

# **REGULATORY ANALYSIS**

## **DRAFT REGULATORY GUIDE DG-1256 LABORATORY INVESTIGATIONS OF SOILS AND ROCKS FOR ENGINEERING ANALYSIS AND DESIGN OF NUCLEAR POWER PLANTS**

(Proposed Revision 3 of Regulatory Guide 1.138, issued December 2003)

### **1. Statement of the Problem**

To evaluate potential sites for nuclear power plants it is necessary to garner information on the engineering properties of the site's soils and rocks. This is done through in situ measurements and laboratory investigation of the static and dynamic engineering properties of the site's soil and rock materials. Laboratory investigation of soils and rocks is an evolving field where methods and procedures are continually enhanced and updated. Typically these are communicated to the technical community through journal publications and organizations responsible for providing standards to the technical community. These standards are continually updated, replaced, and or retracted when appropriate. To address updated methods and standards the NRC's guidance should be updated regularly to reflect current generally-accepted professional standards, methods and procedures available for the laboratory investigation of soils and rocks. Without updating, applicants would have to either: (i) use outdated methods and procedures for the determination of static and dynamic soil and rock properties used in seismic response analyses and engineering design, or (ii) propose and justify alternate methods.

### **2. Objective**

The objective of this regulatory action is to assess the need to update the NRC guidance on the laboratory investigation of soils and rocks for engineering analysis and design of nuclear power plants.

### **3. Alternative Approaches**

The NRC staff considered the following alternative approaches for providing NRC guidance on acceptable methods and procedures for laboratory investigation of soils and rocks for engineering analysis and design of nuclear power plants:

1. Do not revise Regulatory Guide 1.138.
2. Withdraw Regulatory Guide 1.138.
3. Revise Regulatory Guide 1.138.

#### Alternative 1: Do Not Revise Regulatory Guide 1.138

Under this alternative, the NRC would not revise this guidance, and applicants would continue to use the present version of this regulatory guide. If NRC takes no action, there would be no cost to NRC in revising the guide. However, the "no-action" alternative would not provide an update to address laboratory testing methods and procedures that have been either revised, replaced, or retracted. This may result in requests from NRC to applicants for additional information (RAI). The requests will impose a burden on the NRC staff in preparing them, in reviewing them, and in determining a path forward following review. Applicants would be burdened by the effort required to respond to the RAIs.

### Alternative 2: Withdraw Regulatory Guide 1.138

Withdrawing this regulatory guide would eliminate the guidance regarding methods and procedures acceptable to the NRC for the determination of static and dynamic soil and rock properties used in seismic response analyses and engineering design with no obvious benefit. Very little NRC staff effort is needed to withdraw a guide and the withdrawal would be publicly announced in a Federal Register Notice. Applicants would be impacted by a withdrawal by having to propose and justify methods and procedures for the determination of static and dynamic soil and rock properties used in seismic response analyses and engineering design. NRC would be impacted by being required to review the alternate methods and procedures and the review may result in RAIs. The requests will impose a burden on the NRC staff in preparing them, in reviewing them, and in determining a path forward following review. If RAIs are needed it will extend the length of an application review. Applicants would be burdened by the effort required to respond to the RAIs.

### Alternative 3: Revise Regulatory Guide 1.138

Under this alternative, the NRC would revise Regulatory Guide 1.138 to reflect the current state of the art testing procedures and methods used for the determination of static and dynamic soil and rock properties used in seismic response analysis and engineering design. For Alternative 3, the value to NRC staff and applicants in revising the guide would be the benefits associated with providing guidance based on current generally-accepted methods and procedures for laboratory investigation of soils and rocks for engineering analysis and design of new nuclear power plants. With such guidance the need for RAIs is reduced. That is a benefit for both NRC and applicants. The impact on the NRC would be the costs associated with preparing and issuing the regulatory guide. For parties who submitted a previous application the impact would be in the cost of addressing a revised guide versus dealing with an established one they had used before. Applicants who have not submitted an application previously would not be affected in the same manner by a revision of the guide.

## **4. Comparison of Alternatives**

The three alternatives were compared against each other with respect to the following factors: safety, NRC resources, licensee and applicant resources, regulatory stability and predictability, and public transparency and public confidence.

