

REPORT TO CONGRESS ON THE
RESIDENT INSPECTOR PROGRAM

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RESIDENT INSPECTOR PROGRAM

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SUMMARY

The NRC has learned a great deal during the first one and one half years of the resident inspector program. The potential benefits of locating inspectors at reactor sites appear to be as strong as, if slightly different from, those originally conceived. We have also found that managing a dispersed inspection force so that benefits are fully realized requires close coordination and attention to planning.

The advantages originally envisioned for resident inspection have already been realized. NRC now depends less on records review because the resident inspector is onsite, directly observing critical and routine licensee activities. The resident inspector, having acquired a broader and deeper knowledge through this direct observation, is the NRC expert on how this licensee operates, giving NRC one or more specifically knowledgeable authorities on the licensee who are quickly available when a question arises or an incident occurs. Resident inspectors use their knowledge to direct their work activities to suit both their professional style and inspection program needs. They can devote time to safety issues because of their continual presence onsite, their flexible work schedule, and their broad-based training. Under an expanded and earlier manning schedule even more time will be devoted to directly observing licensee activities.

The resident inspector himself benefits in assuming a more responsible position, one which allows him to gain in-depth knowledge that he can more effectively use to inspect, and ultimately insure, the safety of licensee activities. He also spends less time in travel, thereby minimizing family separations.

Unforeseen communications advantages have also developed. Communication between the licensee and NRC has improved, since licensees say they can discuss plant technical problems more readily with the resident, who can effectively discuss them with NRC. The resident inspector clarifies regulations and technical specifications for the licensee. Communication between NRC offices has also improved. Since the resident

inspector has a better understanding of the plant and licensee actions and plans, he can more effectively assist in the development of the NRC position as to what a licensee must do to correct a problem. Thus, the resident inspector is a vital communication link to both the Office of Inspection and Enforcement and the Office of Nuclear Reactor Regulation.

Licensees are enthusiastic about resident inspectors, although they still are unwilling to state that the residents actually improve safety. Licensees generally believe that public acceptance of the safety of nuclear power may be enhanced due to the presence of resident inspectors. Nor is the licensee's operation disrupted by the resident inspector: he conducts his inspections without an escort, retrieves documents without assistance, and is able to contact the appropriate person for information.

CONGRESSIONAL CONCERNS

In its request for this report, Congress stressed two concerns: that the individual resident inspectors might not have the breadth of technical knowledge to oversee the construction and operation of a nuclear power plant, and that the frequent contact with licensee personnel might lead the resident inspector to lose his objectivity.

Breadth of Technical Knowledge: Each inspector does not possess qualified knowledge in all technical areas. NRC's Inspection Program recognizes this:

- The resident inspector functions as the principal inspector for the site, conducting general inspections in a variety of areas. Specialist inspectors from the Regional Office support and supplement the resident's efforts.
- Senior resident inspectors must have the appropriate skills before assignment. Junior resident inspectors receive most of their training after assignment to a site. The training program keeps experienced inspectors current in their fields and prepares junior inspectors for their new assignments.

Possible Loss of Objectivity: The resident inspection concept originally authorized placed one inspector at a site. This could lead to loss of objectivity and measures were adopted to minimize this possibility: select mature, experienced inspectors; limit the tour of duty at a site; strengthen the code of conduct; and contact regional supervisors frequently. The expanded resident inspector program now requires a minimum of two residents at all operating sites, and the presence of one or more associates is the best method for reducing the potential for loss of objectivity. Nevertheless, NRC expects to devote considerable attention to detecting any loss of objectivity. Regional supervisors are sensitive to this issue and our licensee performance appraisal inspections specifically review this possibility. The NRC will rectify these situations as they occur.

IMPLEMENTATION

The fiscal year 1979 staffing goal was 49 inspectors at resident sites. This goal was not met--only 40 inspectors were onsite by September 30, 1979, because of logistical and administrative problems in starting the program in fiscal year 1978 and diversion of manpower to the Three Mile Island response. Many of these problems have been resolved and NRC is meeting the much more demanding goal for the end of fiscal year 1980:

| <u>Location</u> | <u>PLANNED STAFFING</u> (at end of FY1980) | | <u>ACTUAL STAFFING</u> (as of 11/30/79) | |
|-----------------------|---|-------------------|--|------------------------------|
| | <u>Sites</u> | <u>Inspectors</u> | <u>Onsite Inspectors</u> | <u>Selected For Transfer</u> |
| Operating Reactors | 63 | 135 | 43 | 53 |
| Construction Reactors | 20 | 20 | 12 | 7 |
| Fuel Facilities | 3 | 2* | 2* | 0 |
| | — | — | — | — |
| TOTAL | 86 | 157 | 57 | 60 |

* One inspector covers two neighboring sites.

The original goals of the resident inspector program were to establish an NRC onsite presence, to increase onsite inspection time, and to emphasize direct verification of licensee activities. NRC presence at reactor sites is a reality and an effective regulatory tool. The goal for more onsite time has also been accomplished: resident inspectors devote an average of 64 percent of their time to inspection compared to about 25 percent for region-based inspectors. Inspection time for residents is expected to again increase significantly as the expanded program is implemented. Inspection procedures are now being reoriented to meet the goal of more direct verification. The second and third resident inspectors at each site will focus almost exclusively on independently observing and verifying licensee actions, and senior resident inspectors will continue to devote most of their efforts to direct verification.

Resident inspectors can respond quickly to incidents occurring onsite or nearby. They provide an important communications link to the NRC, relaying information quickly and, because of their more complete facility knowledge, accurately and in detail.

The difficulties encountered in implementing the resident inspector program stem mainly from the speed with which inspectors are being placed onsite. Staffing the resident inspector program has depleted the pool of experienced NRC inspectors, and there is some concern that the regional inspection, response, and supervisory capability may be temporarily affected. Scoping the full range of implementation needs is difficult. Rapid expansion of the program and changes in its emphasis require that implementation tasks be redefined and new tasks added on short notice. Establishing and manning many separate resident offices is a substantial administrative burden. Lack of onsite support staff has placed some of this burden on the resident inspectors, the administrative and supervisory load has been borne by an insufficiently expanded regional staff.

Relocation is a burden on the resident inspectors, since reimbursement for selling/buying a home and for moving expenses have too often proved

insufficient to cover the actual cost of relocation. Increased commuting expense is not reimbursable. Moreover, the resident inspector may be less willing to accept a promotion before the end of his resident tour, since the financial and emotional cost of a possible second relocation in a short time may be too great. With proper planning and coordination, many of these current difficulties should be eliminated before the program is fully implemented. The Executive Director for Operations' special task force is reviewing potential solutions, including legislative actions; the Office of Inspection and Enforcement is considering changes in its headquarters organization to more effectively implement the resident inspector program.

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1. INTRODUCTION

In the House of Representatives Report accompanying the NRC Authorization Bill for fiscal year 1979,⁽¹⁾ the Committee on Interstate and Foreign Commerce remarked:

Although the committee approved without change the NRC request for the Office of Inspection and Enforcement, it continues to have reservations about the proposed Resident Inspector Program. The committee believes that the placement of an NRC employee at the site of an operating reactor or one under construction might lead to a familiarity with the operator or contractor which impairs the inspector's objectivity. This observation is, in no way, meant to raise questions as to the character or integrity of any inspector. Resident inspectors will have more frequent contact with the operator or contractor than they have with other NRC employees, and the likelihood of less than total objectivity must be viewed as a natural outgrowth of this phenomenon. Every effort must be exerted to guard against this possibility. Additionally, the committee questions the capacity of any one individual to possess the requisite knowledge in multiple technical areas to effectively oversee the construction and operation of an entire nuclear power plant.

Given these reservations, the committee believes the Commission should vigorously oversee the implementation of the resident inspector program and submit an evaluation to Congress by January 1, 1980, of its progress and problems.

This report, on the progress and problems of implementing the resident inspector program, has been prepared in response to that request. In addition, we have addressed Congressional concerns about loss of objectivity and breadth of knowledge, and discussed the advantages and disadvantages that have become apparent in the first year of implementation. However, this is not a full-scale evaluation of the effectiveness of the program; that evaluation is being conducted by Teknekron Research, Inc., under Contract NRC-05-79-254. An evaluation of the fiscal year 1979 experience is to be completed by July of 1980; the fiscal year 1980 experience is to be evaluated by March 1981.

In the time since Congress asked for this report on the implementation of the resident inspector program, reaction to the Three Mile Island accident has expanded the program's scope and form. To place the current expanded program in context, Section 2 of this report gives a brief historical sketch of resident inspector program developments up to the present. Since resident inspection is part of a unified Revised Inspection Program, Section 3 sets out the plans and accomplishments of each program component, though the resident inspector program is emphasized.

Sections 4 and 5 describe, respectively, our preliminary assessment of the advantages and disadvantages of the resident inspector program. There has been a full year of experience at 12 sites, and more than 23.5 man-years of experience with the resident inspector program were accumulated through the end of fiscal year 1979. Thus some advantages and disadvantages have already begun to appear, though it is too early in the program's history for definitive judgments to be made by NRC. Much of the information in these two sections was gathered in interviews Teknekron Research conducted with NRC headquarters and regional staff, resident inspectors, and licensee personnel.

