relationship of the fault or fold to regional structures; the nature, amount, and geological history of displacements along the fault; and the outer limits of the zone established by mapping the extent of Quaternary deformation in all directions. The staff must be satisfied that the investigations cover a large enough area and are in sufficient detail to demonstrate that there is little likelihood of near-surface deformation hazards associated with capable tectonic sources existing undetected near the site.

Subsection 2.5.3.7 Designation of Zones of Quaternary Deformation in the Site Region. The zone that requires detailed investigations is defined by the area characterized by Quaternary deformation within a distance of 40 km (25 mi) of the site. The staff reviews the results of the applicant's investigation together with a review of the published literature. The investigative techniques employed by the applicant are evaluated to ascertain that they are consistent with the state of the art. As part of this phase, experts in specific disciplines may be asked to review certain aspects of the investigative program. The results of the investigations are analyzed to determine whether the outer limits of the zone of Quaternary deformation investigation are appropriately conservative.

Subsection 2.5.3.8 Potential for Surface Tectonic Deformation of the Site. If the detailed investigations for the proposed commercial nuclear power plant reveal that there is a potential for surface deformation at the site, the staff recommends that an alternative location for the proposed plant be

considered. It is not expected that nuclear power plants could be successfully designed for displacement in its foundation at the present time. However, in the future, if it becomes feasible to design a commercial nuclear power plant to accommodate displacements, substantial information would be required to support the design basis for surface deformation.

While fulfilling the tasks of Subsections 2.5.3.1 through 2.5.3.8, it is important for the staff SAR or ESR reviewer to identify all significant new information, such as a seismic source or a new tectonic model that was not included in the site PSHA, and coordinate that information with the staff PSHA reviewer.

IV. EVALUATION FINDINGS

If the evaluation by the staff, on completion of the review of the geological and seismological aspects of the plant site, confirms that the applicant has met the requirements of applicable portions of General Design Criterion 2, "Design Bases for Protection Against Natural Phenomena," of Appendix A to 10 CFR Part 50; and 10 CFR 100.23, "Geologic and Seismic Siting Factors," the conclusion in the SER would state that the investigations performed, and the information and analyses provided, support the applicant's conclusions regarding the geologic and seismic suitability of the subject nuclear power plant site with respect to surface deformation potential. Staff reservations about any significant deficiency, either presented in the applicant's ESR or SAR, and identified by the staff, should be stated in sufficient detail to make clear the precise nature of the concern. The above determinations are made by the staff during the early site, construction permit, operating license, or combined license reviews.

The ESR or SAR is also reviewed for any significant new information derived by the site-specific geological, seismological, and geophysical investigations that had not been applied to the tectonic and ground motion models used in the PSHA. Appendix E of Regulatory Guide 1.165 (Ref. 3) discusses an acceptable method to address significant new information in the PSHA.

A typical finding for this section of the SER follows:

> In its review of the geological and seismological aspects of the plant site, the staff considered pertinent information gathered during the regional and site-specific geological, seismological, and geophysical investigations. The information includes data gathered from both site and near-site investigations and from an independent review of state-of-the-art published literature and other sources by the staff.
>
> As a result of this review, the staff concludes that the geological, seismological, and geophysical investigations and information provided by the applicant in accordance with 10 CFR 100.23 and Regulatory Guide 1.165 provide an adequate basis to establish that no capable tectonic sources exist in the plant site vicinity that would cause surface deformation or localize earthquakes there.
>
> The information reviewed for the proposed nuclear power plant concerning the potential for near-surface tectonic deformation is summarized in SER Section 2.5.3.

The staff concludes that the site is suitable from the perspective of tectonic surface deformation and meets the requirements of: (1) General Design Criterion 2 in Appendix A to 10 CFR Part 50, and (2) 10 CFR 100.23. This conclusion is based on the following:

1. The applicant has met the requirements of:

   a. General Design Criterion 2 in Appendix A to 10 CFR Part 50 with respect to protection against natural phenomena such as faulting.

   b. 10 CFR 100.23, Geologic and Seismic Siting Factors, with respect to obtaining the geological and seismological information necessary (1) to determine site suitability, (2) to determine the appropriate design of the plant, and (3) to ascertain that any new information derived from the site-specific investigations does not impact the SSE derived by a probabilistic seismic hazard analysis. In complying with this regulation, the applicant also meets the staff's guidance in Regulatory Guide 1.165, "Identification and Characterization of Seismic Sources and Determination of Safe Shutdown Earthquake Ground Motion;" Regulatory Guide 1.132, "Site Investigations for Foundations of Nuclear Power Plants;" and Regulatory Guide 4.7, "General Site Suitability Criteria for Nuclear Power Plants."

V. IMPLEMENTATION

The following is intended to provide guidance to applicants and licensees regarding the NRC staff's plans for using this SRP section.

Except in those cases in which the applicant or licensee proposes an acceptable alternative method for complying with specific portions of the Commission's regulations, the method described herein will be used by the staff in its evaluation of conformance with Commission regulations.

Implementation schedules for conformance to parts of the method discussed herein are contained in the referenced regulatory guidance (Refs. 3 - 7).

The provisions of this SRP section apply to reviews of construction permits (CP), operating licenses (OL), early site permits, and combined license (CP/OL) applications docketed pursuant to 10 CFR 100.23.

VI. REFERENCES

1. General Design Criterion 2, "Design Bases for Protection Against Natural Phenomena," in Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."

2. Section 100.23, "Geologic and Seismic Siting Factors," in 10 CFR Part 100, "Reactor Site Criteria."

3. US NRC, "Identification and Characterization of Seismic Sources and Determination of Safe Shutdown Earthquake Ground Motion," Regulatory Guide 1.165.[1]

4. US NRC, "Site Investigations for Foundations of Nuclear Power Plants," Regulatory Guide 1.132.[1]

5. US NRC, "General Site Suitability Criteria for Nuclear Power Stations," Regulatory Guide 4.7.[1]

6. US NRC, "Report of the Siting Policy Task Force," NUREG-0625, August 1979.[2]

7. US NRC, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants," Regulatory Guide 1.70.[1]

8. R.L. Bates and J.A. Jacksons, editors, "Glossary of Geology," American Geological Institute, Falls Church, Virginia, 1980.

9. G.V. Cohee (Chairman) et al., "Tectonic Map of the United States," U.S. Geological Survey and American Association of Petroleum Geologists, 1962.

10. P.J. Murphy, J. Briedis, and J. H. Pfeck, "Dating Techniques in Fault Investigations," pp. 153-168, in Geology in the Siting of Nuclear Power Plants, A.W. Hatheway and C.R. McClure, Jr., editors, "Reviews in Engineering Geology," Volume 4, Geological Society of America, 1979.

11. H. Rood et al., "Safety Evaluation Report Related to the Operation of Diablo Canyon Nuclear Power Plant, Units 1 and 2," US NRC NUREG-0675, Supplement No. 34, June 1991.[2]

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[1]Single copies of the regulatory guides, both active and draft, may be obtained free of charge by writing the Office of Administration, Attn: Distribution and Services Section, USNRC, Washington, DC 20555 or by fax at (301)415-2260. Copies are available for inspection or copying for a fee from the NRC Public Document Room at 2120 L Street NW., Washington, DC; the PDR's mailing address is Mail Stop LL-6, Washington, DC 20555; telephone (202)634-3273; fax (202)634-3343.

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