Operating Experience Programs
of the
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission

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Operating experience responsibilities at the Nuclear Regulatory Commission (NRC) are
shared among the program offices of Nuclear Reactor Regulation (NRR) and Nuclear
Regulatory Research (Research). This paper will focus on the activities of the NRR
program, but will first provide a broad overview of both programs.

NRR
The NRC Office of NRR is responsible for ensuring the public health and safety through
licensing and inspection activities at all nuclear power reactor facilities in the United
States. The Office consists of five Divisions and a sub office. A link to the
organizational structure is provided - NRR Organization[1]. Within the Division of
Regulatory Improvement Programs exists the Operating Reactor Improvements
Program. It's operating experience program is responsible for: systematically assessing
and screening all nuclear power reactor related events, reports, and data to determine
their significance and need for additional evaluation or plant-specific actions; developing,
coordinating, and issuing operational feedback to licensees in the form of information
notices, bulletins, generic letters and regulatory issue summaries[2] for the safety
concerns identified from power reactor events and conditions; identifying the need for an
Augmented Inspection Team or Incident Investigation Team response and coordinating
NRR involvement in establishing the scope and composition of these teams and;
coordinating operating events briefings and serving as the NRR focal point for interface
with the regions, other offices, and industry for event and other incoming reports.

Additionally, within the Division of Inspection Program Management, resides the Industry
Trends Program, another element of the agency's operating experience programs. It
was recently established as a means to confirm that the safety of operating power plants
is being maintained.

Research
Research plans, recommends, and implements programs of nuclear regulatory research.
It also is comprised of five divisions and a link to its organizational structure is provided
Research Organization.   Within this construct its activities are broad. Directly related to
operating experience, however, Research has programs within the Division of Risk
Analysis and Applications and the Division of Systems Analysis and Regulatory
Effectiveness.

Specifically, the Operating Experience Risk Analysis Branch, systematically assesses
U.S. operational safety data and reliability information to determine risk-significant
insights and trends. It performs risk and reliability analyses and evaluations based on
operating experience to assess industry and plant performance and identify plant
outliers. It develops and manages data systems for the storage and retrieval of safety
experience. It remains cognizant of operational and reliability data systems in the

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[1] A cross-reference to the actual url designations is provided in Attachment 1.
[2] These documents are referred to as generic communications and an overview is provided in Attachment 2.

industry and the NRC, and provides the focal point for and coordination of the NRC safety data collection programs with the Advisory Committee on Reactor Safety, industry (Institute of Nuclear Power Operations (INPO), and Electric Power Research Institute (EPRI)), foreign governments, and other groups and agencies involved with data collection systems. It provides an NRC focal point for the Equipment Performance and Information Exchange system and oversees the use of this data by NRC users. It develops and implements and the Accident Sequence Precursor Program for operating nuclear power plants. It performs reliability studies for risk significant systems and equipment on operating nuclear power plants. It provides feedback of the lessons of operating experience to program offices and the regulated community.

The Regulatory Effectiveness Assessment and Human Factors Branch, plans, conducts and manages research programs to improve NRC's understanding of human performance. It prioritizes Generic Safety Issues (GSI)[3], resolves GSIs related to systems performance, and provides oversight of the GSI programs to assure timeliness and consistency including performing regulatory analyses. It performs a comprehensive review of operating experience and conducts in-depth analyses and evaluations.

Intent of Combined Approach
Given these broad descriptions of operating experience responsibilities, it is often characterized that the operating experience responsibilities of NRR focus on short term feedback and regulatory actions, while those of Research are aimed at longer term improvements in both reactor safety and regulatory effectiveness. Together the programs provide for a comprehensive approach to maintaining nuclear safety and improving regulatory effectiveness through operating experience.   Each element is intended to contribute to the agency's performance goals of maintaining safety, increasing efficiency and effectiveness, increasing public confidence, and reducing unnecessary regulatory burden.