Congressional concerns--loss of objectivity and adequate breadth of any resident inspector's technical knowledge--are addressed where appropriate in Sections 3, 4, and 5. Section 6 briefly summarizes the major points relating to those concerns as well as to the implementation of the program and its problems and benefits. The Appendix presents the perceptions of the resident inspector program gathered in the interviews conducted by Teknekron Research.

2. HISTORICAL BACKGROUND OF THE RESIDENT INSPECTOR PROGRAM

The idea of locating inspectors at regulated sites is not new to the Nuclear Regulatory Commission (NRC). In early 1974, the NRC* proposed a concept of resident inspection in which an inspector would be assigned close to a cluster of reactor sites rather than to a Regional Office. A trial program based on this idea was tested at two locations, beginning in mid-1974 and ending in late 1976. Evaluation⁽²⁾ of the trial program results showed that:

- Onsite inspection time increased.
- Inspector knowledge of the plant increased.
- NRC awareness of plant status and problems improved.

These benefits suggested that resident inspection could use inspector time more efficiently, allow more direct observation of activities, enable NRC to focus more precisely on problems, and permit those problems to be more quickly resolved. The dollar costs of increased administration and relocation appeared likely to be offset by increased inspection efficiency, and the trial program produced no clear evidence of loss of objectivity. NRC realized that mature and experienced inspectors were fundamental to maximizing the benefits of the program and minimizing the potential for loss of objectivity.

Based on the trial program experience, NRC analyzed four alternative approaches to resident inspection.⁽³⁾ These alternatives were:

1. Basing an inspector near a cluster of sites (the trial program approach).
2. Basing at least one inspector full time at each site with a reactor under construction or in operation.

* Then, the Atomic Energy Commission.

3. Providing 24-hour inspection at sites with reactors in startup or operation; sites with reactors under construction or in preoperational testing receive the full-time coverage described in Alternative 2.
4. Providing 24-hour control room monitoring in addition to the inspection provided in Alternative 2.

In each alternative, the resident inspector was to receive technical support from inspectors working out of the Regional Offices and from inspection teams specializing in independent measurement and in-depth performance appraisal.

Using the existing inspection program as a baseline, NRC evaluated each alternative against qualitative criteria associated with program performance (how the program might affect the inspectors' competence, usefulness, flexibility, and objectivity, and how it might motivate licensees) and against the quantitative factors of manpower needs, dollar costs, and effectiveness and efficiency as expressed in onsite time. Based on this evaluation, NRC chose to implement the second, "full-time onsite," alternative: it would more than double total onsite time, would substantially increase the amount of direct verification, and would provide "high utility," by maximizing the inspectors' opportunity to focus on activities meaningful to safety, while costing only 30 percent more than the baseline program. Alternatives 3 and 4 further increased onsite time but cost substantially more without providing a corresponding increase in inspector utility. NRC recognized that Alternative 2 carried the greatest risk of loss of objectivity, due to assignment of (usually) a single inspector to each site and to the inspector's daily contact with the licensee, but felt this potential risk could be limited by proper choice of personnel; contact with Regional Office inspectors and supervisors; and by limited tours of duty.

In April 1977, the President asked NRC to implement a program that would place resident inspectors at power reactor and other nuclear sites. In June of 1977, the Commissioners approved a "Revised Inspection Program"⁽⁴⁾ which included full-time onsite resident inspection as one component. The

other three components are a performance appraisal group that conducts in-depth evaluations of licensees' management systems and evaluates the implementation of the entire inspection program; increased independent verification efforts (both direct observation of licensees' activities and confirmatory measurements) by NRC; and a broader training and career development program. Actually, there is also a fifth, continuing component: the technical support and the specialized inspections that continue to be provided by the five Regional Offices. Thus, the resident inspector program is part of a considered and broad-based approach to enhancing the efficiency and effectiveness of NRC inspection. Each of the elements of the Revised Inspection Program is discussed in Section 3 of this report, though the resident inspector program receives the most emphasis.

After the Three Mile Island accident, NRC was urged to markedly increase its inspection at all sites. In July of 1979, the Office of Inspection and Enforcement recommended stationing a full-time inspector at each preoperational and operating nuclear power unit, in addition to a site resident inspector. These additional residents were to focus primarily on direct verification of licensee activities, and thus augment NRC's knowledge and confidence about the safety-related performance of licensees.

In late July 1979, the Commissioners approved an expanded program, and recruitment began in order to provide a minimum of two resident inspectors at most sites. One-unit sites and two-unit sites will have a senior resident inspector and an additional resident inspector; three-unit sites will have a senior and two additional resident inspectors. The number of construction sites to be staffed with resident inspectors has also been increased to provide adequate coverage of quality assurance programs at plants in the earlier stages of construction, including those where specific problems have been identified. The fiscal year 1980 Congressional Appropriation for NRC (May 1979) provided funding for an additional 146 positions to implement the expanded resident inspector program.

It must be emphasize that resident inspection does not represent a change in NRC's basic philosophy: that the licensee is responsible for the safe construction and operation of a nuclear power plant. NRC's role is to assure that this responsibility is discharged. The resident inspector program is designed to make NRC's role more effective. The resident inspector, as NRC's onsite "eyes and ears," should:

- Increase NRC's knowledge of conditions at the facility, thereby firming the basis for regulatory action
- Directly observe licensee actions, in addition to examining records of those actions
- Improve NRC's ability to respond quickly and effectively to plant problems through his greater knowledge of the facility and the workings of its staff

The presence of the resident inspector cannot, nor should it, substitute for the licensee's basic responsibility to safety, but it should help NRC assure that this responsibility is being met.

3. PLANS AND ACCOMPLISHMENTS

While 45 sites* now have resident inspectors, 42 sites** do not. Those sites not staffed with residents are subject exclusively to NRC's region-based inspection program, in which inspectors are located in Regional Offices and periodically travel to the sites. Each operating reactor licensee typically receives about two inspections of two to five days duration each month; reactors under construction are inspected two to four times per month depending on the stage of construction, and fuel facilities receive at least one inspection per month.

Regional inspectors are either principal inspectors or technical specialists. Principal inspectors are responsible for conducting certain inspections, monitoring inspection status and coordinating inspection effort at a site to assure that all necessary inspection requirements are fulfilled, and following up on outstanding items and enforcement actions. Technical specialists are experienced in one or more areas such as health physics, welding, physical security, or nondestructive examination. They inspect licensee activities in those specific areas, complementing the broad-based inspections conducted by the principal inspectors. Region-based inspectors examine a sample of technical procedures, management controls, and licensee records; directly observe a limited number of licensee activities; and make confirmatory independent measurements, particularly in radiological protection.

3.1 THE REVISED INSPECTION PROGRAM

The Revised Inspection Program alters the region-based pattern of inspection to provide more onsite time and more direct verification of

* As of November 30, 1979, resident inspectors were assigned to 31 sites with reactors in operation or in preoperational testing, 11 sites with reactors under construction, and 3 fuel facility sites.

** As of November 30, 1979, resident inspectors were not assigned to 33 sites with reactors in operation or in preoperational testing and 9 sites with reactors under construction.

licensee activities. A brief description of each program component will help to place the actual accomplishments in each area, as discussed later, in perspective.

The Resident Inspector Program

The senior resident inspector functions as the principal inspector for the site to which he is assigned, conducting general inspections in a variety of areas. Specialists from the Regional Office continue to conduct in-depth technical inspections and provide other support the resident inspector may need. This dual approach recognizes that no one individual is sufficiently qualified in all technical areas. Technical support by the Regional Office is essential to a comprehensive inspection program.

Resident inspectors spend essentially all their working time onsite.* This increased time provides greater opportunity to observe and measure licensee activities directly, thus improving confidence in the accuracy of licensee work and records. The resident inspector can respond to incidents more quickly because no time is lost in travel from the Regional Office. He also has more opportunity to become familiar with the details of the plant and its operation, which is expected to give NRC a better technical basis on which to take any required regulatory action.

Performance Appraisal Team

Performance Appraisal Teams of highly qualified, experienced inspectors conduct inspections that have three purposes: 1) evaluating the performance of NRC licensees from a national perspective, 2) evaluating the effectiveness of the NRC inspection program, and 3) evaluating the objectivity of NRC inspectors.

* Not all onsite time is spent in inspection. See Section 3.2.

The Performance Appraisal Team reports to IE Headquarters, not to any Regional Office. The team inspects facilities in all regions, and this "national perspective" on licensee performance complements the information obtained through region-based inspection and the site-based resident inspector. The national perspective gained by a single group conducting inspections in all NRC regions can also provide information on how consistently the regions are implementing NRC's inspection program. The Performance Appraisal Team also evaluates inspection program effectiveness by applying the same inspection procedure as that used by the region-based inspectors but with a higher than required sampling rate; their results are compared with those obtained by the regional inspectors who use the specified lower rate.

Direct Verification

Direct verification takes two forms - direct observation of licensee work, and independent measurements. Both types of direct verification are intended to provide first-hand assurance that the licensee has performed work properly.

