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Report to the Chairman, Subcommittee on Clean Air, Wetlands, Private Property, and Nuclear Safety, Committee on Environment and Public Works, U.S. Senate

January 2000

NUCLEAR REGULATION

NRC Staff Have Not Fully Accepted Planned Changes

GAO/RCED-00-29

Contents

Abbreviations

GAO	General Accounting Office
NRC	Nuclear Regulatory Commission

GAO
Accountability * Integrity * Reliability

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Resources, Community, and
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The Honorable James M. Inhofe
Chairman, Subcommittee on Clean Air,
Wetlands, Private Property, and Nuclear Safety
Committee on Environment and Public Works
United States Senate

Dear Mr. Chairman:

The Nuclear Regulatory Commission (NRC) has been moving from its traditional regulatory approach, which was largely developed without the benefit of quantitative estimates of risk, to an approach—termed risk-informed regulation—that considers relative risk in conjunction with engineering analyses and operating experience.[1] NRC believes that such an approach will reduce the unnecessary regulatory burden on licensees and lower their costs without reducing safety and will increase the agency's effectiveness and efficiency.

NRC's move to a risk-informed approach is a major change to its culture. Ultimately, this approach will apply not only to the nation's 103 operating nuclear power plants but also to the thousands of entities that are licensed to (1) use nuclear materials in medical, academic, and industrial applications; (2) process, enrich, and fabricate uranium ore into fuel for nuclear power plants; and (3) dispose of radioactive waste generated by these and other activities.

Recognizing the magnitude of the effort that NRC has undertaken, you asked us to determine the (1) views of NRC's staff on the quality of the work that NRC performs, the management of and staff's involvement in changes occurring in the agency, and the move to a risk-informed regulatory approach and (2) status of NRC's efforts to develop a strategy to implement a risk-informed regulatory approach. To obtain a diversity of views, we surveyed 1,581 NRC staff; 1,076, or 68 percent, responded. (App. I shows the questions used in the survey and the responses of NRC's staff.)

[1]NRC differentiates between "risk-informed" and "risk-based" regulation, noting that the latter approach relies solely on the numerical results of risk assessments. NRC does not endorse a risk-based approach.

In addition, we reviewed various documents and met with key staff to determine the status of NRC's efforts to develop a risk-informed strategy.

Results in Brief

According to our survey results, the vast majority of NRC's staff feel personally responsible for the quality of their work and believe that their work contributes to protecting public health and safety. They also generally believe that NRC's management supports their efforts in this regard. With respect to NRC's efforts to change its regulatory approach, however, the staff expressed less favorable views. A large number of NRC's staff do not believe that management is effectively leading the change process or involving them in the changes being made. With respect to the change to risk-informed regulation, in particular, almost half of the staff who responded to the survey said that the approach could be effective, but only about one-fourth believe that NRC's staff have "bought in to" the process. Relatedly, many staff expressed concern about a central element of risk-informed regulation—the new oversight process to assess the performance of nuclear power plants. For example, 60 percent of the staff who expressed an opinion about the oversight process believe that it will reduce plant safety margins.

Responding to a recommendation that we made in an earlier report, NRC's staff expect to provide the Commission with a draft comprehensive strategy for moving to a risk-informed regulatory approach in February 2000.[2] NRC will then seek public comments on the strategy, and it may then take another year before NRC has an implementation roadmap. Until the roadmap is available, NRC's staff will not have a clear appreciation of their role in implementing the various activities, the type of training they will receive, and the interrelationship of the various activities. In addition, NRC has neither established long-range goals to implement a risk-informed approach nor developed performance indicators to determine whether the agency has met the goals. With such information, NRC could redefine and/or redirect, for example, its communication and training strategies and have a living document that is updated as new issues arise. Without such information, NRC has no way to determine where it is going, how it will get there, or what progress has been made.

[2]See *Nuclear Regulation: Strategy Needed to Regulate Safety Using Information on Risk* (GAO/RCED-99-95, Mar. 19, 1999).

Background

NRC is responsible for overseeing the safe commercial use of materials and facilities regulated under the Atomic Energy Act, as amended. NRC is responsible for ensuring that licensees perform their activities in a way that protects public and worker health and safety and the environment, including the nation's 103 operating commercial nuclear power plants; almost 5,900 entities that use nuclear materials in medical, academic, and industrial applications (materials licensees); 10 facilities involved in processing, enriching, and fabricating uranium ore into nuclear power plant fuel (fuel cycle facilities); and 7 active or closed sites that have disposed of commercially generated low-level waste.

Since the early 1980s, NRC has been incorporating risk in the regulatory process and, in August 1995, issued a policy statement that advocated certain changes in the development and implementation of its regulations for commercial nuclear plants through a risk-informed approach. Under such an approach, NRC and the utilities would give more emphasis to those structures, systems, and components deemed more significant to safety. NRC has issued guidance stipulating that utilities use risk assessments to meet regulatory requirements for specific activities and has undertaken many activities to implement a risk-informed approach. In response to past criticisms about the lack of a consistent, objective, and transparent method to assess nuclear power plants' overall performance, in January 1999, NRC proposed a new risk-informed oversight process. The process would use performance indicators, inspection results, utilities' self-assessments, and clearly defined, objective thresholds for making decisions. NRC began pilot tests of the new process at 13 plants in May 1999 and expects to implement it industrywide in April 2000. NRC has also been examining various approaches to consider risk for such other regulatory concerns as nuclear materials licensees, low- and high-level waste sites, and casks to transport and store radioactive materials.

Because of such issues as economic changes in the industry, federal deficit reduction, and downsizing of the agency, NRC's Office of the Inspector General surveyed the staff to obtain their views on a number of topics. In its June 1998 report, the Office of the Inspector General noted that the staff had a strong commitment to protecting public health and safety. However, the staff expressed high levels of uncertainty and confusion about the new directions in regulatory practices and challenges facing the agency. The Office of the Inspector General concluded that without significant and meaningful improvement in management's leadership, employees' involvement, and communication, NRC's climate could eventually erode the staff's outlook and commitment to doing their job. As we testified in February 1999, we believe that this climate could also erode NRC's progress in moving forward with a risk-informed regulatory approach.[3]

To address the concerns raised by the Office of the Inspector General, in September 1998, NRC identified activities intended to further communications with staff and encourage them to participate in the many changes taking place. As a first step, the Chief Financial Officer, Chief Information Officer, and Executive Director for Operations (the Executive Council) met with all supervisors and managers. NRC also took the following steps:

- NRC committed itself to prepare plans to communicate the status of each of the initiatives in the tasking memorandum[4] to the staff and hired a communications consultant to help develop the plans. In addition, NRC's Office of Nuclear Reactor Regulation has developed a communication plan for the new nuclear power plant oversight process (includes the inspection, enforcement, and assessment of performance) that identifies "change coalition" staff who communicate with other NRC staff and solicit feedback on the initiatives.
- NRC held workshops and conferences on its new nuclear plant oversight process.

[3]See *Nuclear Regulatory Commission: Strategy Needed to Develop a Risk-Informed Safety Approach* (GAO/T-RCED-99-71, Feb. 4, 1999).

[4]The tasking memorandum is a list of high-priority activities with short- and long-term actions and milestones to address each of the activities. NRC prepared the first tasking memorandum in August 1998 and has revised it several times to reflect the status of the activities identified.

- NRC established a separate Webpage to provide information on the results of the Office of the Inspector General's survey and the actions taken to respond to them.
- NRC held meetings with the staff–called information panel meetings–to discuss the near-term initiatives discussed in the tasking memorandum—a list of high-priority activities with short- and long-term actions and milestones to address each of the activities.
- NRC directed each manager and supervisor to reinforce the view that all staff are NRC's most important resource, foster open communication, and solicit employees' involvement to ensure the completion of identified tasks.

Despite Positive Views About the Agency's Commitment to Safety, Staff Are Concerned About Their Limited Involvement in the Agency's Changes and the Move to Risk-Informed Regulation

Similar to the findings of NRC's Office of the Inspector General, the results of our survey showed that staff have a strong commitment to safety but have concerns about the future direction of the agency. Our survey results suggest that senior management may not be providing the leadership necessary to facilitate change and that staff believe they have not been involved in many of NRC's recent initiatives. In addition, NRC's staff expressed mixed views about the move to risk-informed regulation. For example, 48 percent of the staff surveyed believe that risk-informed regulation has had a positive effect on nuclear safety, but about 20 percent believe it has had a negative effect. In addition, only 27 percent of the staff agree or strongly agree that the new risk-informed approach has been accepted by NRC's staff.

Staff Are Generally Pleased With the Agency's Commitment to Quality and the Extent of Communication on Policy Issues

Almost all NRC staff who responded to the survey believe that their work helps protect public health and safety. The majority of those surveyed also believe that the quality of their work is important to and supported by NRC. Table 1 provides responses to questions concerning these beliefs.

Table 1: Beliefs of NRC's Staff About the Importance and Quality of Work at NRC

Percentage of respondents who agree or strongly agree	
Statement	**Percent**
I feel that the work I do at NRC protects public health and safety.	85
NRC staff feel personally responsible for the quality of their work.	82
Quality of work is important to NRC management.	78
I feel that NRC has allowed me to take the training necessary for me to be able to do my job effectively.	70
NRC management encourages staff to take responsibility for their work.	67
NRC staff are provided with the necessary tools and training so that their work can be high quality.	59
Management supports an environment where staff involvement, contributions, and teamwork are encouraged.	51

In addition, a majority of the staff–62 percent–who responded to our survey agree or strongly agree that senior management provides them with useful information about NRC's policies and decisions.[5]

Despite giving relatively good marks to the importance and quality of work and to management's efforts to communicate its change efforts to the staff, responses to several questions indicate that the morale of some staff could be low. For example, 26 percent said they were considering leaving NRC within the next year, and 41 percent said they would probably not advise a colleague to take a job at NRC; the most frequently cited reasons were a lack of opportunity for advancement and the shrinking size of the agency. As a result of low morale, staff could become less receptive to the many planned changes.

[5]For the purpose of the survey, senior management refers to managers at the Deputy Office Director/Deputy Regional Administrator level and above, including the Chairman, Commissioners, and Executive Council, and mid-level management refers to section chiefs, team leaders, assistant branch chiefs, branch chiefs, and deputy and division directors.

Staff Are Concerned About Management of and Their Involvement in Change

Organizational theory and research have shown that for the type of large-scale change that NRC is undertaking to be successful, management must lead the change process and employees should be involved in decisions that affect them.[6] However, our survey results raise questions about whether senior management has taken the steps necessary to lead the change process and encourage the staff's participation. For example, only 23 percent of NRC's staff agree or strongly agree that senior management is receptive to suggestions and provides feedback on the disposition of those suggestions. In addition, only about 20 percent of the staff agree or strongly agree that trust exists between senior management and NRC's staff. Furthermore, NRC's staff do not believe that they have been involved in the many change initiatives. For example, less than one quarter of the staff agree or strongly agree that they were asked to provide input into the development of strategic plans, annual performance plans, and the new nuclear power plant oversight process. Table 2 provides other examples of concerns identified by the staff.

As might be expected and as shown in table 2, the survey results for some questions showed statistically significant differences between the views of management and staff, with management's views being significantly more positive.[7] For example, 73 percent of the managers agree or strongly agree that mid-level management is receptive to suggestions for change that are made by NRC's staff, compared with 40 percent of the staff who have this same response.

[6]In *Aviation Acquisition: A Comprehensive Strategy Is Needed for Cultural Change at FAA* (GAO/RCED-96-159, Aug. 22, 1996), we list several reports that we prepared on cultural change as well as 27 studies used in that report related to strategic change management and organizational theory.