Historical Perspective
To understand the NRC's current organizational structure as it pertains to operating experience programs, it is worth examining some NRC history. From 1979 until 1999, when it was abolished, the Commission had an independent Office of Analysis and Evaluation of Operational Data (AEOD). Its primary mission pertained to systematically collecting and evaluating operating experience, and communicating the lessons learned to the NRC staff and the regulated industry. In 1999, agency streamlining transferred the responsibilities of AEOD to Research and NRR, with the majority going to Research. NRR was assigned the short-term domestic/foreign operating experience review; oversight of the agency's backfit program; and reportability and rulemaking rulemaking. Research became responsible for long-term event assessment activities, the Accident Sequence Precursor Program, system and component reliability studies, risk databases, the Abnormal Occurrences Program[4], and integrated plant performance analysis. An analysis on the creation of the Office of AEOD, its evolution, and subsequent dismantlement in 1999 is provided in Attachment 3.

NRR's Operating Experience Program
Operating Reactor Improvements Program/Operating Experience Section

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[3] A link to a brief overview of the GSI Program is provided
[4] Links to brief overviews of the Accident Sequence Precursor and Abnormal Occurrence programs are provided.

As previously stated, this functional units responsibilities include systematically assessing and screening all nuclear power reactor related events, reports, and data to determine their significance and need for additional evaluation or plant-specific actions. It develops, coordinates, and issues operational feedback to licensees in the form of information notices, bulletins, generic letters and regulatory issue summaries for the safety concerns identified from power reactor events and conditions. It identifies the need for an Augmented Inspection Team or Incident Investigation Team response and coordinates NRR involvement in establishing the scope and composition of these teams. It coordinates operating events briefings and serves as the NRR focal point for interface with the regions, other offices, and industry for event and other incoming reports. It maintains a database of all events as well as other issues that are assigned for further evaluation.

Model

The construct of this activity is a normal input, processing, output model; but the inputs and outputs are widely varied. A detailed model of the process is found in Figure 1 and a full page representation is provided in Attachment 4.
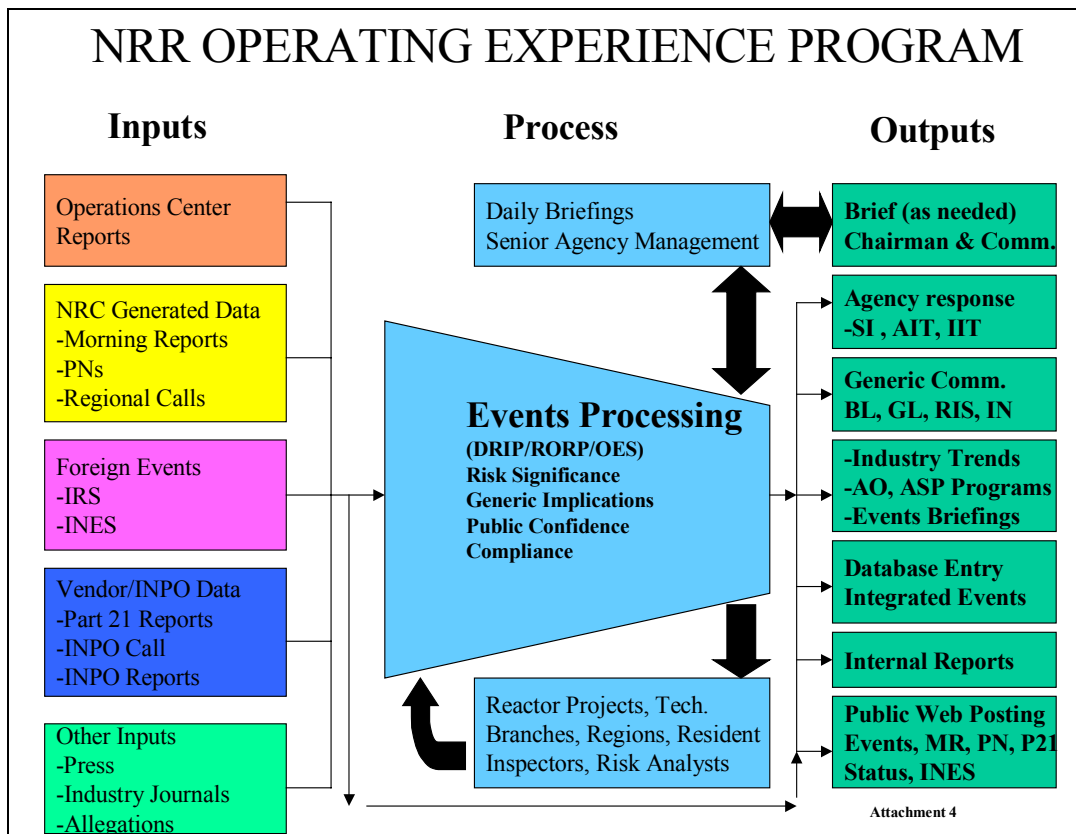