Direct observation involves witnessing licensee activities in progress. This "over the shoulder" observation is done by both resident and regional inspectors, though opportunities for direct observation were emphasized when structuring resident inspectors' activities. Preoperational tests, power ascension tests, surveillance tests, and routine maintenance and operations can all be observed more frequently by resident inspectors and with greater convenience to both NRC and the licensees. Independent measurements are "hands on" (as opposed to "over the shoulder") inspections, in which NRC inspectors personally perform certain activities. Both direct observation and independent measurement permit the inspector to verify that the licensee is following written procedures and has measured and reported accurately. These inspection techniques can increase NRC's confidence in the technical performance of the licensee and

in the accuracy and completeness of licensee documentation. Nondestructive examination, instrument calibration, and an expanded radiological measurement program are being evaluated for inclusion as independent measurements. Some measurements may be most appropriately performed by site-based inspectors, while others may be more effectively performed by regional personnel or by specialized teams operating from a central location.

The additional resident inspectors to be assigned to each site under the expanded resident program will focus primarily on direct verification. This increased direct verification role emphasizes:

- On a regular basis, reviewing proper positioning of valves and switches and proper equipment lineup after maintenance
- Observing a sample of entire surveillance tests, starting by verifying that test instruments are properly calibrated, continuing through the test and return of equipment to service, concluding with independent verification of formulae and compensation factors
- Frequently verifying compliance with technical specifications
- Observing whether safety-related maintenance is promptly scheduled, properly conducted, and quickly completed
- Verifying placement and removal of control jumpers
- Checking work-in-progress against procedures
- Witnessing portions of all safety-related startup and preoperational tests
- Conducting independent periodic radiological surveys and measurements

Continual Regional Support

Specialist inspectors working from the Regional Offices complement the resident inspector's efforts, since NRC recognizes that no single person

is expert in all inspection areas. Basing the specialist inspectors in the regional offices is an efficient use of manpower, since one specialist can inspect the same technical area at several plants at a uniform level of detail.

The Regional Office is also the point of supervision and administrative support for the resident inspectors. Noncompliances found by the residents are processed by the Regional Office, and the resident maintains frequent telephone contact with his supervisor in addition to submitting periodic written reports.

Inspector Training and Career Development

This component of the Revised Inspection Program supports the others by assuring that properly trained personnel are available to fill supervisory, resident, regional, and performance appraisal positions. Assigning inspectors to nuclear facility sites for a "tour of duty" requires planned mobility and a greater assurance that inspector skills are matched to future inspection needs.

The inspector training program is designed to meet NRC needs. Classroom instruction is supplemented by training sessions in a power reactor simulator and by programmed self-study and on-the-job training. It is estimated that 18 to 24 months are required to train most new inspectors for duty as the senior resident inspector assigned to a site, even though they may have prior experience in the nuclear industry. The other, more junior, residents require up to 12 months of on-the-job and classroom training, some of which occurs after assignment to a site. Currently, most junior resident inspectors are new hires (with previous nuclear experience in a utility or the Navy) who are assigned directly to sites and who receive their NRC training while assigned to that site.

3.2 ACCOMPLISHMENTS OF THE RESIDENT INSPECTOR PROGRAM

Staffing

The schedule for staffing the resident inspector program has undergone a number of changes. The "original" schedule, as approved by the Office of Management and Budget (OMB), was:

| | <u>FY78</u> | <u>FY79</u> | <u>FY80</u> | <u>FY81</u> | <u>FY82</u> |
|---------------------|-------------|-------------|-------------|-------------|-------------|
| Resident Inspectors | 22 | 49 | 76 | 93 | 98 |

Each figure includes two resident inspectors to be stationed at fuel facilities; the remainder were to be stationed at sites with one or more reactors in operation or at selected sites with reactors in the last three years of construction.

NRC obtained funding for the resident inspector program in July of 1978, and the first 22 resident inspectors were to have been onsite by September 30, 1978. As of that date, eight residents were onsite. By the end of December 1978, 18 resident inspectors were onsite: 2 at fuel facilities, 5 at construction sites, and 11 at operating sites. This delay in placing resident inspectors onsite was due to the difficulty of relocating people on short notice. NRC's goal was to have 49 resident inspectors by the close of fiscal year 1979. As of September 30, 1979, 28 operating reactor residents, 10 construction reactor residents, and 2 fuel facility residents, for a total of 40 residents, were onsite.

The original plans for fiscal year 1980 called for 76 resident inspectors, an increase of 36 over the number actually onsite at the close of fiscal year 1979. Plans for fiscal year 1980 have now become more complex, due to the expansion of the program in the wake of the Three Mile Island accident.

These plans now include additional resident inspectors at each operating site and some additional construction site coverage:

| <u>Location</u> | <u>Resident Inspectors</u> |
|--------------------|----------------------------|
| Operating Sites | |
| Three Mile Island | 7 |
| Other sites | 128 |
| Construction Sites | 20 |
| Fuel Facilities | 2 |
| TOTAL | <u>157</u> |

As of the end of November 1979, 57 residents were onsite and 60 more residents had been selected.

It is no simple matter to find and place on site so many people in less than one year. Senior residents usually come from the current ranks of regional inspectors. The additional residents are expected to be less experienced personnel of lower grade than senior residents, since the additional residents' job activities do not require the experience demanded of the senior residents. Many of the additional residents are to be new hires with education or experience in nuclear, civil, mechanical, or electrical engineering disciplines, with a general knowledge of nuclear technology, and with particular knowledge in one or more areas of reactor operations.

Even with a reasonable plan, it is clear that staffing the expanded resident inspector program may be difficult. Persons qualified to be senior residents cannot be removed precipitously from the Regional Offices without weakening the regional inspection program. Placing newly hired persons at the sites as residents who focus exclusively on direct observation of defined activities has the advantage of relatively simple training, in comparison with the training and experience required of a senior resident inspector. But to produce a solid, viable, and productive inspection program, NRC must use only adequately trained and qualified inspectors.

Use of Inspector's Time

The way resident inspectors use their time differs substantially from the way in which regional inspectors work. Historically, regional operations inspectors have spent about 25 percent of their work time in inspection.* Roughly a fifth of their onsite time is spent in directly observing work activities; the rest is spent reviewing documents. The regional inspector also spends about 10 percent of his work time in travel. The remaining time is spent in training, or in the Regional Office preparing for upcoming inspections by reviewing the licensee's inspection history and technical specifications, evaluating inspection findings for possible enforcement action, documenting inspections he has conducted, and reviewing licensee reports of events or malfunctions.

By contrast, the senior resident inspectors already onsite are averaging about 95 percent of their work time onsite, with 48.8 percent of their work time spent in routine inspection and another 4.6 percent in "nonroutine" inspection (following up on particular events, occurrences, or licensee response to bulletins). These figures are averages for all resident inspectors** for the period October 1978-June 1979 and do not include overtime. Less than 4 percent of the senior residents' time was spent in travel. About 16 percent of their time was spent in documenting the results of inspections. Another 19 percent was devoted to programmatic activities, particularly servicing requests from other NRC offices: the Office of Nuclear Reactor Regulation, Office of State Programs, and the Office of Public Affairs. Also included is the almost daily telephone call to their regional supervisors covering inspections in progress, events that occurred, and other items of interest.

Another activity, and one that takes substantial time, is routine administration of the resident inspector's office. Much of this time would be better spent on inspection. Some resident offices have been assigned

* Regional inspectors have been spending more than 25 percent of their time onsite since Three Mile Island.

** Operations, construction, and safeguards.

part-time employees to handle the administrative work and to provide typing services. This approach is now being used in an increasing number of resident offices. Table 1 summarizes how region-based and resident inspectors spend their work time.

Table 1

AVERAGE TIME BREAKDOWN FOR REGIONAL AND RESIDENT INSPECTORS

| | Regional Inspectors <u>% of Work Time</u> | Resident Inspectors <u>% of Work Time</u> |
|--|---|---|
| Routine Inspection | 21.4 | 48.8 |
| Investigation | 7.4 | 4.6 |
| Documenting Inspections/ Enforcement Activities | 25.5 | 16.0 |
| Inspection/Management Support | 12.5 | 19.2 |
| Miscellaneous | 22.6 | 7.6 |
| Travel | 10.5 | 3.8 |
| TOTAL | <u>100</u> | <u>100</u> |

NOTE: No sick leave, vacation, or holidays are included.

Quick Response to Incidents

Inspectors located at reactor sites can respond quickly to incidents occurring onsite or nearby, since little travel is usually needed. The NRC Regional Offices and Headquarters can obtain prompt and accurate information from the resident inspector. For example:

- A resident inspector in Region I investigated a spill from a truck carrying materials that were suspected to be radioactive. He surveyed the area and promptly assured the local authorities that no contamination existed.
- A resident inspector in Region III was called at home by the licensee when the reactor tripped late at night. The resident returned promptly to the plant, assessed the situation, and was able to inform NRC headquarters that no serious problem existed and that the licensee had taken proper action. NRC headquarters and the Region III Office were able to pass prompt and accurate information on to the press.
- A resident inspector in Region II was notified at home by the licensee when a minor release, followed by a reactor shutdown, occurred early in the morning. The resident returned and notified NRC headquarters and the Regional Office. Over the next few hours, he provided the basic information NRC needed to evaluate the situation.