[7]For all statements except the one concerning staff input into the development of strategic plans, the percentage of management agreeing with the statement is significantly different from the percentage of staff at $p < 05$. This means that 95 times out of 100, a difference this large would not occur by chance.

Table 2: NRC's Staff Have Concerns About Management and Change at the Agency

Percentage of respondents who agree or strongly agree			
Statement concerning management and change	**Total responses[a]**	**Management**	**Staff**
Management			
Senior management is receptive to suggestions for change that are made by NRC staff.	26	46	23
Senior management provides feedback to NRC staff on the outcome/disposition of their suggestions.	25	39	23
Mid-level management is receptive to suggestions for change that are made by NRC staff.	44	70	40
Mid-level management provides feedback to NRC staff on the outcome/disposition of their suggestions.	46	73	41
The number of senior management levels in NRC is kept to a minimum.	21	38	18
There is trust between NRC staff and senior management.	21	33	19
Staff involvement in change			
Senior management solicits ideas and opinions from NRC staff before making changes affecting work.	19	34	17
Mid-level management solicits ideas and opinions from NRC staff before making changes affecting work.	40	66	36
NRC staff are asked to provide input into the development of operating plans.	32	45	30
NRC staff were consulted in the development of the new oversight process.	31	41	29
NRC staff are asked to provide input into the development of strategic plans.[b]	25	30	24
NRC staff are asked to provide input into the development of annual performance plans.	25	32	24
I have been given sufficient opportunity to provide my input into the new reactor oversight process.	22	36	20

[a]Percentages in this column are based on the answers of all 1,076 respondents. However, because 31 respondents did not specify whether they were management or staff, the other columns represent the answers of 1,045 respondents.

[b]The only statement of the 13 shown in table 2 where the difference between management and staff is not statistically different.

NRC and the nuclear industry have long recognized that differences exist among NRC regional offices and between the regions and headquarters. Although our survey results showed that the responses of staff in NRC's headquarters and regional offices concerning management and change at the agency were similar, the results showed different perceptions among the staff of NRC's four regional offices. For example, the staff in Region IV

(Arlington, Tex.) were generally more positive than the staff in the other three regional offices. In addition, the staff in Region III (Lisle, Ill.) had the lowest positive responses for 6 of the 13 statements shown in table 3. For example, only 10 percent of the staff in Region III agree or strongly agree that trust exists between NRC's staff and senior management. The staff in Region I (King of Prussia, Pa.) had the lowest positive responses for five of the statements. For example, only 19 percent of the staff in Region I agree or strongly agree that senior management is receptive to suggestions made by NRC's staff. Table 3 shows the perceptions of the regional staff about management and change at the agency.

Table 3: Perceptions of NRC's Regional Staff About Management and Change at the Agency

Percentage of respondents who agree or strongly agree				
Statement concerning management and change	**Region I**	**Region II**	**Region III**	**Region IV[a]**
Management				
Senior management is receptive to suggestions for change that are made by NRC staff.	19	33	26	38
Senior management provides feedback to NRC staff on the outcome/disposition of their suggestions.	14	28	27	44
Mid-level management is receptive to suggestions for change that are made by NRC staff.	39	42	35	50
Mid-level management provides feedback to NRC staff on the outcome/disposition of their suggestions.	40	45	41	53
The number of senior management levels in NRC is kept to a minimum.	19	14	17	35
There is trust between NRC staff and senior management.	24	24	10	30
Staff involvement in change				
Senior management solicits ideas and opinions from NRC staff before making changes affecting work.	25	27	18	31
Mid-level management solicits ideas and opinions from NRC staff before making changes affecting work.	42	40	32	52
NRC staff are asked to provide input into the development of operating plans.	16	17	17	27
NRC staff were consulted in the development of the new oversight process.	52	52	40	44
NRC staff are asked to provide input into the development of strategic plans.	23	21	17	22
NRC staff are asked to provide input into the development of annual performance plans.	15	19	18	24
I have been given sufficient opportunity to provide my input into the new reactor oversight process.	34	32	38	40

[a]Region I is located in King of Prussia, Pennsylvania; Region II is located in Atlanta, Georgia; Region III is located in Lisle, Illinois; and Region IV is located in Arlington, Texas. Information is based on 110 respondents from Region I, 100 from Region II, 103 from Region III, and 86 from Region IV.

NRC managers said that the agency began its cultural change effort about 2 years ago and believe that the skepticism shown by the survey results is healthy, considering where the agency is in a process that can take 5 or more years to implement. They also noted that a large percentage of the staff support the changes that NRC has undertaken.

NRC's Staff Have Mixed Views on Risk-Informed Regulation

Our survey results showed that staff had mixed views about NRC's move to risk-informed regulation. Although 48 percent believe that risk-informed regulation has had a positive effect on nuclear safety, about 20 percent believe it has had a mostly negative effect. In addition, only 27 percent of the staff agree or strongly agree that the new risk-informed approach has been accepted by NRC's staff, and only 23 percent of the resident inspectors agree or strongly agree that they have accepted the new culture. With such limited acceptance by the staff and resident inspectors, it will be difficult for NRC to effectively implement its new regulatory approach. In addition, a large percentage of the respondents–65 percent—agree or strongly agree that the public will perceive that NRC is "backing off" from its regulatory responsibilities by moving to a risk-informed regulatory approach. However, a relatively small percentage of staff–only 27 percent–agree or strongly agree that NRC will "rubber stamp" risk-informed proposals submitted by licensees. This suggests that the staff believe that NRC will continue to carry out its mandate to protect public health and safety despite concerns about the risk-informed approach.

Although 48 percent of the staff who responded to the survey believe in the positive aspects of risk-informed regulation, the staff in the Office of Nuclear Reactor Regulation, which is responsible for developing the centerpiece of such regulation—the new nuclear plant oversight process—generally had a less positive view of its value and merits than their colleagues. As shown in table 4, only 25 percent of the staff in the Office of Nuclear Reactor Regulation agree or strongly agree that a risk-informed approach will allow them to do their job more efficiently, as compared with 40 percent of the staff in the Office of Nuclear Material Safety and Safeguards and 38 percent of the staff in the Office of Nuclear Regulatory Research. Table 4 shows some other staff perceptions about a risk-informed regulatory approach as well as the different perceptions between headquarters and regional offices.

Table 4: Staff's Perceptions About Risk-Informed Regulation

Percentage of respondents who agree or strongly agree							
Statement concerning risk-informed regulation				**Region**			
	NMSS[a]	**NRR[b]**	**RES[c]**	**I**	**II**	**III**	**IV**
A risk-informed approach will improve NRC's ability to fulfill its responsibilities.	52	41	55	44	48	45	40
A risk-informed approach will enable me to do my job more effectively.	47	33	46	49	40	48	42
A risk-informed approach will enable me to do my job more efficiently.	40	25	38	48	38	46	41

[a]The Office of Nuclear Material Safety and Safeguards (NMSS) regulates about 5,900 licensees and the 30 states that have formal agreements with NRC to regulate about 15,000 licensees that possess and use nuclear materials in medical and industrial applications. This office also regulates the disposal of nuclear waste and uranium recovery facilities.

[b]The Office of Nuclear Reactor Regulation (NRR) is responsible for ensuring the public health and safety of all nuclear power plants in the United States.

[c]The Office of Nuclear Regulatory Research (RES) plans, recommends, and implements programs related to research, the development of standards, and the resolution of safety issues for nuclear power plants and other facilities regulated by NRC.

NRC's managers said that these data are not surprising. They said that staff are skeptical about moving to a risk-informed approach until they see how the approach is implemented. Some staff, the managers noted, do not believe that NRC will achieve its objective to implement a risk-informed approach. In commenting on a draft of this report, NRC noted that only a relatively small portion of staff in the Office of Nuclear Reactor Regulation are responsible for the development and management of the new oversight process and that not all staff within that office are fully informed about the program.

Of the NRC staff who provided opinions about a central aspect of risk-informed regulation–the development and implementation of the nuclear power plant oversight process—our survey results show that

- 75 percent agree or strongly agree that utilities and industry groups had too much input/influence in developing the process,
- 60 percent agree or strongly agree that the process will reduce safety margins, and

- 86 percent agree or strongly agree that as time passes, subjectivity will creep into the process.[8]

Table 5 shows 31 other issues listed in the survey as potential problems in implementing the new oversight process.[9] On the basis of the total responses, we ranked the potential problems in table 5 in descending order. The results generally highlight that compared with staff in headquarters or regional offices, a higher percentage of resident inspectors, who will be primarily responsible for implementing the new oversight process, perceived that the issues listed in table 5 would be a problem. Our survey results also showed that different perceptions exist among different NRC offices: 70 percent of the resident inspectors perceive that the new oversight process may not identify and halt degrading performance, compared with 36 percent of the staff in the Office of Nuclear Reactor Regulation, who developed the process.

[8]About 33 percent of NRC staff who responded to the survey neither agreed nor disagreed, did not know or had no basis to judge, or provided no answer to these questions.

[9]We developed the list of problems from various internal and external comments that NRC had received on the new process.

Table 5: Potential Problems in Implementing and Enforcing the Nuclear Power Plant Oversight Process

Potential problem	Total responses[a]	Headquarters[b]	NRR	Regions[c]	Resident inspectors
	Percentage indicating a problem				
Utilities' probabilistic risk assessments differ in their quality and scope.	54	32	66	53	87
Performance indicators will not measure all aspects of licensee performance.	45	26	46	57	65
The proposed process may mask performance problems.	43	24	37	55	76
Inspections may not identify all risk-significant problems.	43	28	44	50	59
Licensees may manipulate performance indicator results.	43	24	40	56	66
The potential that NRC will reduce the overall number of inspectors as a result of the new process.	41	27	37	50	65
The process may not identify and halt degrading performance.	41	24	36	53	70
NRC's increased reliance on utilities' self-assessments.	38	25	39	47	52
NRC does not have enough trained staff to evaluate inspection findings for risk significance.	38	27	50	36	38
The number of prescribed inspection hours may be reduced.	37	21	34	46	67
NRC's elimination of civil penalties for some risk-significant violations.	38	28	32	50	47
Determining the risk significance of violations.	36	27	33	45	48
NRC's increased reliance on utilities' corrective action programs.	36	23	34	47	54
Inspectors may not be able to determine the risk significance of inspection findings (significance determination process).	35	26	42	35	41
Lack of clarity of enforcement procedures.	34	21	23	56	53
Too little NRC staff input in changing the enforcement process.	33	26	23	49	43
Inspectors may not receive the training necessary to implement the new reactor oversight process.	31	21	33	40	41
Non-risk-significant regulatory requirements may not be identified.	31	18	29	39	50
NRC does not have a way to ensure consistent implementation at all plants.	29	21	28	36	42

Continued

Percentage indicating a problem					
Potential problem	Total responses[a]	Headquarters[b]	NRR	Regions[c]	Resident inspectors
The significance threshold is set too high.	29	9	23	41	65
NRC does not have a way to measure the effectiveness of the baseline inspection process.	29	15	29	38	47
Utility management effectiveness will not be evaluated.	29	18	30	33	45
Human performance will not be assessed.	28	14	28	34	52
NRC's eliminating severity levels for some violations.	28	22	27	34	33
Too little time allotted for regional-initiated inspections.	25	12	22	36	40
Too little time allotted for resident inspections.	25	11	19	25	67
NRC enforcement staff may not receive the training necessary to implement the new reactor oversight process.	22	21	20	29	21
The need for inspectors to verify that corrective action program items are completed.	20	11	19	24	30
Integration of enforcement, inspection, and assessment in the reactor oversight process.	19	12	15	27	33
The added responsibility for inspectors to verify performance indicator data.	18	14	22	18	19
The Reactor Program System (RPS), the data system that will support the new process, is not effective.	14	4	10	24	25

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[a]Percentages in this column are based on the answers of all 1,076 respondents. However, because 53 respondents did not identify their work location and/or job classification, the other columns represent the answers of 1,023 respondents (317 at headquarters, excluding NRR; 319 in NRR; 258 in regional offices, excluding resident inspectors; and 129 resident inspectors).