Figure 1

Inputs

The inputs to the operating experience program are largely event or condition driven. The NRC has mature reporting criteria for operating reactors in the form of 10 CFR 50.72, "Immediate notification requirements for operating nuclear power reactors" and 10 CFR 50.73, "Licensee event report system". These reporting criteria, which the NRC revised in 1999, were designed provide the NRC with risk significant issues that may need to be addressed in the short term (NRR function), as well as providing data for long

term analysis and trending (Research function). The text of the reporting criteria is provided in Attachment 5. A link to NUREG-1022, "Event Reporting Guidelines" is provided.

The operating experience staff reviews approximately 1200 events per year. Following the model, another set of inputs is NRC generated data. The include Morning Reports, Preliminary Notifications of Unusual Event or Occurrence, and information gathered from planned calls with our Regional Offices who are getting up to date information directly from their onsite resident inspector. While there is substantial overlap between these sources of information and the licensee event reports, these sources of information have substantial value in their ability to distribute information in a timely manner. Event reports are collected by the NRC's Operations Center and disseminated in a batch process once daily.   An event could be unfolding and the licensee required report may not be received in time for the daily systematic processing of these reports. A Morning Report or Preliminary Notification can fill that void. Additionally, they serve as vehicles to capture items of interest that are not required to be reported by licensees.

The NRC learns of foreign events through the International Reporting System (IRS) and the International Nuclear Event Scale (INES) web postings of the IAEA. It also learns of foreign events through the press and direct contacts individual staff may have in other countries. Significant foreign events are communicated to management and have been the subject of formal presentations to management and staff at the group's monthly events briefing. This fiscal year we have made presentations on the Hamoaka and Brunsbuttl hydrogen events and a Korean steam generator tube rupture.

A representation of the volume of source documents reviewed over the past two fiscal years is provided in Figure 2.

Figure 2
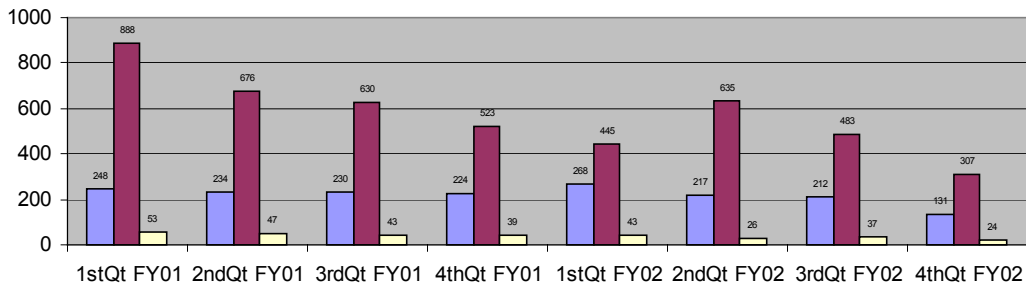
- Event Reports Received
- Other Source Documents
- Assignments Made

Yet other sources of input to the model are vendor or INPO Data. These include vendor reports to the Commission required pursuant to 10 CFR PART 21 as well as INPO

Operating Experience Reports and information obtained from the groups direct conversations with INPO. INPO is an industry-working group and its reports are not widely disseminated; they are proprietary.

The model also receives input from the group's web search every morning for news articles of interests. The group is generally aware of the publications in areas surrounding nuclear power plants and with the web technology, coupled with search engines specifically dedicated to nuclear power issues, is able to efficiently become aware of nuclear issues making the news.

Processing
Up until 1999, the processing of these inputs was accomplished by a panel of NRR managers from different disciplines and management representatives from both Research and the former AEOD. The purposes of the of the panel were to consistently assess the safety significance of potential generic communication and compliance activities and prioritize them; identify important operating experience and ensure lessons learned are communicated back to staff and industry; and consistently and uniformly identify significant events.

This function is now done at the staff level. The maturity of risk assessment tools and the staff's understanding of them have made the identification of significant events more efficient. Further, years of experience have demonstrated that the need for a generic communication is self-evident or that the staff has sufficient expertise to champion the need, if warranted.