Achieving an Integrated Inspection Program

The written inspection procedures have gone through two revisions to accommodate the resident inspector concept, and further modifications will undoubtedly be needed as NRC gains more experience and as the program's technical emphasis changes.*

The initial revision came when the first residents were placed onsite in late fiscal year 1978. At that point, one could make only an educated guess about the actual manhours available to the resident for inspecting and how those hours could be most productively used. The regular "modularized" inspection program was retained essentially intact, but with the sampling rate for some modules increased. Procedures covering health physics and physical security were recast to make them more amenable to performance by the resident inspectors, and direct observation activities were specifically increased in most areas. Some regions required that all

* Technical emphasis is already changing in response to Three Mile Island and to increased storage of spent fuel, as it did in response to such previous events as pipe cracking, the Brown's Ferry fire, and fuel densification.

the revised modules (called the "C" level program) be completed solely by the resident inspector, but this proved to be extremely difficult. In addition, many residents felt their time would be better spent in probing areas they knew to be weak, pointing out potential problems and requiring that licensees take action to prevent noncompliances from occurring, and in directly observing licensee activities to an even greater degree.

The program revision now underway reflects this experience. New modules are being written for the additional residents, who will focus primarily on independently observing and verifying licensee actions. The emphasis of existing modules is being shifted to include more direct observation by all inspectors, not just the residents. More hands-on testing by NRC (described later) is also being included. The goal, after a year and a half of experience with the resident inspector program, is to produce an integrated program that combines regional and resident skills and advantages in a reasonable way. Each Regional Office will divide the program modules between regional and resident inspectors to take advantage of the particular skills possessed by all the inspectors in that region. NRC plans to have this revision ready for use early in 1980.

Management of the Resident Inspector Program

In August 1979, a coordinator was appointed to define and monitor effort on the tasks that must be accomplished to implement and manage the resident inspector program. An implementation plan covering 11 priority tasks was approved by the Director of the Office of Inspection and Enforcement on October 18, 1979. The tasks are:

- Define Program Commitments and Goals
- Develop "Routine" Inspection Programs
- Hire/Select and Assign Inspectors
- Transfer Inspectors to Duty Stations
- Administratively Support the Site Offices

- Train and Orient Inspectors
- Report Monthly Accomplishments
- Develop Personnel and Organizational Policies
- Coordinate the Program with Non-Program Offices
- Develop an Incident Response Program
- Prepare Policy/Information Papers

The Office of Inspection and Enforcement is also considering altering the structure of its Headquarters office to ensure more effective implementation of the resident inspector program. Possible changes are being considered in the context of actions recommended by investigations of the Three Mile Island accident.

3.3 ACCOMPLISHMENTS IN PERFORMANCE APPRAISAL

Ten performance appraisal positions were authorized for fiscal year 1978 and 15 for fiscal year 1979. In fact, due to staffing the resident inspector program and to promotion to management positions, the Performance Appraisal Branch had only 10 members as of the end of fiscal year 1979, and several of these were detailed to the investigation of the Three Mile Island accident. Despite these obstacles, the Performance Appraisal Branch:

- Formulated detailed plans for conducting inspections of licensee management controls and of the effectiveness of NRC's inspection modules
- Conducted five management inspections (one in each NRC region)
- Conducted five inspections (one in each NRC region) designed to test the effectiveness of the modular inspection program

The "national perspective" that began to develop from the five management inspections has revealed that licensees' structure and operation may vary

more than NRC had realized. The Branch also confirmed that the sampling rates used in the specific inspection procedure tested did in fact present an accurate and reliable picture of the licensees' regulatory activities in that area.

The Performance Appraisal Branch has not yet attempted direct assessment of inspector objectivity, though program implementation, including objectivity, is evaluated as part of each management inspection. Eventually, the Performance Appraisal Branch may play a more substantial role in this area.

3.4 ACCOMPLISHMENTS IN DIRECT VERIFICATION

The region-based inspection program has always included direct verification. During construction, inspectors make spot checks of work in progress to assure that the licensee follows his quality assurance program. In the preoperational test and startup phases, inspectors witness and review the results of selected tests and analyze the test procedures. At an operating reactor, inspectors spend about 20 percent of their time directly observing or making measurements. In addition, approximately 20 percent of an inspector's onsite time is "unprogrammed" to permit him to follow up on areas of interest or concern, and some inspectors use that time for additional direct observation.

The integrated inspection program mentioned in Section 3.2 builds on the existing program. First, the additional resident inspectors at each site are to devote nearly all their time to direct verification. Second, Sandia Laboratories has studied options for direct verification⁽⁵⁾ during reactor construction and operation and has defined ways in which NRC can directly test the operability of systems and components important to safety. The results of the Sandia study are being incorporated into the inspection program.

A third direct verification program will improve NRC's capability to independently assess radiological safety. This internally developed study

is evaluating possible expansion of the types, frequency, and the sample size of in-plant, environmental, and effluent measurements that are made periodically at operating facilities. The study will also specify the radiological monitoring or survey equipment needed in each Regional Office, resident office, and at other locations to make these measurements under both normal and accident conditions.

3.5 ACCOMPLISHMENTS IN TRAINING AND CAREER DEVELOPMENT

NRC's specialized training group, a component of the Office of Inspection and Enforcement, has grown from 7 instructors in the summer of 1979 to 14 as of the close of the calendar year. Four more instructors are needed, and these positions should be filled shortly. The January 1979 syllabus of training courses offered 20 reactor operations courses. Two more reactor simulator courses, covering transients and abnormal operating conditions, have been added, and the NRC has negotiated to extend its use of the Tennessee Valley Authority's simulators for three additional years. Available simulator time has been expanded from 13 to 28 weeks. A one-week course in observation techniques has been devised primarily for the additional resident inspectors, and two advanced technology courses have been lengthened to three weeks each. NRC's Region II Office has prepared a training guide that covers the type and timing of on-the-job and classroom training a new resident inspector must have during his first year. The guide is being considered for use by all five regions.

As of October 1979, position descriptions and grade levels had been defined for use in assigning senior and additional resident inspectors to operating reactor sites. Senior resident inspectors are established at the GG-13 or 14 grade. Other resident inspectors are graded, according to qualifications, as GG-11, 12, or 13. Position descriptions for resident inspectors at reactor construction sites and fuel facilities are comparable to those of the reactor operations senior resident. Under

contract to NRC, General Research Corporation has documented alternate career opportunities within the Office of Inspection and Enforcement.⁽⁶⁾ The promotions available for a senior resident inspector are the same as those available to any equally qualified GG-14 inspector: he can become a supervisor in the Regional Office or join the headquarters staff, depending upon the positions open in each of these areas. Inspectors of lower grade can rise through the ranks.

A new computerized Personnel, Assignment, Qualifications and Training System (PAQTS) contains the training and experience history of all inspection personnel. PAQTS will supplement the regional supervisors' recommendations for resident status or promotion by identifying additional training each person requires.

4. ADVANTAGES OF THE RESIDENT INSPECTOR PROGRAM

The advantages of the resident inspector program accrue primarily to the NRC, but they also accrue to the resident inspectors and the licensees. Some of the advantages benefit more than one of these groups. Many of the advantages to the NRC benefit the public through the improvement of NRC's ability to regulate effectively and with increased perception.

The information on advantages has been supported by interviews performed by Teknekron Research, Inc., under an NRC Contract No. NRC-05-79-254. See the Appendix for Teknekron's discussion of the interview results.

4.1 ADVANTAGES TO NRC

Increased Inspection Time

In designing the resident inspector program, one of the major goals was more onsite inspection. The objective was 56 percent of working time for the typical resident inspector. As shown in Table 1 in Section 3.2, resident inspectors have, on the average, spent about 48.8 percent of their work time in routine inspection and another 4.6 percent in investigating particular problems, for a total of 53.4 percent. In contrast, regional inspectors have historically spent about 25 percent of their work time in inspection, though this has increased since the Three Mile Island accident. Resident inspection has thus about doubled inspection time, and this increase may be even greater when more residents have clerical help and logistical problems, such as mail delivery, have been solved.

While time spent inspecting has increased, residents are also performing more inspections outside of normal working hours ("backshift" inspections). Most regional inspections are scheduled for prime shift hours because that is when most inspectable activities take place. The resident inspector, having the same access to the plant as an employee and

living closer to the site, can more efficiently cover backshift activities that are required to be inspected. He also conducts more frequent "surprise" backshift inspections to spot-check routine operation.

Better Knowledge of the Licensee

An important advantage is the resident inspector's particular knowledge of the plant and how it is being constructed, tested, and operated. In almost all cases, this knowledge is both broader and deeper than that possessed by region-based inspectors. A major factor in developing this enhanced knowledge is the increased amount of time the resident inspector spends in directly observing licensee activities. People's actions and equipment response, when seen firsthand, convey a different type of information than do the records of those actions and responses.

This "real time," more insightful knowledge about the licensee is expected to contribute to NRC's awareness of the safety of that licensee's operation. It is not easy to define necessary and sufficient conditions that lead to safety, but good defense-in-depth design, qualified personnel, good maintenance, sound operating practices, and adherence to regulations all contribute. The resident inspector's firsthand observation of all of these factors should add a valuable dimension to NRC's regulatory scheme.

The resident inspector's knowledge of the plant also aids regional management. Regional supervisors report that they use their inspection force more efficiently by following up on licensee weaknesses indicated by the resident inspector.

Improved Response to Incidents

A resident inspector's more complete knowledge of the facility allows him--and NRC--to respond to incidents occurring at the site in a more

informed way. The resident inspector is likely to be more familiar with the nuances of the facility than is a region-based inspector, and hence he can place an event in the context of the plant's recent operating history. Resident inspectors can also respond quickly to incidents occurring onsite or nearby, since substantial travel time is unnecessary. Thus, the NRC Regional Offices and headquarters can obtain information more quickly and accurately from the resident inspector.