[b]Excluding the Office of Nuclear Reactor Regulation (NRR).

[c]Excluding resident inspectors.

According to NRC managers, the agency has recognized these potential problems and will monitor them during the pilot project and the development of the final oversight program. The managers also said that we had not determined the extent to which staff's views have changed. However, NRC's Office of the Inspector General generally did not question the staff about the new oversight process because the agency had not formulated the process at the time of that survey and no other survey of the staff had been conducted. Therefore, no data exist for us to benchmark any change that may have occurred in the staff's perceptions. In our opinion, our survey establishes the benchmark that NRC is seeking.

In addition, NRC managers noted that these results are skewed because they reflect the perceptions of staff who responded to the survey. The managers said that they would expect the staff from the Office of Nuclear Reactor Regulation to be better informed about the new oversight process because that office developed the process. Yet our survey results show that this is not the case because the staff from the Office of Nuclear Reactor Regulation who responded to the survey did not know, had no basis to judge, or had no answer to numerous questions related to the development of the oversight process. For example, about 75 percent did not know, had no basis to judge, or had no answer about whether an effective mechanism exists to refine the process in the future and whether NRC's transition plan has identified all major activities to ensure the successful implementation of the new process. In addition, 59 percent did not know, had no basis to judge, or had no answer about whether the new risk-informed culture has been accepted by inspectors. In commenting on a draft of this report, NRC said that the survey results reflect the staff's knowledge and views at a particular point in time; however, as the new process continues to develop and more staff are provided with training, the agency expects an increase in the staff's level of knowledge and confidence about the new oversight process.

NRC Has Not Yet Developed a Strategy to Implement a Risk-Informed Regulatory Approach

NRC agreed with the recommendation in our March 1999 report that it should develop a comprehensive strategy to implement a risk-informed regulatory approach. NRC said that staff were developing a document describing the agency's strategy for risk-informed regulation that will specify the scope and approach for implementing the strategy. The document will also describe the activities that NRC wants to risk-inform, the actions needed to achieve this objective, and the schedule and resources needed to do so. NRC also plans to restructure its Probabilistic Risk Assessment Implementation Plan (a catalog of risk-informed activities) to link the activities to its strategy. NRC's staff expect to have a draft strategy for the Commission's consideration in February 2000, but the strategy will not be finalized until NRC obtains and addresses public comments on it, which could take another year. In the interim, NRC will continue moving forward with its various risk-informed initiatives, but the staff will not have a clear appreciation of when and if activities will affect them, what type of training they will receive, and how various activities are interrelated.

As it prepares the comprehensive risk-informed strategy, we believe that NRC needs to address other matters in the context of, or in conjunction

with, the strategy. For example, by developing safety goals for nonreactor (material) licensees, defining adequate protection of the public, and discussing agencywide cultural change goals and performance indicators to assess whether the agency has met the goals, NRC would enhance the completeness of the strategy and make it a more effective management tool. Now, inconsistencies exist between the regulation of commercial nuclear power plants and the regulation of other licensees because NRC does not have a safety goal policy for nonreactor licensees. According to an NRC document, the lack of a safety goal policy for material licensees represents a significant gap in terms of risk-informed regulation. In March 2000, NRC's staff expect to recommend to the Commission whether the agency should modify its safety goal policy for nuclear power plants to reflect the agency's risk-informed approach. However, NRC's staff do not believe that the Commission will approve a proposal to concurrently develop high-level, overarching safety principles to permeate all of the agency's activities, including material licensees. The staff noted that the Commission may want to see the results of some ongoing efforts before proceeding with the overarching safety principles. Until NRC does so, inconsistencies will continue to exist between nuclear power plant and materials licensees. In commenting on a draft of this report, NRC acknowledged that the draft strategy would not address nonreactor matters, a need exists to do so, and the agency has embarked on a process to do so. NRC also said that by the end of January 2000, it expects to provide the Commission with a final report on developing a technical basis for risk assessments of by-product licensees.

Furthermore, it is difficult to understand how NRC can effectively implement a risk-informed approach without defining what constitutes adequate protection to the public. With the change to risk-informed regulation, NRC, licensees, states, and the public may not be using the same criteria to define "adequate protection." In the past, it was generally understood that adequate protection meant that the licensees substantially complied with NRC's rules and regulations. Now, NRC is allowing licensees to consider risk when complying with its rules and regulations and protecting the public and is making these decisions on a case-by-case basis. In its August 1999 report, the Center for Strategic and International Studies noted that NRC does not consistently apply the safety philosophy of adequate protection to all nuclear power plants, in part, because the agency has not defined "adequate protection."[10] The report recommended that NRC do so as soon as possible. In commenting on a draft of this report, NRC said that its staff will consider a more refined description of the meaning of "reasonable assurance of adequate protection" as it revises its safety goal policy for commercial nuclear power plants.

Finally, NRC has not established long-range goals for the move to risk-informed regulation or performance indicators to measure progress toward meeting the goals. For example, NRC has not established goals for the staff's acceptance of a risk-informed approach or the means to determine the extent to which staff have accepted such an approach. Our survey results show that a large percentage of NRC's staff have not "bought in to" a risk-informed regulatory approach, which NRC estimates will take at least 4 to 8 years to implement.

Conclusions

NRC's move to risk-informed regulation is a major change to its culture. We recognize that changing NRC's culture will take significant time and effort. Our survey results show that the staff have not fully "bought in to" a central aspect of the new culture–the move to a risk-informed regulatory approach. Although we cannot compare the results of our survey with those of NRC's Office of the Inspector General, the level of concern expressed by NRC's staff about the future direction of the agency and their participation in the many change initiatives seems to indicate that not much has changed in the interim between the two surveys. NRC has an

[10]The Center for Strategic and International Studies is a private, tax-exempt institution focusing on international public policy issues. Its research is nonpartisan and nonproprietary. The Nuclear Energy Institute funded the Center's August 1999 report.

opportunity to alleviate the staff's skepticism as it develops the strategy to implement a risk-informed regulatory approach. NRC could, for example, include the goals that it wants to achieve and the indicators it will use to measure performance and determine that the agency has met the goals established. With such information, NRC could redefine and/or redirect, for example, its communication and training strategies and have a living document that is updated as new issues arise. Without such information, NRC has no way to determine where it is going, how it will get there, or what progress it has made.

Agency Comments and Our Evaluation

We provided NRC with a draft of this report for review and comment. The Commission stated that the information provided in the survey, which appears in the appendixes, will help to communicate change initiatives to the staff. The Commission also agreed that much work needs to be done to increase staff's participation in and support for the agency's initiatives. NRC reiterated a number of points that we made in the draft, observing that the staff has a strong commitment to public health and safety, the agency is in the very early stages of its cultural change process, and the agency is aware of many of the issues identified by the survey. NRC said that the questions and concerns of the staff at this point in the process are appropriate and constructive and that it plans to increase its efforts to communicate the change initiatives to the staff and use the results of the survey to identify areas for increased attention as the agency implements and refines its communication plans. In addition, NRC noted that its cultural change is broader than risk-informing its activities and is intended to expand NRC's traditional focus on safety to include goals to increase public confidence, become more efficient and effective, and reduce unnecessary regulatory burden.

The Commission stated that it was not surprised by the results of our survey but noted that it did not share our concerns about some issues. For example, NRC said that the lack of a benchmark with other organizations is a significant drawback in our work and puts the survey results in a more negative light than the data warrant. As a specific example, NRC noted that 26 percent of the staff surveyed said they were considering leaving NRC within the next year but that for fiscal years 1996 through 1998, its personnel attrition rate was 5.4 percent and was lower than the 9-percent governmentwide average. NRC did not note, however, that the attrition rate for its resident inspectors was 15.5 percent, 22.3 percent, and 13.8 percent for fiscal years 1996, 1997, and 1998, respectively. As we stated in the draft

report, no benchmark data existed for us to compare with the overall results of our survey.

In addition, the Commission said that it is not surprising that 75 percent of the staff in the Office of Nuclear Reactor Regulation could not respond to specific questions about the new oversight process because only a relatively small portion of that office's staff are responsible for the development and management of the process. We revised the report to include this information.

NRC provided several clarifying comments that we incorporated where appropriate. The agency's letter and our response to its specific comments are provided in appendix II.

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after the date of this letter. At that time, we will send copies to the Honorable Richard Meserve, Chairman, Nuclear Regulatory Commission; the Honorable Nils J. Diaz, the Honorable Greta Joy Dicus, the Honorable Edward McGaffigan, Jr., and the Honorable Jeffrey S. Merrifield, Commissioners, Nuclear Regulatory Commission; and the Honorable Jacob J. Lew, Director, Office of Management and Budget. We will make copies available to others on request.

We conducted our review from February through December 1999 in accordance with generally accepted government auditing standards. Appendix III provides details on our scope and methodology.

If you or your staff have any questions about this report, please call me on (202) 512-3841. Key contributors to this report were Robert Baney, Vondalee Hunt, Mary Ann Kruslicky, and Lynn Musser.

Sincerely yours,

(Ms.) Gary L. Jones
Associate Director, Energy,
Resources, and Science Issues

Results of GAO's Survey of NRC's Staff

The following tables show the questions included in our survey of the Nuclear Regulatory Commission's (NRC) staff and the responses by number and percent of respondents.

Table 6: Innovation and Change: What Are Your Opinions Concerning Innovation and Change at NRC?

Query statement	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Do not know/no basis to judge	No answer
NRC staff can challenge the traditional ways of doing things without fear of punishment.	74 6.9%	263 24.4%	158 14.7%	421 39.1%	101 9.4%	43 4.0%	16 1.5%
Innovation and creativity are encouraged.	94 8.7%	340 31.6%	192 17.8%	352 32.7%	63 5.9%	22 2.0%	13 1.2%
Innovation and creativity are rewarded.	113 10.5%	323 30.0%	274 25.5%	254 23.6%	44 4.1%	50 4.6%	18 1.7%
NRC staff are receptive to suggestions for change that are made by management.	31 2.9%	250 23.2%	263 24.4%	438 40.7%	51 4.7%	26 2.4%	17 1.6%
Senior management is receptive to suggestions for change that are made by NRC staff.	119 11.1%	322 29.9%	223 20.7%	253 23.5%	31 2.9%	100 9.3%	28 2.6%
Mid-level management is receptive to suggestions for change that are made by NRC staff.	85 7.9%	251 23.3%	218 20.3%	415 38.6%	59 5.5%	26 2.4%	22 2.0%
Senior management solicits ideas and opinions from NRC staff before making changes affecting work.	245 22.8%	371 34.5%	160 14.9%	187 17.4%	19 1.8%	66 6.1%	28 2.6%
Mid-level management solicits ideas and opinions from NRC staff before making changes affecting work.	116 10.8%	290 27.0%	195 18.1%	390 36.2%	44 4.1%	20 1.9%	21 2.0%
Management follows up on staff suggestions for improvements in work processes.	100 9.3%	284 26.4%	315 29.3%	251 23.3%	27 2.5%	71 6.6%	28 2.6%
Senior management provides feedback to NRC staff on the outcome/disposition of their suggestions.	106 9.9%	285 26.5%	242 22.5%	245 22.8%	25 2.3%	136 12.6%	37 3.4%

Continued

Query statement	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Do not know/no basis to judge	No answer
Mid-level management provides feedback to NRC staff on the outcome/disposition of their suggestions.	57 5.3%	209 19.4%	233 21.7%	441 41.0%	49 4.6%	65 6.0%	22 2.0%

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Table 7: Quality of Work at NRC: What Are Your Opinions Concerning the Quality of Work at NRC?

