Use of Reactor Operating Experience at the United States Nuclear Regulatory Commission

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Abstract. The United States Nuclear Regulatory Commission (NRC) staff recognized the need to enhance its reactor operating experience (OpE) program. As a result, the NRC has invested significant resources to evaluate the reactor OpE program and has made significant changes to the program. These efforts are intended to ensure that the key objectives of an effective reactor OpE program are achieved, and that the reactor OpE program directly contributes to the NRC strategic goals of safety, security, openness, and effectiveness. This paper summarizes the significant changes, ongoing activities, and remaining challenges to the NRC's reactor OpE program associated with the use of domestic and international OpE information.

1. Introduction

In 2003, the NRC staff formed a Reactor Operating Experience Task Force (ROETF) to evaluate the agency's reactor OpE program and to recommend specific program improvements. In November 2003, the ROETF completed its work and recommended several actions to improve the NRC's reactor OpE program. As a result of these recommendations, the staff developed an enhanced reactor OpE program that was implemented in January 2005. The new and enhanced program is relatively young and as the NRC staff gains experience and considers stakeholder feedback, the staff will continue to make process and program improvements.

2. Description

2.1 Background

NRC recognizes that the effective use of OpE plays an important role in the safety mission of the agency. According to the current NRC Strategic Plan, one of the NRC's key strategies to achieve the strategic goal of safety is "Evaluate and utilize domestic and international operational experience and events to enhance decision-making." As a result, NRC's emphasis on the effective use of OpE remains strong.

The ROETF determined that the following three objectives are critical to the agency's reactor OpE Program:

- OpE is collected, evaluated, communicated, and applied to support the agency goal of ensuring safety.
- OpE is used to improve the effectiveness, efficiency, and realism of NRC decisions.
- The public, Congress, and other external stakeholders are provided with accurate, timely, and balanced information regarding operational experience, including actual or potential hazards to health and safety.

To accomplish the objectives of a reactor OpE program, the staff determined that the following attributes were necessary for the program to be effective:

- Clearly defined and communicated roles and responsibilities.
- Efficient collection, storage, and retrieval of OpE.

- Effective screening of OpE for followup, evaluation.
- Timely communication of OpE to stakeholders for information or evaluation.
- Timely and thorough evaluations of OpE to identify trends, recurring events, or significant safety issues for appropriate followup, actions.
- Timely decisions on implementation and appropriate followup resulting from the review of OpE.
- Periodic assessments of the OpE program to determine its effectiveness and to identify needed improvements.

Based on the thorough evaluation of the existing program against the above objectives and attributes, the ROETF made a number of recommendations, including better defined roles and responsibilities, a central Clearinghouse, and improved collection, storage and retrieval of OpE. In response to the recommendations, NRC staff developed an enhanced OpE program in 2004. This enhanced program was first implemented in January 2005.

2.2 Four Phases of Operating Experience Process

The implementation team used the ROETF recommendations to break down the OpE process into four phases, which address all of the attributes of an effective OpE program. These phases are explained in detail in Management Directive (MD) and Handbook 8.7, "Reactor Operating Experience Program" (see references). MD 8.7 also delineates the roles and responsibilities for all of the participants in the OpE program as well as explains the necessity of a periodic assessment of program effectiveness. A diagram of the process has been provided in Figure 1, and the definition of each phase and the significant OpE program activities and changes related to each phase are summarized below.