Improved Followup

The onsite presence of the resident inspector makes the entire "inspection-detection-correction" system work more quickly. The resident inspector is able to monitor daily the action a licensee takes to correct a cited noncompliance. Further, resident inspectors can promptly direct the licensee's attention to potential problem areas. Faster resolution of cited and potential problems means improved regulatory compliance. The resident inspector also discusses NRC bulletins with the licensee and can observe that appropriate and timely action is taken.

Improved Public Contact

The resident inspector represents NRC to local officials, other government offices, the local media, and the public in the plant neighborhood. This role is secondary to inspection, but it provides a visible regulatory presence that did not exist prior to the resident inspector program.

After a resident inspector is assigned to a site, the resident inspector, his section chief, and the NRC regional public affairs and state liaison officers meet with local officials. The resident inspector is introduced, his and NRC's roles in normal and emergency situations are outlined, and points of contact with the local community are established. The NRC Regional Office often issues a press release to local papers and radio stations about the resident inspector's assignment. Unfortunately,

following the Three Mile Island accident, some of these efforts were delayed up to 3 months. Most resident inspectors have been well received by the local communities and press.

Improved Communication Within NRC

The resident inspector functions as a communication link to both the inspection and the licensing offices of the NRC. The prime licensing office--The Office of Nuclear Reactor Regulation (NRR)--defines the detailed operating parameters (the "technical specifications") for each plant as part of the licensing process. Licensees often have questions about the precise implication of a technical specification under particular operating conditions, and they consult the resident inspector for interpretation, first because he is the NRC "presence" onsite, and second, because they feel he can often communicate more effectively with NRC headquarters than can the licensee.

This inspection--NRR communication link is of value to both NRC groups. NRR is gaining firsthand knowledge of the problems licensees face in interpreting and applying technical specification conditions. The Office of Inspection and Enforcement is acquiring similar information and is clarifying its requirements for reporting violations of technical specifications.

4.2 ADVANTAGES TO THE RESIDENT INSPECTORS

Increased Personal Knowledge and Experience

The resident inspectors feel that their presence onsite allows them to understand a particular plant and style of operation in greater depth than can a regional inspector. In general, they feel that this knowledge will make them better and more knowledgeable inspectors in future assignments.

Less Time Away from Home

Less travel is a major plus for most resident inspectors. While work days are certainly no shorter and increased backshift inspections may make hours less regular, the resident inspector spends considerably less overnight time away from home than does the typical regional inspector. Less travel also means that some resident inspectors can, if they choose, more easily attend courses at local schools and participate in community affairs.

Career Potential

The first residents transferred to reactor sites are now becoming senior resident inspectors and, as such, assuming a supervisory role as additional resident inspectors are placed onsite. Resident inspectors also receive extensive training in technical and inspection skills. While assignment as a resident inspector does not guarantee promotion, it provides an opportunity for self-development and a chance to demonstrate quality performance. The NRC intends that assignment as a resident inspector will become an advantage in reaching higher levels in the NRC.

4.3 ADVANTAGES TO LICENSEES

Communication with NRC

The licensees appear to feel that the resident inspector's greater knowledge of their operation and his presence onsite enhances their communication with NRC. They state they can often communicate plant technical problems to the NRC much more effectively in face-to-face discussions with the resident inspector than in long-distance telephone conversations with an NRC Regional Office or with NRC headquarters. They also believe that the resident inspector is more effective in communicating with NRC than are licensee personnel. The licensees also feel that the resident inspector's presence encourages quick resolution of

minor issues and often gives them prompt clarification of technical specifications and regulations.

Attention to Requirements

Most NRC personnel feel that the presence of a resident inspector makes licensees more careful, conscientious, and more aware of regulatory requirements. Licensee personnel also seem to feel that way, explaining that it is "human nature" to be more careful when observed. Whether this increased caution contributes to operating safety is a matter of debate among licensees. A substantial number of licensees contacted* stressed that operating safety was their, not NRC's, responsibility. While safety is indeed the licensee's responsibility, any increased care and attention generated by the resident inspector's presence is likely to result in safer operation with fewer noncompliances.

Minimal Regulatory Burden

After a resident inspector has been at the site for a few months, licensees do not find his presence a burden. The resident inspector can conduct his inspections without a licensee escort and retrieve documents without assistance from licensee personnel. His greater familiarity with plant details may more quickly allow him to assimilate the technical description of a problem and the circumstances leading to that problem. He can pose his questions directly to the person best able to answer them.

* As recorded in (1) a recent GAO report, "Placing NRC Inspectors at Nuclear Power Plant Sites: Is It Working?"; (2) an NRC Audit Report; and (3) interviews by Teknekron Research, Inc.

Ongoing Observation and Correction of Problems

Most licensees have indicated that an inspection program that emphasizes direct observation rather than records review gives a more accurate picture of how well and safely a plant is run. They feel that correcting an error in past record-keeping is not as relevant to safe operation as is taking immediate action on a current problem. Licensees appear to respond more positively and quickly when the resident inspector points out an observed, existing problem, and they have commented that prompt resolution of current problems improves their own operation.

More Informed NRC Response

Licensees feel the resident inspector's onsite presence and knowledge of their facility is a distinct advantage when an incident occurs. Most residents live near the site and can get to the site more quickly than can Regional Office personnel. In addition, the resident inspector can use his in-depth knowledge of the plant to provide NRC with accurate information about the context in which a problem occurred.

5. DISADVANTAGES OF THE RESIDENT INSPECTOR PROGRAM

Implementation of the resident inspector program has not been trouble-free. Some difficulties are unavoidable because they are inherent in the resident inspection concept. Other problems could have been minimized by better planning and a longer period in which to act; these essentially short-term problems are consequences of the transition to the resident inspector program, not of the program itself.

The information on disadvantages is supported by interviews conducted by Teknekron Research, Inc., under NRC Contract No. NRC-05-79-254. (See the Appendix for Teknekron's discussion of interview results.) A recently released GAO report on the resident program, "Placing Resident Inspectors at Nuclear Power Plant Sites: Is It Working?" and several internal NRC audits corroborate many of these points.

5.1 DISADVANTAGES TO NRC

Administrative Problems

NRC Regional Offices have experienced a variety of problems in implementing the resident inspector program. One of these--difficulty in supervising and maintaining contact with inspectors in the field--is unavoidable because it is inherent in the resident inspector concept. In most NRC regions, the resident and his supervisor are in telephone contact almost every workday. These telephone conversations have become the major contact between resident inspectors and the rest of NRC. Regional supervisors find it difficult to visit the sites because their own workload has increased under the resident inspector program.

Logistical difficulties have also arisen. The NRC sends the resident inspector's mail to the nearest post office (often 15 to 25 miles away), and he makes a daily pick-up at the expense of time that could be used in

inspection. More than 15 percent of some resident inspectors' time has been devoted to mail pickup. Some resident inspectors have not received copies of updated licensing documents relating to the site; others receive too much duplicate mail and spend considerable time screening and filing.

Steps are now being taken to solve some of these problems: for example, part-time clerical help is now available in some resident offices, and improved mail delivery together with a more organized approach to assuring full document distribution was recently instituted. Nevertheless, the separation of resident offices, regional offices, and NRC Headquarters may continually breed problems in communications and administrative support.

Manpower Problems

Of more concern is the "manpower drain" that staffing the resident inspector program currently places on the regional inspection program. The senior resident inspectors now onsite and those scheduled to go onsite in the next year come primarily from the ranks of experienced principal inspectors. The rapid staffing of resident positions has, in some cases, depleted the regional staff of "generalist" inspectors, and there is concern that the regional inspection program and the regional capability to respond to incidents will suffer. These experienced principal inspectors are also those next in line for promotion, and placing them onsite directly conflicts with the need to expand the regional supervisory staff in response to the resident inspector program.*

These factors are unavoidable in an inspection program that must be staffed with highly qualified, experienced people. However, they might not have been as serious had the program been staffed more slowly or had the NRC been willing to bring people from NRR into I&E. More measured

* Resident inspectors are not barred from applying for promotion while onsite. Yet many of them have stated that they feel the resident inspector program will be more effective if staffing changes are minimized. Others are not prepared to suffer the costs of another household move so soon.

staffing would have allowed the pool of talent in the Regional Offices to shift more gradually by providing for more regular replacement. But on balance, NRC believes that the benefits of early site assignment of residents inspectors outweigh these short-term manpower problems.

Potential for Loss of Objectivity

The day-to-day exposure that provides the resident inspector with an extra dimension of knowledge about the plant is also the factor that may lead to a major concern of both Congress and the NRC: loss of objectivity. While loss of objectivity is a real concern, the majority of NRC regional and headquarters staff feel that current resident inspectors' objectivity has not been compromised. Regional section and branch chiefs, who supervise and have almost daily telephone contact with the resident inspectors, have as yet found no clear evidence of loss of objectivity, though they are attuned to the conversational hints ("my licensee") that may indicate a problem. The resident inspectors themselves are highly conscious of the appearance of such actions as carpooling with licensee personnel, though avoiding them may cause considerable personal inconvenience.