Query statement	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Do not know/no basis to judge	No answer
Quality of work is important to NRC management.	29 2.7%	101 9.4%	85 7.9%	496 46.1%	341 31.7%	16 1.5%	8 0.7%
NRC staff feel personally responsible for the quality of their work.	20 1.9%	77 7.2%	76 7.1%	473 44.0%	410 38.1%	8 0.7%	12 1.1%
NRC staff are held accountable for the quality of their work.	45 4.2%	167 15.5%	153 14.2%	466 43.3%	216 20.1%	18 1.7%	11 1.0%
NRC management encourages staff to take responsibility for their work.	26 2.4%	130 12.1%	163 15.1%	542 50.4%	180 16.7%	15 1.4%	20 1.9%
NRC staff are provided with the necessary tools and training so that their work can be high quality.	70 6.5%	173 16.1%	174 16.2%	496 46.1%	139 12.9%	15 1.4%	9 0.8%

Table 8: Strategic Planning at NRC: What Are Your Opinions Concerning the Strategic Planning Process Within NRC?

Query statement	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Do not know/no basis to judge	No answer
NRC has an established, formal process for developing strategic and performance goals.	38 3.5%	103 9.6%	117 10.9%	525 48.8%	130 12.1%	148 13.8%	15 1.4%
NRC uses output measures to assess its overall performance.	32 3.0%	133 12.4%	164 15.2%	504 46.8%	79 7.3%	136 12.6%	28 2.6%
NRC staff are asked to provide input into the development of strategic plans.	150 13.9%	348 32.3%	192 17.8%	239 22.2%	29 2.7%	97 9.0%	21 2.0%
NRC staff are asked to provide input into the development of annual performance plans.	150 13.9%	352 32.7%	175 16.3%	239 22.2%	28 2.6%	108 10.0%	24 2.2%
NRC staff are asked to provide input into the development of operating plans.	140 13.0%	317 29.5%	149 13.8%	295 27.4%	49 4.6%	102 9.5%	24 2.2%
NRC establishes and integrates strategic goals into its planning and budgeting process.	39 3.6%	72 6.7%	181 16.8%	420 39.0%	55 5.1%	274 25.5%	35 3.3%
NRC establishes and integrates performance goals into its planning and budgeting process.	36 3.3%	97 9.0%	187 17.4%	397 36.9%	42 3.9%	275 25.6%	42 3.9%
NRC evaluates its progress toward meeting its strategic and performance goals.	25 2.3%	88 8.2%	173 16.1%	466 43.3%	54 5.0%	236 21.9%	34 3.2%

Table 9: Communication Within NRC: What Are Your Opinions About Communication Within NRC?

Query statement	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Do not know/no basis to judge	No answer
Senior management provides information about its policies and decisions to NRC staff.	62 5.8%	190 17.7%	126 11.7%	566 52.6%	106 9.9%	18 1.7%	8 0.7%
Mid-level management provides information about senior management's policies and decisions to NRC staff.	61 5.7%	155 14.4%	139 12.9%	581 54.0%	114 10.6%	14 1.3%	12 1.1%

Continued

Communication between different offices (NRR, NMSS, RES, and regional offices) is encouraged.	67 6.2%	220 20.4%	239 22.2%	430 40.0%	72 6.7%	33 3.1%	15 1.4%
Communication between different divisions is encouraged.	49 4.6%	180 16.7%	210 19.5%	491 45.6%	100 9.3%	29 2.7%	17 1.6%
Communication between different branches is encouraged.	39 3.6%	182 16.9%	197 18.3%	482 44.8%	135 12.5%	27 2.5%	14 1.3%
NRC headquarters should hold counterpart meetings similar to those held in the regions.	24 2.2%	83 7.7%	171 15.9%	327 30.4%	186 17.3%	231 21.5%	54 5.0%

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Legend:

NMSS = the Office of Nuclear Material Safety and Safeguards

NRR = the Office of Nuclear Reactor Regulation

RES = the Office of Nuclear Regulatory Research

Table 10: Your Personal Experiences at NRC: What Have Been Your Personal Work Experiences at NRC?

Query statement	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Do not know/no basis to judge	No answer
I feel that the work I do at NRC protects public health and safety.	22 2.0%	48 4.5%	68 6.3%	469 43.6%	443 41.2%	8 0.7%	18 1.7%
I feel that the work I do at NRC is recognized and rewarded.	115 10.7%	240 22.3%	188 17.5%	377 35.0%	130 12.1%	13 1.2%	13 1.2%
Management supports an environment where staff involvement, contributions, and teamwork are encouraged.	93 8.6%	223 20.7%	188 17.5%	447 41.5%	104 9.7%	8 0.7%	13 1.2%
I feel that there are reasonable opportunities for advancement at NRC.	342 31.8%	292 27.1%	132 12.3%	239 22.2%	51 4.7%	9 0.8%	11 1.0%
The conditions under which I work promote my best performance.	129 12.0%	332 30.9%	221 20.5%	314 29.2%	62 5.8%	5 0.5%	13 1.2%
The amount of work I am expected to do is reasonable.	65 6.0%	149 13.8%	120 11.2%	619 57.5%	100 9.3%	7 0.7%	16 1.5%
My position makes good use of my training, skills, and abilities.	99 9.2%	159 14.8%	112 10.4%	500 46.5%	183 17.0%	4 0.4%	19 1.8%
I feel that opportunities for additional training and education are available.	51 4.7%	130 12.1%	143 13.3%	538 50.0%	186 17.3%	8 0.7%	20 1.9%
I feel that NRC has allowed me to take the training courses necessary for me to be able to do my job effectively.	42 3.9%	109 10.1%	137 12.7%	550 51.1%	208 19.3%	9 0.8%	21 2.0%
I can challenge the traditional ways of doing things without fear of punishment.	116 10.8%	260 24.2%	237 22.0%	334 31.0%	82 7.6%	32 3.0%	15 1.4%
The number of senior management levels in NRC is kept to a minimum.	281 26.1%	307 28.5%	164 15.2%	200 18.6%	27 2.5%	74 6.9%	23 2.1%
The number of mid-level management levels in NRC is kept to a minimum.	165 15.3%	247 23.0%	167 15.5%	336 31.2%	87 8.1%	47 4.4%	27 2.5%
There is trust between NRC staff and senior management.	214 19.9%	294 27.3%	254 23.6%	190 17.7%	33 3.1%	64 5.9%	27 2.5%
There is trust between NRC staff and mid-level management.	127 11.8%	232 21.6%	230 21.4%	388 36.1%	57 5.3%	27 2.5%	15 1.4%

Table 11: Job Satisfaction: How Do You Rate Your Satisfaction With Your Job at NRC?

Query statement	Very dissatisfied	Dissatisfied	Neither dissatisfied nor satisfied	Satisfied	Very satisfied	No answer
How would you rate your overall satisfaction with NRC at the present time?	82 7.6%	243 22.6%	182 16.9%	432 40.1%	130 12.1%	7 0.7%
How would you rate your overall satisfaction with the individual who directly supervises you?	68 6.3%	145 13.5%	155 14.4%	380 35.3%	315 29.3%	13 1.2%

Table 12: Would You Advise a Colleague to Take a Job at NRC?

Answer	Response
Probably yes	563 52.3%
Probably no	438 40.7%
No answer	75 7.0%

Table 13: Reasons for Advising a Colleague to Take a Job at NRC

I would advise a colleague to take a job at NRC because of[a]	Response
Ability to bring about change	97 17.2%
Salary	310 55.1%
Involvement in cutting-edge work	100 17.8%
Well-respected technical organization	428 76.0%
Challenging work	375 66.6%
Career development	212 37.7%

Continued

I would advise a colleague to take a job at NRC because of[a]	Response
Job security	380 67.5%
Other	60 10.7%

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[a]Information is based on 563 staff who said they would advise a colleague to take a job at NRC. Some staff provided more than one reason.

Table 14: Other Reason(s) You Would Advise a Colleague to Take a Job at NRC

Issue	Number of comments	Percent of respondents[a]
Work environment	21	3.7
Satisfying work/NRC's mission	26	4.6
Salary and benefits	8	1.4
Career advancement/individual development	5	0.8
Other	15	2.7

Note: Responses to this open-ended question were coded for content by two GAO evaluators. Reliability between the two evaluators was 100 percent. We coded some comments into more than one category. Responses were made by 67 staff.

[a]Based on the 563 NRC staff who said that they would advise a colleague to take a job at NRC.

Table 15: Reasons Cited for Not Advising a Colleague to Take a Job at NRC

I would not advise a colleague to take a job at NRC because[a]	Response
Shrinking size of the agency	343 78.3%
Salary	94 21.5%
Work overload	103 23.5%
Questionable future of the agency	305 69.6%
Lack of challenging work	152 34.7%
Lack of opportunity for advancement	356 81.3%
Lack of job security	85 19.4%
Other	142 32.4%

[a]Information is based on the 438 staff who said they would not advise a colleague to take a job at NRC. Some staff provided more than one reason.

Table 16: Other Reason(s) You Would Not Advise a Colleague to Take a Job at NRC

Issue	Number of comments	Percent of respondents[a]
Problems with senior management	21	4.8
Problems with management	49	11.2
Morale problems	42	9.6
Employee involvement	5	1.1
New risk-informed approach	5	1.1
Other	34	7.8

Note: Responses to this open-ended question were coded for content by two GAO evaluators. Reliability between the two evaluators was 100 percent. We coded some comments into more than one category. Responses were made by 138 staff.

[a]Based on the 438 NRC staff who said that they would not advise a colleague to take a job at NRC.

Table 17: Are You Considering Leaving NRC Within the Next Year?

Answer	Response
Yes	282 26.2%
No	783 72.8%

Table 18: Reasons Cited for Considering Leaving NRC Within the Next Year

I am considering leaving NRC within the next year because[a]	Response
Generally dissatisfied with NRC	121 42.9%
Dissatisfied with risk-informed, performance-based changes going on in NRC	50 17.7%
Opportunity for career growth/enhancement elsewhere	151 53.5%
Opportunity for higher salary elsewhere	97 34.4%
Plan to retire	80 28.4%
Personal reasons	48 17.0%
Other	63 22.3%

[a]Information is based on 282 staff who indicated they are considering leaving NRC.

Table 19: Other Reason(s) You Are Considering for Leaving NRC

Issue	Number of comments	Percent of respondents[a]
Problems with senior management	12	4.2
Problems with management	7	2.5
Morale problems	17	6.0
Employee involvement	1	0.3
New risk-informed approach	2	0.7
Other	24	8.5

Note: Responses to this open-ended question were coded for content by two GAO evaluators. Reliability between the two evaluators was 100 percent. We coded some comments into more than one category. Responses were made by 63 staff.

[a]Based on the 282 NRC staff who indicated that they are considering leaving NRC.

Table 20: Usefulness of Information Distributed to NRC's Staff: How Useful Do You Find the Information You Obtain From Each of the Following NRC Sources?