The work group begins its day scanning the news and web to learn of any issues as it awaits release of the incoming reports from the NRC Operations Center. A designated staff individual prepares a summary of the events. The Executive Director for Operations (EDO) is briefed by his own staff which receives the reports concurrently with the operating experience staff. The operating experience staff function at the EDO brief is to serve as a backup for information on reactor issues as well as to receive feedback from executive managers on the issues themselves.

Subsequent to this meeting, the designated staff directly briefs NRR executive management and receives feedback. While this designated staff is performing this morning routine, four other staff are participating in conference calls with the four regional offices who have just completed compiling their information from their respective morning conversations with each site's resident inspector.

Following this, the group meets each morning to begin the central part of our processing model. The group processing of the information is then an integrated processing of everything it has learned form the event reports themselves, feedback from EDO and NRR executive management briefings and discussions with the Regions. The processing is driven by *risk informed decision-making*, concern for *generic implications*, and *public confidence*. Compliance is of concern but is normally handled through the inspection program.

Outputs
Of principle importance are any issues that require agency response. The agency primarily uses risk informed decision-making in formulating an agency response. Currently, the agency's tools for assessment of risk are the Significance Determination

Process of the Reactor Oversight Process and the Standardized Plant Analysis Risk models. The agency has produced a pool of certified risk analysts both in the region and headquarters and has others capable of using the technology.   A comparison of risk assessment tools and a broad gauge of expected agency response is provide as Attachment 6.

Concurrent but separate with the assessment of need for agency response in the form of additional inspection, is the assessment of the generic implications of an event or condition. If an event or condition is of more than minor significance and potentially has generic implications, an assignment is made into the groups integrated events tracking system for further evaluation. This evaluation will include a search of the database of past occurrences of the condition or related conditions as well as any previous generic communication on the issue. It will also include interface with the respective technical experts on the subject matter. The current practice is that a generic communication will be initiated at the request of any branch level manager made to the Operating Reactor Improvements Program. As previously stated, the agency currently has four generic communication products: Generic Letter, Bulletin, Information Notice, and Regulatory Issue Summary. An explanation of each product and its uses is provided in Attachment 2.

From 1995 to present the agency has issued 36 Generic Letters or supplements, 11 Bulletins, 365 Information Notices, and 71 Regulatory Issue Summaries. All NRC generic communications are available on the web at Generic Communications .

Generic Communciation Distribution 1995 to Present
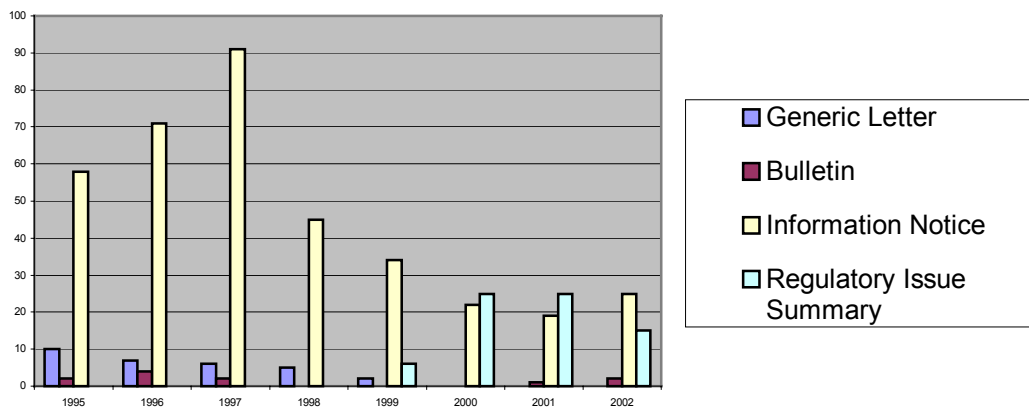
All events entered into the tracking system do not result in a generic correspondence. The group may find that the staff and industry has previously been adequately informed on the issue or for the industry, in a manner that does not need regulatory involvement, through INPO. Oftentimes issues are entered into the events database solely to capture for future reference.

Irrespective of the processing of information, all event reports, morning reports, preliminary notifications, plant status, and Part 21 reports are posted on the web at Document Collections . INES reports are placed on the IAEA website, which is currently a subscription service.