A few regional and headquarters personnel are less convinced about the resident inspectors' objectivity. Some of them base their position on a feeling that resident inspectors may cite fewer noncompliances than regional inspectors. However, it is not clear if or how numbers of noncompliances might indicate an inspection program's objectivity or effectiveness. Efforts that bring licensees into compliance with regulations might in fact produce fewer noncompliances over time. This issue will be addressed by Teknekron Research, Inc., as part of its evaluation of the Revised Inspection Program.

Potential for loss of objectivity was the major obstacle to establishing the resident inspector program,* and considerable thought has been given

* Similar concerns were expressed by other Federal agencies. See the NRC-contracted study of other agency inspection and enforcement experiences: NUREG/CR-0051 and NUREG/CR-0052, "Evaluation of Inspection and Enforcement Programs of Other Regulatory, Safety, and Professional Organizations."

to the factors that may contribute to such a loss. Frequent contact with the licensee and isolation from NRC are the major factors. NRC has included a variety of program features intended to limit the effect of increased licensee contact. Prospective resident inspectors are selected to minimize this concern; only balanced, mature, and independent inspectors are chosen for site assignments. A resident inspector is not assigned to a site if he was recently employed by the operating utility. The pre-transfer training for prospective resident inspectors warns about loss of objectivity and suggests precautions to be taken. The NRC code of conduct strictly limits relationships of inspectors and licensees, forbidding inspectors to participate in licensee-sponsored social or recreational events and even in licensee carpools. Resident assignments are of limited duration--3 to 5 years at any one site--since loss of objectivity appears more probable in longer assignments.

The most effective way of insuring against loss of objectivity may be to provide a peer with whom the resident inspector can interact. This was consistently recommended by other agencies with a resident inspector program (see NUREG/CR-0051). The expanded resident inspector program now places a minimum of two resident inspectors at each operating reactor site, though the more junior inspector will not be a true peer, particularly, since currently, many junior inspectors have no prior NRC experience, although all have nuclear experience with a utility or the Navy.

Feelings of isolation from the NRC can also result in loss of objectivity. The fairly remote location of many reactor facilities inevitably strengthens feelings of isolation, as does lengthening assignment as a resident or reassignments from one site to another. The resident inspector program is too new for specific examples of isolation to have surfaced, but general solutions have been adopted. NRC regions are beginning to schedule periodic meetings of resident inspectors where site and office issues can be discussed among the residents and with regional management. A Headquarters staff member usually participates in these meetings both as a listener and as a discussion leader. Resident inspectors receive copies of the reports generated daily by each Regional Office. Supervisors maintain frequent telephone contact with their residents.

Assignment of additional resident inspectors to a site should help prevent feelings of isolation. All operating sites manned by the end of fiscal year 1980 are to have a minimum of two residents, and four sites will have three residents. Many site offices will also have part-time clerical assistance. With a complement of three to four NRC employees, feelings of isolation should be sharply reduced.

5.2 DISADVANTAGES TO THE RESIDENT INSPECTORS

Personal Difficulties

Resident inspectors have encountered a number of personal problems, some of which are unavoidable. First, locating a senior resident at a site usually requires moving his family, the sale of one home, and the purchase of another. Even the smoothest relocation always causes some strains, and some disruption cannot be avoided.

High mortgage rates have made home sale and purchase more difficult. Moreover, current government reimbursement policies generally do not cover the full amount of relocation and settlement costs, and many resident inspectors have lost money: the average loss is \$5,000, and a loss as high as \$14,000 has been reported. Residents also complain about the excessive time involved in processing reimbursement paperwork, and some resident inspectors have carried the entire financial burden of relocation longer than necessary.

Since many reactor sites are located in relatively unpopulated areas, it is sometimes difficult to find satisfactory housing nearby. Availability of suitable schools often dictates the choice of housing for families with young children. A number of resident inspectors have been forced to relocate farther from the site than they had been from the Regional Office, and the increased commuting cost is not currently reimbursable.

These problems can be severe: financial penalties in a time of high inflation place a substantial and perhaps unwarranted burden upon these

particular employees. A task force under the Executive Director for Operations is exploring ways to ease these burdens, including legislative action that may be required.

The resident inspectors and their families also face personal and social costs. The inspector's Code of Conduct prohibits certain activities that could lead the casual observer to suspect that a resident inspector was not objective: for example, the resident inspector may not carpool with plant employees, use the bus operated at some sites, or join in licensee-sponsored activities. These requirements also extend to the resident inspector's family. In small communities where the utility may be the major employer, this sharply limits the social contacts and recreational opportunities open to the resident inspector and his family.

There have been a few attacks by local press, officials, and intervenors on the integrity of resident inspectors. In such cases, the resident and his family, as the local NRC "presence," are personally exposed to hurt from which they would otherwise be shielded if they were located at an NRC Regional Office or in NRC headquarters. It is often difficult to respond with appropriate support, and an adequate solution to such situations has yet to be developed.

Job Isolation

Placing resident inspectors onsite full time isolates them from the mainstream of NRC activity, an isolation that has both personal and professional elements. They are removed from the daily contact with other NRC inspectors and their supervisors in the NRC Regional Office; they cannot participate in the informal exchange of information that occurs in any large office. This type of isolation is inherent in the resident concept.

The often-daily telephone call by the regional supervisor somewhat mitigates this isolation, as does the contact with the regional inspectors who visit the sites at least monthly. In some NRC regions, residents spend one or two days a month in the Regional Office, but this limited exposure,

usually for training, is only a small antidote against feelings of isolation. The addition of a second resident inspector will substantially reduce personal isolation, but it cannot counteract the professional isolation inherent in the job.

5.3 DISADVANTAGES TO LICENSEES

As a group, the licensees have experienced fewer problems with the resident inspector program than have NRC and the resident inspectors.

Dollar Costs

Licensees are required by law to provide office space, utilities, and janitorial service for the resident inspectors. Few licensees could readily state dollar costs for the amenities, though the range seems quite large, depending upon the availability of space at the site. In one case, the site administration building was being expanded, and space for the resident inspector could be provided at essentially no additional capital cost. In another case, the licensee purchased a trailer for use by the resident at a cost of \$42,000. NRC provides all office furniture and equipment, telephone, copier, and telecopier service, and part-time clerical help.

Inspection Impacts

Licensees had expected the number of regional inspection visits to decrease with the advent of the resident inspector program, on the premise that the "principal" inspector would now be stationed at the site and only specialist inspections would be conducted by the Regional Office. (Licensee personnel generally accompany region-based inspectors and retrieve documents for them, but the resident inspector does not need these services.) Regional inspection has in fact not diminished, mainly due to the increased number of inspections following the Three Mile Island

accident. Licensees recognize that the level of inspection has been influenced by Three Mile Island, and the impact of the resident inspector program on the amount of regional inspection--and the licensee manpower required to support that regional inspection effort--cannot as yet be evaluated.

6. CONCLUSION

During the last one and one half years, NRC has gained considerable experience in implementing and managing the resident inspector program. NRC recognizes and had anticipated Congress' concerns:

- No single inspector is qualified in all technical areas: region-based inspections supplement the residents' activities, resident inspectors are assigned according to their expertise, and all resident inspectors receive substantial training.
- Loss of objectivity is a valid concern: a variety of program measures help to minimize the potential effects of isolation from NRC and increased contact with the licensee. To date, there is no clear evidence that any inspector has lost objectivity.

The resident inspector program has expanded in scope and is being implemented more rapidly than originally planned:

- The increased staffing goals for the close of fiscal year 1980 are being met: more than 36 percent of the residents are now onsite and inspectors have been selected for more than 60 percent of the remaining resident positions.
- Program goals have been achieved or are being met: average onsite inspection time has more than doubled, direct verification of licensee activities has substantially increased, and an NRC regulatory presence is highly visible.

NRC has found that managing a dispersed inspection force requires close coordination and realistic planning:

- Establishing and manning many separate resident offices has created problems: increased administrative burdens have been placed on both the resident inspectors and regional office staffs, and the regional pool of experienced NRC inspectors has been temporarily diminished.

- Scoping the full range of implementation needs is difficult: rapid expansion of the program demands that currently planned tasks be redefined and that new tasks be added on short notice.
- The resident inspectors are faced with personal difficulties: relocation is an often-heavy financial burden, his social and personal activities may be restricted, and the job requires personal and professional isolation. Legislative proposals may be required.

NRC is addressing these problems and should have several of them resolved within a few months. However, most of these problems appear to be consequences of the transition to a resident inspector program, and we believe they are outweighed by the benefits:

- The type and quality of information gathered by the inspection program has changed: NRC acquires broader, deeper knowledge of a licensee's operation by the resident inspector's direct observation of licensee actions and through the increased time he spends onsite.
- Communication between NRC offices has improved: the resident inspector is a communication link to both the Office of Inspection and Enforcement and the Office of Nuclear Reactor Regulation.
- Licensees respond favorably to the program: they communicate with NRC more readily and effectively through the resident inspector, they believe the resident inspector program provides NRC with a more accurate view of their operation, and the resident inspector does not disrupt licensee activities.
- Public acceptance of the safety of nuclear power may be enhanced: prompt resolution of problems is encouraged and the presence of the resident inspector may reduce public anxiety.