Information source	Not at all useful	Somewhat useful	Very useful	Have never received information from this source	Not familiar with source	No answer
Senior management	145 13.5%	613 57.0%	230 21.4%	37 3.4%	27 2.5%	24 2.2%
Mid-level management	76 7.1%	547 50.8%	395 36.7%	24 2.2%	17 1.6%	17 1.6%
Informational panel meeting(s)	142 13.2%	256 23.8%	90 8.4%	240 22.3%	316 29.4%	32 3.0%
NRC internal home page on the Internet	111 10.3%	516 48.0%	333 30.9%	58 5.4%	23 2.1%	35 3.3%
Commission "all hands" meeting (s)	474 44.1%	446 41.4%	79 7.3%	30 2.8%	23 2.1%	24 2.2%
Colleagues	28 2.6%	379 35.2%	621 57.7%	10 0.9%	15 1.4%	23 2.1%
Change coalition members	124 11.5%	219 20.4%	67 6.2%	239 22.2%	370 34.4%	57 5.3%
NRC technical training division courses	116 10.8%	394 36.6%	360 33.5%	125 11.6%	30 2.8%	51 4.7%
Regional "all hands" meeting(s)[a]	32 8.0%	218 54.6%	115 28.8%	9 2.3%	13 3.3%	12 3.0%
Regional counterpart meeting(s)[a]	16 4.1%	139 34.8%	169 42.4%	41 10.3%	21 5.3%	13 3.3%

[a]Information is based on 399 staff in the regional offices.

Table 21: Activities Affecting Nuclear Safety: What Effect Do You Believe Each of the Following Activities Has on Nuclear Safety?

Activity	Mostly negative	Neither negative nor positive	Mostly positive	Do not know/no basis to judge	Not aware of activity	No answer
Restructuring of electric utility industry	415 38.6%	280 26.0%	137 12.7%	208 19.3%	17 1.6%	19 1.8%
Ongoing congressional oversight	402 37.4%	359 33.4%	180 16.7%	109 10.1%	8 0.7%	18 1.7%
Industry involvement in regulatory activities	403 37.5%	259 24.1%	344 32.0%	49 4.6%	5 0.5%	16 1.5%
Risk-informed regulation	212 19.7%	250 23.2%	516 48.0%	72 6.7%	7 0.7%	19 1.8%

Table 22: NRC's Risk-Informed Approach: What Are Your Opinions Concerning NRC's Risk-Informed Approach?

Query statement	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Do not know/no basis to judge	No answer
The new risk-informed culture has been accepted by NRC staff.	127 11.8%	332 30.9%	271 25.2%	279 25.9%	16 1.5%	40 3.7%	11 1.0%
A risk-informed approach will improve NRC's ability to fulfill its responsibilities.	91 8.5%	202 18.8%	244 22.7%	379 35.2%	102 9.5%	43 4.0%	15 1.4%
Risk-informed, performance-based regulation is an important priority for NRC.	31 2.9%	52 4.8%	140 13.0%	562 52.2%	247 23.0%	20 1.9%	24 2.2%
Risk-informed, performance-based regulation is an important priority for me.	70 6.5%	135 12.5%	236 21.9%	395 36.7%	192 17.8%	22 2.0%	26 2.4%
A risk-informed approach will enable me to do my job more effectively.	100 9.3%	214 19.9%	235 21.8%	300 27.9%	139 12.9%	55 5.1%	33 3.1%
A risk-informed approach will enable me to do my job more efficiently.	100 9.3%	234 21.7%	272 25.3%	260 24.2%	125 11.6%	62 5.8%	23 2.1%
With the new risk-informed approach, the public will perceive that NRC is "backing off" from its responsibilities.	22 2.0%	99 9.2%	149 13.8%	416 38.7%	282 26.2%	92 8.6%	16 1.5%

Continued

Query statement	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Do not know/no basis to judge	No answer
NRC will "rubber stamp" licensees' proposals to implement a risk-informed approach.	107 9.9%	354 32.9%	198 18.4%	171 15.9%	122 11.3%	94 8.7%	30 2.8%
NRC has developed a comprehensive strategy to implement a risk-informed approach.	135 12.5%	256 23.8%	238 22.1%	213 19.8%	42 3.9%	169 15.7%	23 2.1%

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Table 23: Development of a Risk-Informed Reactor Oversight Process: What Is Your Opinion Concerning the Development of the New Risk-Informed Reactor Oversight Process?

Query statement	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly Agree	Do not know/no basis to judge	No answer
NRC staff were consulted in the development of the new oversight process.	88 8.2%	188 17.5%	102 9.5%	266 24.7%	62 5.8%	319 29.6%	51 4.7%
I have been given sufficient opportunity to provide my input to the new reactor oversight process.	134 12.5%	253 23.5%	137 12.7%	182 16.9%	58 5.4%	197 18.3%	115 10.7%
Utilities and industry groups had too much input/influence in the development of the new reactor oversight process.	23 2.1%	120 11.2%	142 13.2%	236 21.9%	200 18.6%	295 27.4%	60 5.6%
The performance indicators, along with inspection findings, will be effective in determining varying levels of licensee performance.	90 8.4%	166 15.4%	202 18.8%	225 20.9%	32 3.0%	302 28.1%	59 5.5%
All significant areas of a nuclear power plant are encompassed by the inspectable areas that will be reviewed.	64 5.9%	158 14.7%	154 14.3%	210 19.5%	28 2.6%	403 37.5%	59 5.5%
The proposed assessment periods in the new reactor oversight program are sufficient to maintain a current understanding of licensee performance.	29 2.7%	94 8.7%	167 15.5%	225 20.9%	32 3.0%	464 43.1%	65 6.0%
The action matrix will result in timely and effective assessment action.	41 3.8%	123 11.4%	191 17.8%	136 12.6%	26 2.4%	491 45.6%	68 6.3%
NRC's transition plan has identified all major activities to ensure successful implementation of the new reactor oversight process.	40 3.7%	115 10.7%	186 17.3%	95 8.8%	12 1.1%	554 51.5%	74 6.9%
The new reactor oversight process includes an effective mechanism to refine/change the process in the future.	37 3.4%	108 10.0%	151 14.0%	123 11.4%	15 1.4%	576 53.5%	66 6.1%

Continued

Query statement	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly Agree	Do not know/no basis to judge	No answer
The new reactor oversight process will ensure the safe operation of nuclear power plants.	74 6.9%	129 12.0%	220 20.4%	159 14.8%	25 2.3%	403 37.5%	66 6.1%
The new reactor oversight process will reduce safety margins.	28 2.6%	154 14.3%	164 15.2%	204 19.0%	71 6.6%	397 36.9%	58 5.4%
As time passes, subjectivity will creep into the new reactor oversight process.	5 0.5%	59 5.5%	175 16.3%	298 27.7%	86 8.0%	392 36.4%	61 5.7%
The new risk-informed culture has been accepted by inspectors.	87 8.1%	240 22.3%	178 16.5%	109 10.1%	8 0.7%	399 37.1%	55 5.1%

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Table 24: Potential Problems With the New Reactor Oversight Process: In Your Opinion, Will the Following Be a Problem When Implementing the New Process to Assess Overall Nuclear Plant Performance?

Potential problem	Yes–a problem	No–not a problem	Do not know/no basis to judge	No answer
The process may not identify and halt degrading performance.	442 41.1%	150 13.9%	421 39.1%	63 5.9%
The proposed process may mask performance problems.	461 42.8%	144 13.4%	404 37.5%	67 6.2%
Inspections may not identify all risk-significant problems.	459 42.7%	154 14.3%	393 36.5%	70 6.5%
NRC does not have a way to ensure consistent implementation at all plants.	316 29.4%	223 20.7%	471 43.8%	66 6.1%
NRC does not have a way to measure the effectiveness of the new baseline inspection process.	310 28.8%	157 14.6%	535 49.7%	74 6.9%
Performance indicators will not measure all aspects of licensee performance.	485 45.1%	155 14.4%	373 34.7%	63 5.9%
Licensees may manipulate the performance indicator results.	458 42.6%	133 12.4%	426 39.6%	59 5.5%
The significance threshold is set too high.	307 28.5%	154 14.3%	541 50.3%	74 6.9%
Human performance will not be assessed.	304 28.3%	169 15.7%	523 48.6%	80 7.4%
Utility management effectiveness will not be evaluated.	314 29.2%	195 18.1%	495 46.0%	72 6.7%
Non-risk-significant regulatory requirements may not be identified.	329 30.6%	240 22.3%	418 38.8%	89 8.3%
Too little time allotted for resident inspections.	267 24.8%	139 12.9%	592 55.0%	78 7.2%
Too little time allotted for regional-initiated inspections.	269 25.0%	151 14.0%	578 53.7%	78 7.2%
Utilities' probabilistic risk assessments differ in their quality and scope.	585 54.4%	83 7.7%	339 31.5%	69 6.4%
NRC's increased reliance on utilities' corrective action programs.	390 36.2%	278 25.8%	342 31.8%	66 6.1%
NRC's increased reliance on utilities' self-assessments.	413 38.4%	255 23.7%	343 31.9%	65 6.0%
The need for inspectors to verify that corrective action program items are completed.	210 19.5%	408 37.9%	380 35.3%	78 7.2%
The added responsibility for inspectors to verify performance indicator data.	195 18.1%	409 38.0%	404 37.5%	68 6.3%
Inspectors may not be able to determine the risk significance of inspection findings (significance determination process).	377 35.0%	215 20.0%	416 38.7%	68 6.3%

Continued

Potential problem	Yes–a problem	No–not a problem	Do not know/no basis to judge	No answer
NRC does not have enough trained staff to evaluate inspection findings for risk significance.	405 37.6%	211 19.6%	391 36.3%	69 6.4%
The potential that NRC will reduce the overall number of inspectors as a result of the new process.	436 40.5%	175 16.3%	394 36.6%	71 6.6%
The number of prescribed inspection hours may be reduced.	399 37.1%	194 18.0%	413 38.4%	70 6.5%
Inspectors may not receive the training necessary to implement the new reactor oversight process.	338 31.4%	240 22.3%	426 39.6%	72 6.7%
The Reactor Program System (RPS), the data system that will support the new process, is not effective.	146 13.6%	95 8.8%	761 70.7%	74 6.9%

Continued from Previous Page

Table 25: Other Problem(s) That May Occur When Implementing the New Process to Assess Overall Nuclear Plant Performance

Issue	Number of comments	Percent of respondents[a]
Problems with senior management	10	0.9
Problems with management	7	0.7
Morale problems	3	0.3
Employee involvement	4	0.4
New risk-informed approach	137	12.7
Other	60	5.5

Note: Responses to this open-ended question were coded for content by two GAO evaluators. Reliability between the two evaluators was 100 percent. We coded some comments into more than one category. Responses were made by 206 staff.

[a]Based on the1,076 NRC staff who responded to the survey.

Table 26: Enforcement Process: In Your Opinion, Will the Following Be a Problem When Implementing the New Enforcement Process?

Potential problem	Yes–a problem	No—not a problem	Do not know/no basis to judge	No answer
Integration of enforcement, inspection, and assessment in the reactor oversight process.	207 19.2%	350 32.5%	462 42.9%	57 5.3%
Determining the risk significance of regulatory violations (significance determination process).	388 36.1%	302 28.1%	340 31.6%	46 4.3%
NRC's elimination of severity levels for some violations.	304 28.3%	413 38.4%	306 28.4%	53 4.9%
NRC elimination of civil penalties for some risk-significant violations.	405 37.6%	300 27.9%	324 30.1%	47 4.4%
Too little NRC staff input in changing the enforcement process.	355 33.0%	185 17.2%	475 44.1%	61 5.7%
NRC enforcement staff may not receive the training necessary to implement the new reactor oversight process.	237 22.0%	223 20.7%	554 51.5%	62 5.8%
Lack of clarity of enforcement procedures.	366 34.0%	187 17.4%	463 43.0%	60 5.6%

Table 27: Other Problem(s) That May Occur When Implementing the New Enforcement Process

Issue	Number of comments	Percent of respondents[a]
Problems with senior management	**2**	**0.2**
Problems with management	**2**	**0.2**
Morale problems	**0**	**0.0**
Employee involvement	**1**	**0.1**
New risk-informed approach	**60**	**5.5**
Other	**45**	**4.2**

Note: Responses to this open-ended question were coded for content by two GAO evaluators. Reliability between the two evaluators was 100 percent. We coded some comments into more than one category. Responses were made by 108 staff.

