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電信

保存期間：平成27年12月31日迄

秘

耐震室 坂 小 前 山 (理)

主管

平成２４年　７月　９日

ウィーン代発
本　　省着

軍原協

外　務　大　臣　殿

小澤　俊朗大使

ＩＡＥＡ女川原発ミッション [redacted]

第２４５３号　秘

貴電軍原協第７４６４３号及び往電第２３８９号に関し，

９日，当代表部村田書記官が，[redacted]

[redacted]概要以下のとおり。（先方：[redacted]）本電を原子力安全・保安院に転達願いたい。

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IAEA Safety Standards

for protecting people and the environment

Evaluation of Seismic Safety for Existing Nuclear Installations

Safety Guide

No. NS-G-2.13

IAEA
International Atomic Energy Agency

(b) Identifying groups of components for which a bounding sample may be evaluated to represent the group (e.g. motor controlled valves);
(c) Verifying the in-office screening for robustness, including any caveats; verifying that seismic system interactions will not impair the component's ability to perform its designated function;
(d) Verifying the feasibility of proposed easy fixes and identifying other candidate easy fixes;
(e) Confirming the walkdown plan for the detailed walkdown.

5.37. Detailed walkdowns should entail an in-plant evaluation of selected SSCs for which robustness screening was not applicable or for which robustness was not verified during the previous preliminary walkdown, and for items requiring an HCLPF or a calculation of fragility function. All field information required as input to the calculation of HCLPF values or fragility functions will be gathered. The data documentation initiated in the pre-walkdown phase (see para. 5.35) should be completed. Documentation of this task should be in the form of drawings, field notes, photographs, videos, etc.

5.38. Each walkdown team should include qualified seismic engineers, with plant support as required (maintenance, operations, systems and engineering). The seismic engineers should have sufficient experience in the seismic analysis, design and qualification of SSCs for resisting earthquakes and other loads arising from normal operations, accidents and external events. At least one team member should be familiar with the design and operation of the SSC being walked down. Support in several technical disciplines such as from the mechanical, electrical and instrumentation and control departments may be required.

5.39. The walkdown should also be aimed at identifying spatial interactions, which have the potential to adversely affect the performance of the selected SSCs. The following are major issues of seismic system interactions that should be addressed:

(a) Falling interaction is a failure of the structural integrity of a non-safety-related item or a safety related item that can impact on and damage one or more selected SSCs. For the interaction to be a threat to selected SSCs, the impacts would have to transfer considerable energy, and the target would have to be vulnerable. A light fixture falling on a 10 cm diameter pipe may not be a credible damaging interaction with the pipe. However, such a light fixture falling on an open relay panel is an interaction that should be addressed. Unreinforced masonry walls are among the most

walkdowns should be developed or adapted from existing walkdown procedures.

5.34. The plant walkdown should include the following:

(a) Preparatory activities for the walkdown (in the office);
(b) Preliminary walkdown of the selected SSCs;
(c) Walkdown plan;
(d) Detailed walkdown;
(e) Documentation.

5.35. Preparation for the walkdown is an office activity. It should include:

(a) Plant familiarization (Section 3).
(b) Review of the selected SSCs identified by systems analysts; making a preliminary grouping of items and specifying the appropriate level of detail for capacity evaluation; confirming with systems analysts the completeness of the list.
(c) Performing a first screening of items on the basis of their robust seismic capacity, for example, using screening rules for the seismic capacity.
(d) Assembling a database of selected SSCs that includes the name, component type, manufacturer, size, anchorage, design conditions, function, physical location and any other appropriate information on the SSCs, and that is available in the office. Typically, these data include a summary listing (of selected SSCs) and individual packages of information called 'seismic safety evaluation worksheets'. This incomplete listing of data will be supplemented in the field in the in-plant evaluation and by means of calculations of HCLPF values or fragility functions upon completion of the project.
(e) Determining requirements for access, such as access for training, for escorting, for maintenance of equipment, etc.
(f) Preparing a preliminary walkdown plan for selected SSCs.

5.36. For the preliminary walkdown of selected SSCs, the selected SSCs that are accessible should be visually examined. The walkdown should include:

(a) Determining the location and accessibility of each item of the selected SSCs; identifying the need for operations or maintenance support to access particular components (e.g. to open electrical equipment to verify the device support and the overall anchorage); completing seismic safety evaluation worksheets and data sheets to the extent possible;

in the quantification of risk, and their effects on the end metrics may be quantified with sensitivity studies.