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APPENDIX: PERCEPTIONS OF THE RESIDENT INSPECTOR PROGRAM

Under Contract NRC-05-79-254, NRC asked Teknekron Research, Inc., to interview NRC headquarters and regional staff, resident inspectors, and licensee personnel to determine their perceptions of the resident inspector program. NRC felt that all parties would respond more openly to an independent group than to interviewers more directly affiliated with NRC. The remainder of this section has been structured and authored by Teknekron Research personnel and has not been edited or otherwise modified by the NRC.

A.1 LICENSEES' PERCEPTIONS OF THE RESIDENT INSPECTION PROGRAM

Teknekron Research interviewed 62 utility employees working for six licensees and spoke with approximately equal numbers of people in the corporate offices and at the plant sites. Typically, Teknekron interviewed a senior manager, several middle-level managers, and working level employees at the corporate offices, and the superintendent, shift supervisors, and working-level employees at the plants. Our* questions were designed to elicit the interviewees' perceptions of several aspects of the resident inspection program. First, we* sought to determine their feelings about the NRC inspection program that existed prior to the Revised Inspection Program to provide a baseline against which their feelings about the revised program could be assessed. Second, we sought to determine the interviewees' feelings about the concept of resident inspection, in order to discern which perceptions reflected their understanding of the idea and which reflected their experience with the actual implementation of the program. We also touched on how the licensees interact with the resident inspector, how the program has affected the licensees' communications with the Regional Office, and their

* As stated above, this appendix was prepared by Teknekron Research. Such terms as "our" and "we" refer to Teknekron personnel.

feelings about multiple residents on a site. Third, we sought to determine if the licensees had changed (or expected to change) their operation or management because of the presence of the resident inspector. Fourth, we wanted to determine whether the licensees thought the resident program had changed the public's view of them and of NRC. Last, we asked what the licensees felt about the increased NRC emphasis on direct observation and independent measurement.

Opinion of Previous Inspection Program

Almost all licensee respondents felt the efficiency, quality, and impact of the NRC inspection effort were determined much more by the characteristics of the individual inspectors than by the written specifications of the program. The respondents felt that the inspectors were generally competent, though many licensee personnel stated that inspectors who had field experience, particularly in reactor operations, were more likely to focus on things the licensees felt were useful and realistic. Several of the respondents felt that the accident at Three Mile Island has, for the time being, overshadowed the influence of the regional inspection program. Most felt the frequency of inspections has increased many fold in the last five years and could be reduced without risk; they also felt, however, that the increased inspection frequency resulted from public pressure on the NRC, and that this pressure was not likely to decline. Interestingly, some QA personnel felt the NRC inspections could be more productive if more frequent and less structured. Licensee management was frequently concerned about the manpower required to respond to each NRC inspection. Specifically, many managers felt that following up on each inspection required a great deal of time spent on paperwork, thus diminishing the time the staff could spend on their plant (safety)-related duties. In general, the licensees felt they had to live with the NRC inspection program, regardless of their feelings about it.

Opinion of the Resident Inspection Concept

Most of the interviewees did not overtly distinguish their perceptions of the resident inspection concept from I&E's implementation of that concept. However, their comments reveal how the resident inspection program has affected them and what they think about both the regional and resident inspection programs.

Most of the interviewees felt that the resident position, to a greater degree than a regional inspector position, required keen technical and interpersonal skills. Essentially all felt the quality and impact of the resident inspection program are determined more by the characteristics of the individual inspectors than by the written specifications of the program. Many indicated that if asked a question by an inspector who they feel is personable and focused on "big picture" safety issues, they feel more inclined to offer more information than the question might demand. However, all indicated that their relationship with the resident inspector is or would be professional, respectful, and cooperative.

All respondents felt that a resident inspector has more opportunity than has a regional inspector to get to know their plant, their staff, and their method of operation. The respondents had experienced or expected a number of benefits from the resident inspector's greater knowledge of their operation, and they recognized that NRC also benefitted. The resident can do much of his inspection without a licensee escort and much of his document retrieval without assistance from licensee personnel; he can more quickly understand the technical description of a problem and the circumstances leading to the problem. The resident can pose his questions directly to the person best able to answer them, and he can coordinate regional specialist inspections and focus them directly upon areas warranting NRC scrutiny. The resident can provide NRC a greater understanding of the licensee's operation.

In addition, the licensees felt a resident's greater knowledge of a utility's operation and his presence onsite could enhance licensee/NRC communication. They felt descriptions of plant technical problems are

communicated to NRC (both I&E and NRR) much more effectively in prompt, face-to-face discussions with a resident inspector than in long-distance telephone conversations with a Regional Office, and the resident, in turn, can communicate more effectively than the licensee with other NRC personnel. The licensees also felt that the resident inspector's proximity encouraged prompt resolution of "nickel-and-dime" issues through face-to-face discussions and afforded prompt clarification of technical specifications and regulations.

Although pleased with the prospect of the residents' enhancing communications with NRC, most of the interviewees felt the placing of a resident inspector at their plant offered no more intrinsic reward than would having a policeman in their home living room. Those licensees with no resident or who had had a resident only for a short time were concerned that the resident inspector's presence might make the plant staff nervous. They were concerned that the resident might intrude on "brainstorming" in plant staff meetings or interrupt staff activities. These interviewees also expressed concern that plant management might have to shift priorities from what it considered important to safety to whatever the resident considered important. Licensees that had more experience with a resident inspector appeared less concerned about these possibilities.

Almost all interviewees felt there was not enough "inspectable activity" at their plants to keep more than one resident inspector busy. They felt placing more than one inspector on their sites would waste NRC manpower and would not increase the number of findings of items significant to safety. A few interviewees felt that NRC probably had to increase the number of residents at each site to assure continuity of inspection quality and to handle onsite work administrative .

Changes in Operation or Management with RI on Site

A majority of the interviewees felt the presence of an NRC resident inspector on site would make the plant staff more conscientious about

license requirements, their responsibilities, and safety, simply because it is human nature to be more cautious when being observed. About half of the majority felt added conscientiousness, caution, and attention to detail by the plant staff would enhance the safety of the operating facility, and half felt this would not enhance safety. A few of the interviewees felt added attention to written detail could slow work and discourage free-thinking enough to decrease safety in the operating plant. A large minority (close in number to the majority) of the interviewees felt the plant staff and management are already highly motivated to do their very best. This group felt the presence of a resident inspector would neither increase nor decrease that motivation.

Essentially all of the licensees indicated they consult the resident inspector for clarification of regulatory requirements, much as they did with their principal inspector when he was based in the Regional Office. However, they do not usually consult him for technical input. They felt very strongly that responsibility for running the plant safely rests solely with the licensee. Thus, though they might ask a resident how other utilities solved a particular problem, they did not ask the inspector to decide what solution they should implement.

Licensee Opinion on the Public's View of the Licensee and NRC

Most of the licensees interviewed felt that the public knows little about the resident inspection program. They felt that the public probably would feel safer with an NRC man onsite, if the public knew more about the resident program. The licensees felt such a sense of comfort might be misplaced, because they feel safety is influenced more by utility management attitude than by the presence of NRC. Some were concerned the public might feel their plant was a poorer performer because "NRC thought it necessary to put an inspector there all the time."

Most licensees felt the general public, if informed about the resident program, would think more positively of the NRC for instituting the

program. All the licensees interviewed felt the resident inspection program was less significant than the Three Mile Island accident in influencing the public view of nuclear utilities and the NRC.

Direct Observation

The licensees generally felt neutral about NRC increasing its direct observation of their activities, if it would not interfere with their personnel and normal operations. Although licensees did not welcome greater NRC inspection, they consistently indicated that, if they wanted to know how well (i.e., "safe") a plant was run, they would rely more on observation of licensee activities than on records review. Some interviewees were quite negative about the prospect of greater NRC observation and verification, fearing it would inevitably disrupt normal plant operation and require additional reporting.

Summary of Licensee Perceptions

The licensees' perceptions of the resident inspector program reflect their fundamental feeling that the quality of any inspection program depends more on the quality of the inspectors than on the written specifications of the program. In general, they see enhanced communication with NRC and the residents' greater knowledge of the facility as advantages to both themselves and to NRC.

While a majority of the licensees felt that the presence of the resident inspector made their staff more conscientious about requirements, feelings were mixed about the effect of this conscientiousness on safety. Licensees whose residents had been onsite for a substantial period did not feel this presence hampered or intruded upon their normal activities.

A.2 NRC PERCEPTIONS OF THE RESIDENT INSPECTOR PROGRAM

We interviewed 25 staff members in the five NRC regional offices and eight people in headquarters. In addition, we spoke with eight resident inspectors; their perceptions are discussed separately. In each of the regional offices, we talked with the Director, the Chief of the Reactor Operations and Nuclear Support Branch, and usually, the latter's section chiefs, plus other inspection personnel. In headquarters we spoke with division directors and middle level managers. We discussed each person's feelings about the inspection program that existed prior to the Revised Inspection Program and about the resident inspection concept. They were also asked what effects the resident inspectors have had on the licensees, on the regional office, and on NRC communications with the licensees and with the public. We also asked what they felt was an appropriate tour of duty for a resident inspector, what problems the residents had faced, and what the residents' feelings were about their positions. Last, the staff was asked what benefits and problems greater direct observation and the unit resident concept pose. The responses to these questions are discussed below.