[a]Based on the 1,076 NRC staff who responded to the survey.

Table 28: Effects of NRC's Initiatives: Over the Next 12 Months, What Effect Do You Believe Each of the Following Initiatives Will Have on Your Workload?

Query statement	Will decrease my workload	Will not affect my workload	Will increase my workload	Do not know/no basis to judge	Not aware of initiative	No answer
Delegating greater responsibility and accountability to individual staff	88 8.2%	293 27.2%	515 47.9%	71 6.6%	89 8.3%	20 1.9%
Fostering greater interactive communications between NRC staff and management	72 6.7%	405 37.6%	379 35.2%	97 9.0%	98 9.1%	25 2.3%
Proposed changes on the use of generic communications	80 7.4%	335 31.1%	126 11.7%	253 23.5%	246 22.9%	36 3.3%
Risk-informed pilot projects for the new oversight process	75 7.0%	345 32.1%	396 36.8%	175 16.3%	52 4.8%	33 3.1%
Risk-informed licensing reviews that change the plants' licensing basis	40 3.7%	444 41.3%	308 28.6%	192 17.8%	49 4.6%	43 4.0%
Risk-informed initiatives in the materials area	32 3.0%	495 46.0%	201 18.7%	181 16.8%	79 7.3%	88 8.2%
New risk-informed inspection process for fuel cycle facilities	19 1.8%	576 53.5%	79 7.3%	224 20.8%	78 7.2%	100 9.3%
Risk-informed approach for medical licensees	44 4.1%	579 53.8%	67 6.2%	197 18.3%	84 7.8%	105 9.8%
Using risk insights to evaluate high-level waste programs	15 1.4%	578 53.7%	73 6.8%	222 20.6%	78 7.2%	110 10.2%
Using risk insights to evaluate regulations related to the transportation of radioactive material	22 2.0%	572 53.2%	121 11.2%	187 17.4%	78 7.2%	96 8.9%
Enforcement initiatives	227 21.1%	406 37.7%	180 16.7%	164 15.2%	65 6.0%	34 3.2%
10 CFR 50.59 initiative	105 9.8%	378 35.1%	227 21.1%	237 22.0%	76 7.1%	53 4.9%
Updated FSAR initiative	57 5.3%	405 37.6%	213 19.8%	221 20.5%	127 11.8%	53 4.9%
Revised definition of design basis	66 6.1%	335 31.1%	253 23.5%	244 22.7%	135 12.5%	43 4.0%
Improved standard technical specifications	113 10.5%	485 45.1%	212 19.7%	172 16.0%	46 4.3%	48 4.5%
Anticipated increase in the number of license transfers	8 0.7%	650 60.4%	155 14.4%	161 15.0%	45 4.2%	57 5.3%
Changes to the 10 CFR 2.206 petition process	18 1.7%	453 42.1%	110 10.2%	253 23.5%	177 16.4%	65 6.0%

Continued

Query statement	Will decrease my workload	Will not affect my workload	Will increase my workload	Do not know/no basis to judge	Not aware of initiative	No answer
Anticipated increase in the number of nuclear power plant license renewal applications	7 0.7%	558 51.9%	306 28.4%	128 11.9%	20 1.9%	57 5.3%
Ensuring adherence to the backfit rule	28 2.6%	533 49.5%	189 17.6%	195 18.1%	71 6.6%	60 5.6%
Dual-purpose cask reviews	4 0.4%	627 58.3%	88 8.2%	177 16.4%	91 8.5%	89 8.3%
Decommissioning activities	26 2.4%	506 47.0%	276 25.7%	167 15.5%	32 3.0%	69 6.4%
Event reporting rulemaking	110 10.2%	434 40.3%	137 12.7%	222 20.6%	120 11.2%	53 4.9%
Revised source term rulemaking	25 2.3%	516 48.0%	119 11.1%	215 20.0%	123 11.4%	78 7.2%
In-situ uranium leach facilities	7 0.7%	588 54.6%	45 4.2%	181 16.8%	152 14.1%	103 9.6%
Expanded use of mill tailing impoundments	3 0.3%	594 55.2%	46 4.3%	176 16.4%	153 14.2%	104 9.7%
Processing alternative uranium feedstock	5 0.5%	568 52.8%	64 5.9%	181 16.8%	149 13.8%	109 10.1%
Performance assessment of low-level waste disposal facilities	2 0.2%	596 55.4%	66 6.1%	190 17.7%	129 12.0%	93 8.6%
Review of license application for Yucca Mountain[a]	6 0.6%	635 59.0%	91 8.5%	173 16.1%	67 6.2%	104 9.7%

Continued from Previous Page

[a]Potential site for nuclear waste repository in Nevada.

Comments From the Nuclear Regulatory Commission

Note: GAOs comments supplementing those in the reports text appear at the end of this appendix.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 10, 1999

Ms. Gary Jones
Associate Director
Energy, Resources, and Science Issues
United States General Accounting Office
Washington, D.C. 20548

Dear Ms. Jones:

Thank you for the opportunity to comment on the draft GAO report: Nuclear Regulation: NRC Staff Have Not Fully Accepted Planned Changes (GAO/RCED-00-29). The information provided in the survey will help as we continue our efforts to communicate change initiatives to the staff. We agree that there is much work to be done to increase staff participation in and support for our initiatives.

In general, we are not surprised by the results of the survey of NRC employees and do not share the report's concern about some issues. We are, in fact, encouraged by the results in some areas:

- The survey reaffirms that the NRC staff have a strong commitment to public health and safety. Table 1 of the report is very positive regarding the staff attitude toward their work and management as it relates to public health and safety. The message from management, as we discuss change issues, has been that maintaining safety is our highest priority. Other positive aspects of the survey are noted in Enclosure 1.

- We believe we are early in the change process. As indicated in a 1993 Study by Joseph Coffee: A Comparative Study of Organizational Culture Change in Federal Agencies, Success Patterns of Long-Term Efforts, "Organizational culture change takes place over a significant period of time; yet, changes activities should be prevalent throughout most of the organization after a minimum of five years of a sustained change effort." NRC is only two years into a sustained change effort, yet significant progress has been achieved.

- We believe the questions and concerns of the NRC staff at this point in the process are appropriate and constructive. We train our staff to bring a questioning attitude to licensee proposals, and thus it is hardly surprising that staff should approach change within the agency in the same fashion. Moreover, as we develop and undertake pilot testing of change initiatives, such as the new reactor oversight program, we want the staff to participate in identifying, evaluating and resolving potential issues prior to full implementation.

- Many of the issues identified in the survey have previously been identified by management, staff and stakeholders. For example, the potential problems in implementing and enforcing the new reactor oversight process (Table 5) had been

identified and discussed with the affected staff. These problems will be carefully considered and addressed during the assessment of the pilot program and as implementation continues.

It is also important that we clarify what appears to be some confusion about the relationship among cultural change, risk-informing NRC's regulatory activities, and the new reactor oversight process. We view cultural change to be broader than risk-informing our activities. The cultural change we seek is to expand our traditional focus on safety to include goals to increase public confidence, become more efficient and effective, and to reduce unnecessary regulatory burden. Maintaining safety remains our predominant goal. However, we believe that, in order for NRC to be a better regulator, management and staff must embrace these additional goals.

Risk-informing NRC's regulatory activities is an important element of our strategy, but is not the sole focus of our efforts. For example, while risk insights are being used in the license amendment process, many of the significant improvements have resulted from process efficiencies, effective planning and communications, and policy changes. Furthermore, the report implies that risk-informing NRC activities has a defineable end-state. Risk-informing our activities is an evolutionary process, the pace of which is controlled by many variables (e.g., the quality of risk assessments and the willingness of industry to commit to risk-informed approaches). Many NRC activities are already risk-informed. As your report indicates, the staff expects to provide a draft strategy to the Commission by February 2000 to further risk-inform NRC activities.

The new reactor oversight process mainly affects the four regional offices, which are responsible for its implementation, and a relatively small portion of the Office of Nuclear Reactor Regulation (NRR), which is responsible for its development and management. The majority of the NRR staff is responsible for licensing aspects of nuclear power plants and has had little interaction with the plant oversight process. It is not surprising therefore, that 75% of the NRR staff could not respond to specific questions about the oversight process. Furthermore, at the time of the survey, even in the regions, only those who were involved in the pilot program were fully engaged in the process. Our past and planned training and communications efforts are substantial and are addressed in more detail in Enclosure 2. The new oversight process incorporates risk information as one of many approaches to make the oversight process more effective, efficient, and objective.

In general, we believe the report interprets the survey in a more negative light than the data warrants. The lack of benchmarking with other organizations is a significant drawback. For example, the report suggests the responses indicated low morale, citing that 26% said they were considering leaving NRC within the next year. The most frequently cited reasons were lack of opportunity for advancement and the shrinking size of the agency. The survey results are probably not atypical of other governmental and private sector organizations undergoing downsizing and significant change. In fact, the NRC Office of the Inspector General (OIG) survey indicated that in most areas, including Management Leadership, the NRC staff responses were more favorable than the U.S. Transition Companies Norm. As another point of comparison, NRC's personnel attrition has averaged only 5.4% for FY 1996 through 1998

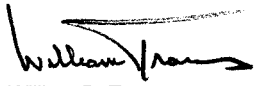
compared with a government-wide average of 9.0% and 8.2% for NASA, 9.2% for DOE and 5.2% for EPA.

Enclosure 2 provides a more detailed discussion of areas where we believe the conclusions or inferences in the report need clarification or balance.

The ultimate test of whether the staff has embraced change is whether behavior has changed to produce the desired outcomes. We believe the significant successes we have experienced recently in such areas as license renewal, use of risk information, reducing unnecessary regulatory burden and making our processes more efficient, indicate that the staff is responding positively. Also, the results of the staff's annual evaluation of feedback from licensees indicated substantial improvement and favorable reaction in such areas as formal communications with licensees, inspector professionalism, the revised reactor oversight process, and reporting of inappropriate regulatory actions.

We plan to increase our efforts to communicate with the staff on change initiatives and to use this report to foster discussion and identify areas for increased attention as we implement and refine our communications plans. We are re-emphasizing to NRC management the importance of communications with our staff and of staff involvement in the process of change.