With respect to safety the laboratory investigation of soils and rocks is an evolving field where methods and procedures are continually enhanced and updated. Standards for soil and rock testing are continually updated, replaced, and or retracted when appropriate. The reason for change is usually based on insights garnered through practical experience or research and should not be ignored as would happen with Alternative 1. The absence of formal guidance (Alternative 2) does not necessarily represent unsafe results since laboratory testing organizations would either continue to use existing methods with which they are familiar and have not proven unsafe, or they may even adopt methods more recent than those found in Rev. 2 of the RG. Alternative 3 would be superior to Alternative 1 and possibly 2 in that it would update the RG to include, where appropriate, revised standards and procedures that offer enhanced safety, improved clarity, reduce the uncertainty in the results, or facilitate the licensing process.

With regard to NRC resources, Alternative 3 represents the greatest initial cost to the NRC, which is attributable to the costs associated with preparing and issuing the regulatory guide. However, when considered over the lifetime of the RG and the potential for additional staff resources expenditures associated with evaluating applicant/licensee submittals which do not meet the RG, it may be that the overall NRC cost of Alternative 3 is closer to or less than the overall cost of Alternatives 1 or 2.

Alternatives 1 and 2 would not reflect the current the professional standard (state of the art) methods and

procedures and to the NRC for the staff time required to issue and review the RAIs. As a result of withdrawal of the RG under Alternative 2, the content of future submittals could vary from licensee to licensee, thereby making their review more burdensome for the staff. Delays and cost increases would likely be greater than under Alternatives 1 and 3 due to an increased number of requests for additional information resulting from the lack of a current standard.

With regard to licensee and applicant resources, Alternative 3 results in the least costs because the licensee's submittals may be delayed because the NRC may have to issue requests for additional information (RAI) and licensees may have to perform additional analyses to address those RAIs. These additional activities would lead to increased costs to licensees and to the NRC for the staff time required to issue and review the RAIs. By contrast, because Alternatives 1 and 2 would not reflect the current state of the art methods and procedures, NRC's reviews of the licensee's submittals may be delayed because the NRC may have to issue requests for additional information (RAI) and licensees may have to perform additional analyses to address those RAIs. These additional activities would lead to increased costs to licensees.

With regard to regulatory stability and predictability for current licensees, Alternative 1 appears to represent the most regulatory stability, inasmuch as the current guidance would be maintained. However, given the NRC's determination that, for future applications and licensee-initiated changes, the current guidance should not be used, Alternative 1 does not actually provide regulatory stability or predictability. Alternative 3 provides the best regulatory stability and predictability, because the NRC is not imposing the revised RG on a licensee unless the licensee initiates a voluntary change that directly involves lab testing of soils and rock properties. Thus, licensees and NRC staff would continue to use guidance with which many are already familiar.

With regard to public transparency and public confidence, Alternative 3 results in the highest level of transparency and public confidence. Express NRC approval of methods and procedures for laboratory testing of soil and rock which are currently regarded as the current state of the art, makes clear to all stakeholders – including licensees and applicants – the NRC's position and expectations on this subject. Approving the use of the current professional standard enhances public confidence in the effectiveness and quality of the NRC's regulatory activities. By contrast, elimination of guidance for future licensees and applicants under Alternative 2 will result in regulatory instability and possible erosion of public confidence by a lack of transparent methods. Maintaining the existing guidance under Alternative 1 is directly inconsistent with transparency, as it would erroneously suggest that the NRC continues to believe that the guidance in the current RG is acceptable for future applications for new and amended licenses. Alternative 1 is also not supportive of public confidence in the NRC's regulatory activities because of the unexplained dichotomy between the current (out-of-date) NRC guidance and the current state of the art.

## **5. Conclusion**

Based on this regulatory analysis, the NRC staff concludes that revision of Regulatory Guide 1.138 is the best alternative for providing NRC guidance on acceptable methods and procedures for laboratory investigation of soils and rocks for engineering analysis and design of nuclear power plants. The proposed action will enhance an applicant's ability to prepare submittals that meet the current generally-accepted standards, methods and procedures used to evaluate the static and dynamic soil and rock properties used in seismic response analyses and engineering design. An updated guide will reduce staff review time and the need for requests for additional information thus reducing costs to licensees, applicants, and the NRC. The cost to NRC in revising the RG and to licensees and applicants in adapting to a revised RG are deemed to be far less than the benefits accrued by reducing the need for RAIs. As

mentioned above RAIs can impose a significant cost burden on licensees, applicants, and staff, and result in licensing delays.

Pre-Decisional