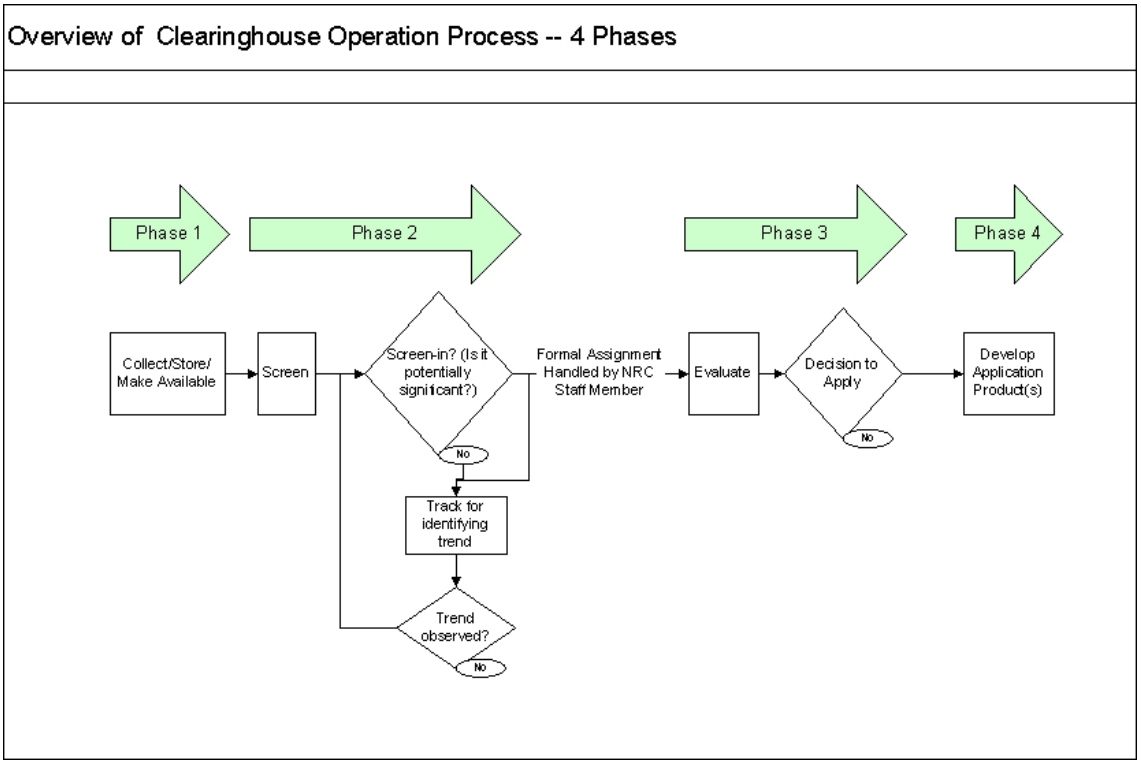

FIG. 1. Overview of Operating Experience Review Process

Phase 1 - The first phase of the OpE process involves collecting, storing, and making available OpE information to the NRC staff. Through the use of information technology, the NRC has made significant advances in this area enabling staff to locate and evaluate OpE information with ease. The collected OpE includes those inputs considered new information that depict recent events or conditions at a plant, as well as previously "analyzed" information. The majority of the new information is provided to the staff by the licensees in response to reporting requirements stated in the regulations. Other sources include the NRC inspection reports, International Nuclear Event Scale (INES) events, Incident Reporting System (IRS) reports, and other internally generated reports on OpE. The previously "analyzed" information contains insights and lessons-learned related to the subject OpE topic. Sources of this type of OpE information include generic communications, inspection findings, Institute of Nuclear Power Operations (INPO) reports, and other OpE-related studies and reports.

Phase 2 - The second phase of the OpE process requires the Clearinghouse to screen a new piece of OpE information to determine if it has potential significance. The NRC has formalized the screening process through the program guidance documents to ensure a more systematic approach to reviewing OpE. A set of screening guidelines that consider risk and qualitative factors such as potential generic implication, adverse trend, or new phenomena (e.g., novel failure mode, material degradation) are applied to screen-in those OpE inputs that are potentially significant and deserving of a more detailed evaluation. If OpE information is screened-in for further evaluation, it becomes a formal assignment for a Clearinghouse staff member, who gathers additional information in preparation for evaluation of the issue. OpE information that does not meet any of the screening guidelines is screened out but may be communicated to relevant technical experts or inspection staff if necessary. It is also tracked to identify any adverse trends.

Phase 3 - After OpE information is screened-in and has been communicated to various stakeholders, it is evaluated by Clearinghouse staff or by other technical staff to clearly determine the significance of its impact on plant operation and safety. An evaluation is conducted to glean OpE insights and lessons-learned that could be applied toward agency action. The evaluation determines the risk significance and/or qualitative determination of other safety or agency concerns for the subject OpE information. A report is generated for the assignment, and it contains insights learned from such OpE information, or recommendations for applying lessons-learned to future regulatory activities. These evaluations have allowed for better communication and integration between the Clearinghouse, the technical staff, and the regional offices.

Phase 4 - Once the assigned staff member completes the evaluation of the screened-in item and recommendation for further action, the Clearinghouse reviews the recommendations to decide whether further action is warranted. The Clearinghouse management decides, in consultation with other appropriate NRC managers when necessary, whether or not to adopt the recommendations for applying the subject OpE information. The options for applying the lessons learned consist of: (1) communicating OpE lessons learned to various internal and/or external stakeholders through reports, briefings, e-mail listserves or generic communications, (2) taking a regulatory action through a generic communication to require responses from the licensees or issuing orders for actions and/or (3) influencing agency programs such as inspection, oversight, licensing, incident response, security, rulemaking, and research. Communication with internal and external stakeholders has improved, and more information including evaluation closeout memoranda are distributed to interested parties. There has also been in an increase in the number of generic communications that are being developed since the program was implemented.

2.3 International OpE Activities

The NRC processes international OpE in the same manner as domestic OpE. The OpE received through various channels is collected, screened, evaluated, and applied. The key OpE sources include the events reported through the INES and IRS. Other international OpE sources include media reports, foreign trip reports, formal international agreements, and meetings. The NRC continues to actively share domestic OpE with the international community in a timely fashion. For example, all reported domestic events are rated daily using the INES, and events that are rated Level 2 or above (on a scale of 0-7 with 7 being the most severe) are reported internationally. A number of operating experience documents, such as NRC Generic Communications, are published on the NRC Public Web Site, which is made available to the international community as well. The NRC continues to strive for excellence in the use and sharing of international OpE, working closely with the international community and organizations such as the IAEA.

2.4 Current Challenges

As the new reactor OpE program is implemented, several challenges currently remain. The majority of the challenges are associated with the increased workload and instability of the new program which has gone through significant transition over the last several years. The procedures and guidance documents will need to be better defined, interfaces with technical staff and the regions will need to be enhanced, and the staff involved in the OpE processes will need additional experience and training. Additionally, a challenge continues to exist in the area of trending and assessing seemingly minor OpE to identify potentially safety significant issues in a timely manner. The NRC will proceed to work on these challenges to further enhance the current reactor OpE program.

3. Conclusion

An effective reactor OpE program is essential for the NRC's goal of ensuring safety. The NRC's strategic plan specifically identifies the use of domestic and international operating experience as one of the strategies to support that goal. NRC has employed the four phases of an effective OpE program- collection, screening, evaluation, and application - to develop a more systematic and effective program. In each phase, the NRC has made substantial enhancements in the reactor OpE program and will continue to seek opportunities for improvement in the future.

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