Sincerely,



William D. Travers
Executive Director for Operations

Enclosures:
1. Encouraging News in the Survey
2. Additional Comments

Enclosure 1

Encouraging News in the Survey

Quality of work:

78% agree/strongly agree that quality of work is important to NRC management (12% disagree/strongly disagree)

82% agree/strongly agree that NRC staff feel personally responsible for the quality of their work (9% disagree/strongly disagree)

63% agree/strongly agree that NRC staff is held accountable for the quality of their work (20% disagree/strongly disagree)

67% agree/strongly agree that NRC management encourages staff to take responsibility for their work (14% disagree/strongly disagree)

Strategic planning process:

61% agree/strongly agree that NRC has an established, formal process for developing strategic and performance goals (13% disagree/strongly disagree)

Communication within NRC:

62% agree/strongly agree that senior management provides information about its policies and decisions to NRC staff (24% disagree/strongly disagree)

65% agree/strongly agree that mid-level management provides information about senior management's policies and decisions to NRC staff (20% disagree/strongly disagree)

Personal work experience at NRC:

85% agree/strongly agree that the work I do at NRC protects public health and safety (6% disagree/strongly disagree)

67% agree/strongly agree that the amount of work I am expected to do is reasonable (20% disagree/strongly disagree)

64% agree/strongly agree that my position makes good use of my training, skills, and abilities (24% disagree/strongly disagree)

67% agree/strongly agree that I feel that opportunities for additional training and education are available (17% disagree/strongly disagree)

1

Enclosure 1

70% agree/strongly agree that I feel that NRC has allowed me to take the training courses necessary for me to be able to do my job effectively (14% disagree/strongly disagree)

Job satisfaction:

65% rate their overall satisfaction with the individual who directly supervises them as satisfied or very satisfied (20% dissatisfied/very dissatisfied)

Usefulness of information distributed to NRC staff:

79% find the information they obtain from senior management somewhat or very useful

88% find the information they obtain from mid-level management somewhat or very useful

79% find the information they obtain from NRC internal home page on the Internet somewhat or very useful

93% find the information they obtain from their colleagues somewhat or very useful

70% find the information they obtain from NRC technical training division courses somewhat or very useful

83% find the information they obtain from regional "all hands" meetings to be somewhat or very helpful

77% find the information they obtain from regional counterpart meetings to be somewhat or very helpful

2

Enclosure 2

Additional Comments on GAO Draft Report:
Nuclear Regulation: NRC Staff Have Not Fully Accepted Planned Changes

Now on p. 4.

1. Reference: Page 2, 1st paragraph, 4th sentence.

"A large number of NRC staff do not believe that management is effectively leading the change process or involving them in the changes being made."

Comment: The specific questions in the survey do not directly ask if the staff believes that management is effectively leading the change process. In fact, the responses to some questions contradict the GAO conclusion. For example, only 26% disagreed that NRC staff are receptive to suggestions for change that are made by management and only 15% disagreed that management encourages staff to take responsibility for their work. Only 24% disagreed that senior management provides information about its policies and decisions to the NRC staff.

See comment 1.

The survey results regarding the concern that management has not involved staff in the change process are expected. It was impractical for all inspectors to participate in the design of the new oversight process. The survey indicated, however, that between 40 and 52% of each region's staff agreed that they were consulted in the development of the new oversight process. Line inspectors were members of the development team. Input from all inspectors will be solicited during the pilot program and during ongoing implementation.

Now on p. 4.

2. Reference: Page 2, 1st paragraph, last sentence.

See comment 2.

"For example, 60% of the staff that responded to the survey believe the process will reduce plant safety margins.

Comment: The responses tabulated in Table 1.13 do not agree with this number. Only 26% agreed or strongly agreed that the new reactor oversight process will reduce safety margins.

Now on p. 4

3. Reference: Page 2 - Second Paragraph. (Need for a comprehensive strategy for moving to a risk-informed approach.)

See comment 3.

Comment: The NRC staff is developing a document describing the agency's strategy for risk-informed regulation, which is due to the Commission in

1

Enclosure 2

February 2000. However, this draft will not be complete in many areas (e.g., non-reactor areas) since plans are still under development and stakeholder input must be obtained. We recognize that completion of all elements of the strategy will take time and the document will evolve as plans develop. However, the strategy document will be a roadmap that can be used to communicate to internal and external stakeholders where the agency is headed and the steps necessary to get there (e.g., training).

Now on p. 7.

4. Reference: Page 4, Last paragraph, last sentence.

See comment 4.

"Our survey results suggest that senior management may not be providing the leadership necessary to facilitate change . . . ."

Comment: See comment 1 above.

Now on p. 10.

5. Reference: Page 7, Last paragraph.

Comparison of Regions.

See comment 5.

Comment: We are not sure these comparisons are meaningful as they may relate in part to varying staff involvement in the pilot of the oversight process. Nevertheless, we will use this information in our ongoing communications efforts.

Now on p. 13.

6. Reference: Page 9, Last paragraph.

"Although 48 percent of the staff responded to the survey believe in the positive aspects of risk-informed regulation, staff in the Office of Nuclear Reactor Regulation, which is responsible for developing the centerpiece of such regulation - the new nuclear plant oversight process - generally have a less positive view of the value and merits than their colleagues. As shown in table 4, only 25 percent of the Office of Nuclear Reactor Regulation staff agree or strongly agree that a risk-informed approach will allow them to do their job more efficiently as compared to 40 percent of the Office of Nuclear Material Safety and Safeguards and 38 percent of the Office of Nuclear Reactor Regulatory staff. Table 4 shows some other staff perceptions about a risk-informed regulatory approach as well as the different perceptions between headquarters and regional offices."

See comment 6.

Comment: Although the new oversight process is risk-informed, it is just one of several of NRC's efforts to risk-inform its processes with respect to

2

Enclosure 2

nuclear power plants. There are significant other efforts associated with risk-informed regulation that affect the staff of the Office of Nuclear Reactor Regulation (NRR), including reviewing risk-informed license amendments and risk-informing the requirement of 10 CFR Part 50.

The new oversight process mainly affects the four regional offices, which are responsible for its implementation, and a relatively small portion of the NRR that is responsible for its development and management. That is, only a portion of the personnel from the NRR, the Office of Nuclear Regulatory Research, the Office of Enforcement, and the regional offices were involved in developing the cornerstones of the new oversight program and resolving major policy issues associated with it. The remainder of the NRR staff is largely responsible for licensing aspects of nuclear power plants, and have had very little interaction with the plant oversight process, be it the new revised oversight program or the previous program. Although such personnel may be aware of the basics of the new oversight program, they are generally responsible for licensing aspects of reactors in which substantial other efforts are in place to risk-inform the processes and associated regulations. As a result, not all the respondents in even NRR are fully informed about the program.

The statement that the NRR staff has a "less positive view of the value and merits" [of risk-informed regulation] is not well supported by the survey results. The various NRC offices are at different stages of development and application of risk-informed programs. In addition, NRR is in the unique position of reviewing and approving risk-informed license amendment requests, which are dramatically different from traditional license amendment requests. Major changes to Inservice Testing programs, Inservice Inspection programs, and Technical Specifications have been reviewed and approved using risk-informed regulation. Those reviews were thorough and included a broader scope than traditional engineering reviews. Substantial reviews involving risk insights are challenging, but have allowed more substantial changes than otherwise could be considered. It is thus easy to see how the NRR staff could indicate that risk-informed regulation might be "less efficient" than traditional approaches. But this is somewhat misleading since there are no comparable traditional engineering efforts. In addition, the risk-informed reviews were often first-of-a-kind undertakings, which would naturally require more effort. The overall observation that the NRR staff has a "less positive view" of risk-informed regulation that must be viewed in context.

Enclosure 2

Note that the text includes a typographical error: the reference to "38 percent of the Office of Nuclear Reactor Regulation staff" should refer to "38 percent of the Office of Nuclear Regulatory Research staff."

Now on p. 14.

7. Reference: Page 10, Three bullets at the bottom of page.

See comment 7.

Comment: It appears these data disregard those who responded that they neither agreed or disagreed, did not know or provided no answer. This inappropriately eliminates from the sample those who chose to wait and see the results of the process, rather than to speculate about the results. These data also disregard those who believe the process is neutral.

Now on p. 15.

8. Reference: Page 10, Carryover paragraph to page 11

"Table 5 shows 31 other issues listed in the survey as potential problems in implementing the new oversight process.[9] On the basis of the total responses, we ranked the potential problems in table 5 in descending order. The results generally highlight that a higher percentage of resident inspectors, who will be primarily responsible for implementing the new oversight process, perceived that the issues listed in table 5 would be a problem as compared to headquarters staff or regional office staff. Our survey results also showed that different perceptions exist among different NRC offices: 70 percent of the resident inspectors perceive that the new oversight process may not identify and halt degrading performance as compared to 36 percent of the Office of Nuclear Reactor Regulation staff, who developed the process."

See comment 8.

Comment: As the footnote to the GAO report notes, these issues were developed from various internal and external comments that the NRC had previously received concerning the new oversight process. We thus are aware of the concerns and have been working to address and resolve them. At this point in time, the questioning and tentative views of the NRC staff are viewed as positive and constructive in nature, ensuring that we have appropriately identified, evaluated, and resolved potential issues prior to full implementation of the reactor oversight process. As the survey results are based on a "moment in time" from individuals with varying levels of knowledge and experience with the new oversight process, many of whom had not yet had the formal training on the new oversight process, varying views of potential problems are not a surprise. As training is completed and experience gained with the new oversight process, we expect concerns over the merits of the process to be alleviated.

Enclosure 2

Now on p. 18.

9. Reference: Page 13, First full paragraph.

"In addition, NRC managers noted that these results are skewed because they only reflect the perceptions of staff that responded to the survey. They said that they would expect the staff from the Office of Nuclear Reactor Regulation to be better informed about the new oversight process because that office developed the process. Yet, our survey results show that this is not the case because staff from the Office of Nuclear Reactor Regulation who responded to the survey did not know, had no basis to judge, or had no answer to numerous questions related to the development of the oversight process. For example, about 75 percent did not know, had no basis to judge, or had no answer about whether an effective mechanism exists to refine the process in the future and whether NRC's transition plan has identified all major activities to ensure the successful implementation of the process. In addition, 59 percent did not know, had no basis to judge, or had no answer about whether the new risk-informed culture has been accepted by inspectors."

See comment 9.

Comment: These results are not surprising given the diverse nature of work performed within the Office of Nuclear Reactor Regulation and the evolving nature of the new oversight process. At the time the survey was performed (summer of 1999), individuals with the most knowledge of the new oversight process would be a small subset of staff from the Regional Offices (i.e., mainly those associated with implementation of the program to the pilot plants) and Office of Nuclear Reactor Regulation (i.e., mainly those associated with development and management of the program). Although the remainder of the staff was most likely aware of the program, they had no reason to be cognizant of the specific details associated with the new oversight process. The survey results are reflective of the staff's knowledge and views at that time, as is evident from Table I.13 in which the dominant response to all questions associated with the new oversight process was "do not know/ no basis to judge." As the new oversight program continues to develop and mature, and more staff are provided training, we expect the level of knowledge and comfort to increase. Nevertheless, a large percentage of the staff within the Office of Nuclear Reactor Regulation, although they are aware of the new oversight process, do not have a role in it's management or implementation and therefore will not have a working level knowledge of the program. In addition, since the majority of the staff within the Office of Nuclear Reactor Regulation are not in frequent contact with NRC inspectors, they are not in a position to judge whether the new risk-informed culture has been accepted by inspectors. Details on our efforts to train and educate our staff on the new oversight program in the period after the survey are provided below.

Enclosure 2

Workshops were attended by personnel from all regions and headquarters and were given as follows:

In support of full program implementation, a new formal course called the Reactor Inspection and Oversight Program Course has been developed. This course provides an introduction to the new reactor oversight process, including: an overview of the program; performance indicators; inspection procedures; significance determination processes; inspection planning; inspection reports; assessment; and enforcement. Breakout sessions during the course will provide detailed discussions of topics in the areas of reactor safety, emergency preparedness, radiation safety and safeguards. This course has been or will be presented at multiple locations and at multiple times as follows:

- 11/15-19/99 in Arlington, TX (Region IV)
- 12/6-10/99 in Lisle, IL (Region III)
- 1/24-28/00 in Chattanooga, TN (Technical Training Center)
- 2/7-11/00 in Chattanooga, TN (Technical Training Center)
- 2/14-18/00 in Atlanta, GA (Region II)
- 2/28-3/3/00 in Lisle, IL (Region III)
- 3/13-17/00 in King of Prussia, PA (Region I)
- 4/3-7/00 in King of Prussia, PA (Region I)
- 4/17-21/99 in Chattanooga, TN (Technical Training Center)

The NRC will also hold a public workshop called a Lessons Learned Workshop 1/10-13/2000 in Washington, DC. This workshop will be used to discuss substantive lessons learned and identify resolutions that will be factored into evaluation of the pilot program success, the training program for full implementation, future NRC/Industry workshops, and the implementation of the revised reactor oversight process.