Opinion of Previous Inspection Program

Most of the interviewees felt the previous inspection program adequately assured licensee compliance with regulatory requirements. Usually, they described the past inspection program as less structured and less confining for the inspectors. Some felt the past program did not probe as deeply as the revised program but did assure licensee compliance in areas each inspector considered important to safety. Most also felt that a less defined program was feasible in the past because most inspectors had many years of reactor operations experience but that such a program would be less reliable when the average experience level of the inspection force is lower. The development of the modular inspection program* was seen by most

* Written specification of the inspectors' activities.

to be necessary because of the rapid increase in the number of inspectors and the increased difficulty in finding senior, operationally experienced inspector recruits. Most people felt that the written specification of inspector practice did not necessarily result in a "better" inspection program, although it did create a more standardized program.

Opinion of the Resident Inspection Concept

Most of the regional interviewees did not distinguish their perceptions of the RI concept from I&E's implementation of that concept. Nonetheless, it was possible to discern in their answers what benefits and problems they feel the resident inspection program and its implementation pose. Some of the headquarters personnel clearly separated their thoughts of the concept from those on the implementation, and this separation is practically the only factor that distinguishes regional from headquarters responses. More than half of the headquarters personnel did not favor the concept at the time of the trial program but generally became convinced that more inspection time would probably result, and that the clearly increased onsite time could provide knowledge about the licensee that was not obtainable through region-based inspection.

Indeed, most regional and headquarters respondents felt that the resident inspector position provides an unprecedented opportunity for the agency to learn more about the licensees' operations than it could learn under the region-based program. They felt that, through the resident, NRC learns more about the quality and nature of day-to-day plant operations, the attitudes and capabilities of plant management and staff, and the technical subtleties of the particular nuclear plant. They felt the resident could spend more time than region-based inspectors observing licensee activities, rather than reviewing records. Also, they felt that, through the resident, NRC knows more about the circumstances leading up to any problems occurring in the plant. Most felt that this combination of additional knowledge enhances NRC's understanding of the plant condition

(i.e., "safety") at all times and NRC's adeptness in responding to abnormal incidents at the plants with residents. The regional personnel often reported they found they could use their regional inspection force more efficiently by following up on licensee weaknesses indicated by the resident inspectors. Some regional supervisors also felt they could manage more effectively by asking the residents' observations on interactions between regional inspectors and licensee personnel. Most regional and some headquarters personnel also felt the resident position offered NRC the opportunity to develop greater rapport with the licensees, to improve the licensees' understanding of regulatory requirements, and, by developing a greater influence on management attitudes, to enhance the public health and safety.

In addition to the several benefits discussed above, headquarters and regional staff also felt the resident inspection program poses a number of problems for NRC. Foremost in the minds of most interviewees was the concern about maintaining inspector objectivity in the resident position. Some of the interviewees felt a loss of objectivity was probably unavoidable because the residents would be "isolated from NRC peer support (of the firm regulatory philosophy under which they live)," and the residents would be immersed in a "hostile, anti-NRC, pro-nuclear" atmosphere. A very few people felt that many resident inspectors had already lost objectivity, based on their personal perception that resident inspectors filed fewer noncompliances than regional inspectors. Some interviewees felt the selection of mature, experienced inspectors and close regional supervision eliminated their concerns about potential loss of objectivity. Others felt there was no potential for loss of objectivity, because there are no incentives for the residents to be less objective than regional inspectors. In addition, they felt that the breadth and diversity of the inspection program requires a comparable breadth and diversity of inspectors, which minimizes the influence of one inspector on NRC's assessment of licensee compliance and plant safety. Many of the interviewees felt the resident position requires additional interpersonal skills for the inspector to be firm without antagonizing the licensee and

breaching confidences established with licensee personnel. Several regional supervisors were concerned that an inspector placed in a resident position is less available to contribute to the regional talent pool to handle problems that arise at other plants.

The staff also described several problems that they felt resulted from the accelerated implementation of the resident program. Specifically, the regional staff reported that a variety of administrative problems have appeared, because moving the resident inspectors out of the regional office did not remove the administrative workload associated with this addition to the inspection program. Regional administrative personnel wanted clearer guidance on their responsibilities toward the residents. Regional supervisors felt challenged to modify their managerial methods to cope with the new problem of supervising an inspector with whom they communicate primarily by telephone. Both headquarters and regional staff were concerned that a rapid staffing of resident positions would require NRC to be less selective in its hiring of new inspectors. A few headquarters people focussed on high-quality staffing, of both the accelerated and the "original" resident inspector program, as the major problem the program faces.

Changes in Licensee Operation or Management with RI on Site

Most of the regional staff felt licensees were more cautious, more conscientious, and more aware of regulatory requirements with NRC's presence onsite. One staff member felt the licensee personnel conducted themselves more professionally and with greater discipline with a resident inspector onsite. Another staff member felt the licensee's awareness of NRC regulations was enhanced by the continual presence of an NRC "interpreter" onsite. Some felt the resident inspector program was no more effective in assuring licensee awareness of NRC regulatory requirements than the regional inspection program. They felt the licensees had not changed since getting resident inspectors.

Changes in the Operation or Management of the Regional Office

Most of the interviewees felt they could not separate the effects of the post-Three Mile Island workload from the effects of the resident inspector program on the regional office. Many felt there had probably been no changes in their operation or management. Most felt the relationship an inspector had with his peers and his supervisors did not change much after he assumed a resident position. The section chiefs reported they now spend much of their time assisting the resident inspector instead of managing. Some regions indicated they hope to alleviate this problem by designating "resident coordinators" in the regional office to perform services that the residents require and cannot accomplish via telephone, services which the section chiefs now provide.

Most of the interviewees felt the residents' proposed length of service at one site (3 years) was about the optimum. Most felt a shorter stay at one site (i.e., moving more frequently) would unfairly disrupt the lives of the residents' families and not give the residents time to learn their assigned plant well and to use their knowledge of the plant effectively. They also felt a longer stay on one site would make it more difficult to assure inspector objectivity and freshness.

Communications with the Licensees and the Public

Almost all felt NRC's public image has been improved by placing resident inspectors onsite. Most also felt NRC's communications with the public had improved but were largely influenced by NRC's communications with the local press, which some regions still handle exclusively through the regional Public Affairs Officer. The regional personnel indicated most licensees and NRC staff treat the resident as the principal inspector. Hence, all communications between the licensee and NRC go through him, as they used to go through the principal inspector based in the regional office.

Resident Inspector Problems

Regional personnel indicated some resident inspectors feel lonely, because they no longer have informal contact with peers and are isolated from the mainstream of regional regulatory activities. Regional interviewees reported the residents usually lost money in moving to their sites for several reasons, such as 1) the government's reimbursing less than the total cost of moving, 2) moving to an area with a higher cost of living, and 3) longer commuting distance and commensurately higher commuting costs. Interviewees indicated residents often took their positions in the belief it would increase their promotional prospects and give them greater independence on the job. Some interviewees stated the residents now feel their prospects for promotion are not as bright as promised. The regional interviewees said the residents welcomed not having to travel as much as regional inspectors but were often forced to avoid social contact with their neighbors, who usually work for the licensees.

Independent Verification and Additional Residents

Many of the regional staff consider direct observation to be a large part of the present, region-based inspection program. Some felt an independent measurement program could be very expensive and could lead to NRC's becoming the nuclear industry's acceptance testing laboratory. Some personnel were concerned that a greater direct observation/independent measurement program could interfere with licensee personnel in their normal execution of duties and hence the safe operation of the plants. Many felt a greater emphasis on direct observation/independent measurement would give NRC greater knowledge of licensee operations and greater credibility with the public. They also felt independent verification offers the benefit of prompt ("real-time") rather than ex post facto correction of deficiencies.

As noted previously, the staff is concerned that staffing resident inspector positions will require NRC to be less selective in its hiring of new inspectors. The regional staff feels that placing additional residents at each site will exacerbate this potential problem. Some of the regional supervisors noted that Unit Inspectors were to be hired "directly to the sites." They felt it is easier to select inspectors most appropriate for each plant/licensee combination if they have worked with the inspectors long enough to know them well.

Resident Inspector Perceptions of the Resident Inspection Program

Eight residents in four NRC regions were interviewed. Their perceptions of resident inspection parallel the regional staff perceptions of the program. They felt their day-to-day contact with plant staff and management gives them much greater opportunity to observe licensee performance, attitudes, and capabilities. The residents felt this allowed NRC to better understand the events and factors affecting nuclear plant safety. Most residents felt the licensees had become more conscientious about safety and more aware of regulatory requirements because of the resident inspection program. Some residents felt the licensee staff found the presence of the resident useful in persuading management to update older plant features or less effective plant practices. Congruent with NRC's philosophy that the licensees bear primary responsibility for plant safety, most resident inspectors felt their principal duty was not to intercede in the licensees' decision-making, but to assure licensee compliance with the NRC regulations. The residents felt their optimum length-of-service at one site would be between three and five years, for the same reasons cited by the regional staff. They usually felt communication with the public and the licensee had improved with placement of resident inspectors. The resident inspectors mentioned a number of problems, such as moving costs, less than promised prospects for promotion, isolation from regional peers and activities, lack of clerical help, and lack of promised government cars. The residents generally

favored greater direct observation as a way to evaluate licensee performance. They felt a second resident could facilitate greater direct observation and alleviate some of their administrative burden, once he was trained. They generally felt that, on the whole, resident inspection was a good concept, but as implemented thus far, the program has taken more than it has given them.