(b) Global behaviour of structures such as uplift, drift, overturning and settlement, and the modelling of these in the PSA (e.g. singletons).

(c) Human actions (see para. 5.18).

(d) Evaluation of the containment and containment systems (see para. 5.19), including fragility functions developed (HCLPF values).

(e) Evaluation of electrical devices (see para. 5.48).

(f) Evaluation of interactions due to seismically induced fire and seismically induced flooding.

COMMON ELEMENTS OF THE SMA AND SPSA METHODOLOGIES

Plant walkdown

5.32. The term 'selected SSCs' denotes those SSCs that are of interest for the purposes of the SMA or SPSA; the equipment of the selected SSCs is typically documented on the list of safe shutdown equipment for the SMA or the list of seismic equipment for the SPSA.[6]

5.33. Plant walkdowns are one of the most significant components of the seismic safety evaluation of existing installations, for both the SMA and the SPSA methodologies. Plant walkdowns should be performed within the scope of the seismic safety evaluation programme. The term 'plant walkdown' is used here to denote the 'seismic capability walkdown' for the SMA approach and the 'fragility walkdown' for the SPSA approach. These walkdowns may serve many purposes, such as: gathering and verifying as-is data; verifying the screening-out of SSCs due to high capacities on the basis of engineering judgement; verifying the selection of safe shutdown paths for the SMA; evaluating in-plant vulnerabilities of SSCs, specifically issues of seismic system interaction (impact, falling, spray, flooding); identifying other in-plant hazards, such as those related to temporary equipment (scaffolding, ladders, equipment carts, etc.); and identifying the 'easy fixes' that are necessary to reduce some obvious vulnerabilities, including interaction effects. Walkdowns should also be used to consider outage configurations that are associated with shutdown modes. Detailed guidance on how to organize, conduct and document

[6] See footnote 3 on p. 25.

EVALUATION OF SEISMIC SAFETY FOR EXISTING NUCLEAR INSTALLATIONS

Safety standards survey
The IAEA welcomes your response. Please see:
http://www-ns.iaea.org/standards/feedback.htm

common causes of falling interactions. Masonry walls may be in close enough proximity that their failure could damage safety related equipment within the enclosure bounded by them.

(b) Proximity interactions are defined as conditions in which two or more items are in close enough proximity that any unsafe behaviour of one of them may have consequences for the other. The most common example of a proximity interaction is the impact of an electrical cabinet containing sensitive relays with adjacent items.

(c) Spray and flooding can result from the failure of piping systems or vessels that are not properly supported or anchored. Inadvertent spray hazards to selected SSCs arise most often from wet piping systems for fire protection. Impact and fracture or leakage of sprinkler heads is the most common source of spray. If spray sources can spray equipment sensitive to water spray, then the source should be backfitted, usually by adding support to reduce deflections and impacts or stresses. Large tanks may be potential flood sources. If a flood source can fail, the walkdown team, with the assistance of plant personnel, should assess the potential consequences, taking into account the flow paths and dispersion of liquid through penetrations, drains, etc.

5.40. As a key activity of the programme for seismic safety evaluation, the walkdown should be properly documented as follows:

(a) A summary walkdown report may be written to summarize system wide issues, if any, and to provide a high level summary.

(b) A summary listing of the selected SSCs with relevant data should be produced.

(c) At the most detailed level, walkdown packages for each item in the listing of selected SSCs should be produced. These walkdown packages include a summary sheet and backup information (e.g. walkdown notes, photographs, drawings, calculations). These packages should be made available to the peer review team. The packages may also include HCLPF or fragility function calculations. However, calculation packages for the HCLPF or fragility function may be filed separately, with cross-referencing of the walkdown package.

Buildings and structures

5.41. For each building and structure defined as part of the selected SSCs, the function to be maintained, the damage mode for the function and the indicator for the damage mode should be defined. For the shear wall structures generally

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ＩＡＥＡ女川原発ミッション [redacted]

第２５９８号　秘　要処理

貴電軍原協第７９５５１号及び往電第２５５１号に関し，

２３日、[redacted]を手交しおいた上で、当代表部石川誠己参事官が[redacted]を往訪し、冒頭貴電の次第を伝達したところ、先方の反応概要以下のとおり（先方：[redacted]，当方：村田真一書記官同席）。本電を原子力安全・保安院に転達願うとともに，下記３（１），（３），（４）及び４につき，結果至急回電願いたい。

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