Finally, the NRC will hold a series of workshops called NRC/Industry Workshops. The purpose of these public workshops is to provide information on the revised reactor oversight process to the industry and the public prior to full implementation of the program. The workshop will consist of presentations on the performance indicators, inspection, assessment, and enforcement processes. These workshops will be conducted at multiple locations and at multiple times as follows:

- 2/22-25/00 in Naperville, IL
- 3/6-9/00 in Atlanta, GA
- 3/13-16/00 in Arlington, TX
- 3/20-23/00 in Philadelphia, PA

Enclosure 2

Now on p. 18.

10. Reference: Page 14, First paragraph. (re: risk-informing nonreactor activities)

See comment 10.

Comment: We agree that there is a need to address non-reactor matters, and have embarked on a process to develop a strategy and approach for risk-informing NMSS programs. The plan was provided to the Commission in SECY-99-100. The Commission has issued direction to the staff to proceed with the proposed process, and to work to develop safety goal elements in a public participatory manner. In addition, the staff has been developing technical basis material for risk assessment for byproduct materials. The draft report was published for public comment this fall, and the staff is scheduled to provide copies of the final technical bases documents to the Commission at the end of January 2000.

Now on p. 20.

11. Reference: Page 14, Second paragraph.

"Furthermore, it is difficult to understand how NRC can effectively implement a risk-informed approach without a definition for what constitutes adequate protection to the public."

See comment 11.

Comment: Risk-informing the regulations is not dependent upon defining adequate protection. Since substantial compliance with the current set of regulations is judged to provide adequate protection. The risk-informed changes to these regulations are being implemented so as to limit the change in risk resulting from any changes to small increments about the current risk profile. What is essential to risk-informed regulation is to define the incremental change in risk that can be tolerated. The Commission does, however, understand the stakeholder concerns regarding better defining adequate protection. For reactors, the staff will consider a more refined description of the meaning of "reasonable assurance" of adequate protection in its ongoing efforts to provide recommendations related to revisions to the Safety Goal Policy. A similar analysis for materials licensees remains to be developed.

7

The following are GAO's comments on the Nuclear Regulatory Commission's letter dated December 10, 1999.

GAOs Comments

1. NRC cites information related to senior management's leading the change process that we discuss in more detail later in the draft report. One section of our survey asked staff their opinion concerning innovation and change at NRC. As shown in table 6 (formerly table I.1), NRC's staff who responded to the survey generally gave low marks to senior management's facilitating change. In addition, we believe that NRC should have considered the questions directly related to the extent to which management involves staff in its change initiatives. For example, only about 19 percent of the staff agree or strongly agree that senior management solicits ideas and opinions from NRC's staff before making changes as compared with about 57 percent who disagree or strongly disagree. In addition, although about 26 percent of the staff agree or strongly agree that senior management is receptive to suggestions made by the staff, about 41 percent disagree or strongly disagree with this view.

2. The example that NRC cites is explained later in the draft. As our report notes, because a significant number of NRC's staff—about 33 percent—did not express an opinion about the new oversight process, we calculated the survey results on the basis of those who did respond.

3. We have added information to the report to reflect that NRC's draft strategy will not include issues related to nonreactor licensees. In addition, we too recognize that the strategy should be a living document for NRC and those it regulates. However, until NRC has a draft strategy for public comment, we cannot determine whether the Commission will address the issues that we have identified and provide the roadmap that we envision.

4. See comment 1.

5. All four NRC regional offices are involved in the new oversight pilot project with a comparable number of plants. Therefore, we believe that the comparisons of the regional offices' responses are meaningful. In addition, in early December 1999, NRC provided us with a memorandum from the Executive Director of Operations to the Regional Administrators about the need to consider how the regions might address the issues raised by our survey and to notify them that they would be contacted to discuss the survey's results and communication issues.

6. NRC said that a relatively small portion of the Office of Nuclear Reactor Regulation's staff are responsible for the development and management of the new oversight process and that the remainder of that office's staff have little interaction with either the previous or the new oversight process. Therefore, not all staff with that office are fully informed about the new process. We revised the report to include this information. NRC also states that the survey's results do not support the statement that the Office of Nuclear Reactor Regulation's staff have a less positive view about risk-informed regulations. Yet the survey's results as depicted in table 4 show, for example, that only 25 percent of the Office of Nuclear Reactor Regulation's staff agree or strongly agree that a risk-informed approach will allow them to do their job more efficiently as compared with about 40 percent of the staff in other NRC offices. On the basis of these results, we continue to believe that the Office of Nuclear Reactor Regulation's staff have a less positive view of the value and merits of a risk-informed regulatory approach.

7. As indicated in footnote 8, these data exclude those NRC staff who neither agreed nor disagreed, did not know or had no basis to judge, or provided no answer to the questions. However, we believe it is significant that about 33 percent of NRC's staff neither agreed nor disagreed, did not know or had no basis to judge, or provided no answer to the questions about the development and implementation of the new oversight process. In its comments, NRC speculates that the staff did not answer the questions because they are taking a wait-and-see approach about the new oversight process. We have no way to determine the reasons why the staff did not answer the questions and chose to focus on those staff who provided answers.

8. The draft provided to NRC for comment noted that the agency is aware of these concerns and will monitor them during the pilot project and the development of the final oversight program. Therefore, we made no changes to the report.

9. We added information in the draft to reflect the training that NRC expects to provide for its staff.

10. NRC agrees that a need exists to address nonreactor matters in the strategy and has embarked on a process to do so. We revised the draft to include this information.

11. As NRC states and as the draft report noted, historically, it was generally understood that "adequate protection" meant that the licensees substantially complied with NRC's rules and regulations. NRC also states that it is essential to define the incremental change in risk that can be tolerated. NRC did not specify what that incremental risk should be. However, NRC said that it will consider a more refined description of reasonable assurance of adequate protection as it revises its safety goal policy. We revised the draft to include this information.

Objectives, Scope, and Methodology

The Subcommittee on Clean Air, Wetlands, Private Property, and Nuclear Safety, Senate Committee on Environment and Public Works asked us to determine the (1) views of NRC's staff on the quality of work that NRC performs, management of and staff's involvement in changes occurring in the agency, and the move to a risk-informed regulatory approach and (2) status of NRC's efforts to develop a strategy to implement a risk-informed regulatory approach.

We reviewed our prior reports that examined the problems associated with bringing about a cultural change at such federal agencies as the Department of Defense and the Federal Aviation Administration. We relied on the analysis of the elements needed to ensure successful cultural change as discussed in Aviation Acquisition: A Comprehensive Strategy Is Needed for Cultural Change at FAA (GAO/RCED-96-159, Aug. 22, 1996). We also reviewed the June 1998 report by NRC's Office of the Inspector General of the agency's safety culture and climate survey and discussed the survey with relevant NRC staff. We examined transcripts of a Commission meeting related to the Inspector General's survey results as well as a June 15, 1999, "all employees" meeting held by the Commissioners with NRC's staff. We also attended an information panel meeting held on April 7, 1999, that discussed some of the tasking memorandum's initiatives.

To determine the views of NRC's staff, we developed a questionnaire that could be completed on the Internet. In developing the questionnaire, we met with NRC's headquarters and regional staff to determine the issues relevant to the staff. We also reviewed a summary of the internal and external comments that NRC had received on its new nuclear power plant's oversight process (includes assessment, inspection, and enforcement). In addition, we met with 77 NRC staff (in four separate group sessions) to select questions concerning potential problems with the new oversight process for nuclear power plants.

The questionnaire contained three parts that addressed the (1) beliefs and opinions about the work environment at NRC, (2) beliefs and opinions about NRC's initiatives and risk-informed regulation, and (3) demographic information. Once we selected the questions, we developed a paper-and-pencil questionnaire with a format similar to that of the Internet questionnaire. Using the paper-and-pencil questionnaire, we conducted pretests with 11 NRC staff. On the basis of the feedback from this pretest, we modified some of the questions. We then designed an electronic questionnaire that was posted on GAO's homepage on the Internet. The electronic questionnaire was pretested with 17 NRC staff to ensure that the

instructions and format were clear: 14 staff completed the questionnaire at NRC headquarters in our presence, and 3 staff from various regional offices completed the questionnaire and then were interviewed over the telephone about their experiences.

Information about accessing the questionnaire was provided via E-mail only for those NRC staff who were being asked to participate in the survey. The survey was activated, and staff were informed of its availability on August 5, 1999; it was available until September 24, 1999. During the course of the survey, we sent several E-mail messages to eligible staff, giving them information about the number of individuals who had completed the survey and urging them to complete the survey if they had not done so. To ensure the anonymity of NRC's staff, we did not link identification numbers or other identifying information to respondents' answers.

We selected 1,581 NRC staff to participate in the survey. We selected staff who would be responsible for implementing NRC's initiatives. This included staff with the following job classifications: attorney; emergency preparedness specialist; enforcement specialist; environmental, fire protection and reactor engineers; fuel facilities inspector; geologist; geophysicist; health physicist; radiation specialist; human factors specialist; hydrogeologist; operations research analyst; physical security inspector; psychologist; quality assurance specialist; resident inspector; research statistician; and reliability and risk analyst.

Of the 1,581 staff in these categories, 1,076 (68 percent) completed the survey. Table 29 shows the number of respondents by organization and position within NRC.

Table 29: Number of Respondents by Organization and Types of Positions Held

Office	Total number of respondents	Number in management positions	Number of staff
Office of Nuclear Material Safety and Safeguards	189	21	165
Office of Nuclear Reactor Regulation	328	37	284
Office of Nuclear Regulatory Research	98	17	80
Other headquarters[a]	46	10	35
Region 1	110	12	93
Region 2	100	14	82
Region 3	103	14	86
Region 4	86	15	68
Office not identified	12	3	9
Office and position not identified	4	0	0
Total	**1,076**	**143[b]**	**902[b]**

[a]Includes the Office of Administration, Incident Response Office, Office of Enforcement, Office of Investigations, and Office of State Programs.

[b]Thirty-one respondents did not identify their position.

For the purpose of the survey, we defined (1) senior management as deputy office directors/deputy regional administrators and above, including the Chairman, Commissioners, and the Executive Council and (2) mid-level management as section chiefs or team leaders, assistant branch chiefs, branch chiefs, and deputy and division directors. Therefore, "management" refers to all of NRC's senior and mid-level management, and "NRC staff" refers to all employees other than the Chairman, Commissioners, and senior and mid-level management. NRC's staff provided about 615 comments or explanations for the relevant survey questions.

To determine the status of NRC's efforts to develop a strategy to guide its initiatives to implement a risk-informed regulatory approach, we met with relevant staff, including the Chairman of NRC's Probabilistic Risk Assessment Steering Committee, reviewed the meeting minutes of that committee, and attended a September 7, 1999, Commission briefing on the Probabilistic Risk Assessment Implementation Plan. We also reviewed a June 1999 NRC abstract of the agency's strategy for risk-informing its regulations and an August 1999 report by the Center for Strategic and International Studies on the regulatory process for nuclear power plants.

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