Another significant output of the process is that its identification of significant events serves as input to other agency programs. These are the Abnormal Occurrence and Accident Sequence Precursor programs of Research and the Industry Trends Program of NRR. The primary objective of the Accident Sequence Precursor Program is to systematically evaluate U. S. nuclear plant operating experience to identify, document, and rank those operating events that were most significant in terms of the potential for inadequate core cooling and core damage (precursors).   The Abnormal Occurrence reporting program is a statutory required program. The NRC is required to submit to Congress each quarter a report listing for that period any Abnormal Occurrences at regulated facilities. An Abnormal Occurrence is defined by statute as an unscheduled incident or event that the NRC determines to be significant from the standpoint of public health or safety. The NRR Industry Trends Program is discussed in a subsequent section.

The operating experience staff also provides briefings monthly to management and staff on events or conditions of interest. This has proven an effective manner to disseminate information and clarify misunderstandings on subjects. It also allows feedback to the staff on aspects of the events they may not have considered.

Lastly, the process provides output to NRR internal management reports. Most significantly is the group's Quarterly Report, which provides a summary of significant events, potential Abnormal Occurrences, and other events of interest as well as timely scram statistics. The report summarizes recent generic communications and provides a synopsis of the inventory of generic communications in process. Also, it identifies the proprietary INPO reports under evaluation. The report is being expanded to include foreign events of interest as well to provide a reference operating experience reports published by Research. Other reports are more aligned with workload management.

Industry Trends Program
The NRC recently initiated an Industry Trends Program within NRR to monitor trends in indicators of industry performance as a means to confirm that the safety of operating power plants is being maintained. The Program has continued the industry-level performance indicators originally developed by the Office of Analysis and Evaluation of Operational Data. Should any long-term indicators show a statistically significant adverse trend, the NRC will evaluate them and take appropriate regulatory action using its existing processes for resolving generic issues and issuing generic communications. The NRC formally reviews these indicators as part of the Agency Action Review Meeting each year, and any adverse trends are reported to Congress in the NRC's Performance and Accountability Report.   It is not the intent to fully present the program within the context of this paper, the program can be accessed on the agency's website at Industry Trends. The trended data provides interesting insight into the maturity of the US nuclear industry and the effectiveness of the NRC's regulatory programs.

Challenges
The Operating Experience Section and the Operating Reactors Improvements Program were newly created with the Division of Regulatory Improvement Programs in January 2002.   The predecessor organization was the Events Assessment and Generic Communications Branch. NRR is challenged in making the transition. The work unit is still primarily driven by events and stakeholders needs for timely and accurate information about those events. The organization must fulfill this need while simultaneously finding a more efficient way to effectively communicate operating

experience in the short term. We feel technology can assist us. We are planning on replatforming the events database to make it an integral part of the agency's Reactor Program System. This will largely integrate the events database with other pertinent power reactor information. The organization is currently considering realigning the operating experience section and the Industry Trends Program within the same division. This should provide for a more effective organizational structure. The organization also has an effort to redefine significant events such that there is a logical, objective relationship among the numerous significance assessment tools that have evolved – Accident Sequence Precursor, Significance Determination Process, INES, and Abnormal Occurrence.

Measuring the effectiveness of an operating experience program is a challenge. It can be seen by Industry Trends that the combined efforts of the licensing, inspection, assessment, enforcement, and operational experience programs have at least contributed to improved safety, but a direct metric of the effectiveness of an operational experience program remains a challenge. The organizational could serve itself by performing an assessment of how our operating experience data and products are used in the industry and other stakeholders.

References:

1.) SECY 98-228 Proposed Streamlining and Consolidation of AEOD Functions and Responsibilities; October 01, 1998
2.) SECY 98-030 Implementation of DSI 22 Research; February 25, 1998
3.) SECY 99-289 Status Report on Accident Sequence Precursor Program and Related Initiatives; December 20, 1999
4.) SECY 98-175 Proposed Guidelines for Appendix C, "Other Events of Interest," to the Abnormal Occurrence Report to Congress; July 28, 1998
5.) SECY 98-032 Rulemaking to Modify Event Reporting Requirements for Power Reactors; March 4, 1998
6.) SECY 99-143 Revisions to Generic Communications Process; May 26, 1999

Credits:

Attachments 4 and 6 originally developed by Thomas Koshy, USNRC