INITIAL REPORT ON CHALLENGES, LESSONS LEARNED AND BEST PRACTICES FROM
THE 2020 COVID-19 PUBLIC HEALTH EMERGENCY

FOCUS ON REGULATORY OVERSIGHT OF OPERATING NUCLEAR REACTORS

Prepared by the U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
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EXECUTIVE SUMMARY

Despite numerous challenges presented to the Nuclear Regulatory Commission (NRC) as a result of the Coronavirus Disease 2019 (COVID-19) public health emergency (PHE), the regional offices and the NRC Offices of Nuclear Reactor Regulation (NRR) and Nuclear Security and Incident Response (NSIR) successfully implemented newly developed guidance to accomplish on-site and remote oversight activities.

The NRC staff continued to complete the baseline inspection program and initial operator licensing exams, while taking precautions recommended by the Centers for Disease Control and Prevention (CDC) to minimize exposure to COVID-19. Nationwide, the staff completed more than the minimum number of baseline inspection samples for 2020. Furthermore in 2020, nearly 150,000 direct baseline inspection hours were collectively completed for all operating nuclear plants in the U.S., with a 2-unit site averaging about 2,700 hours. A few inspection procedures, such as aspects of the refueling outage inspection and certain team inspections, were not able to be performed due to the COVID-19 restrictions and were deferred or rescheduled for a later time. Reasonable assurance of safe plant operation was achieved from on-site resident inspector presence and monitoring of plant activities in accordance with inspection manual chapter (IMC) 2515, Appendix D, "Plant Status," as well as inspectors' discussions with plant personnel, their review of plant records, the observance of overall plant performance that includes findings, performance indicators, events and equipment performance, and satisfactory completion of samples that were performed.

A 17-member team was established to identify lessons learned and best practices and to make recommendations to improve NRC readiness for future emergencies and non-emergency conditions. The team concluded that the NRC's continued oversight of nuclear power reactors during the pandemic was appropriate considering the circumstances and reflected NRC staff and management's ability to adapt to the challenges the pandemic presented. NRC inspectors, staff and management learned a great deal in a very short time, and while the pandemic continues, these lessons learned and best practices should prove highly beneficial for future emergencies that limit or prevent access to nuclear plant sites.

The team developed recommendations that can be used to: help improve implementation of the Reactor Oversight Process (ROP) during the continuing COVID-19 PHE; ensure the inspection program is adequately prepared for future emergencies; and identify those processes and actions taken during the COVID-19 PHE that can be used during normal operations to enable the NRC to become a more modern, risk-informed regulator.

The team's recommendations focus on three key areas: 1) information technology (IT) capability and reliability, 2) remote inspection practices, and 3) inspection guidance enhancements. The areas and associated recommendations are listed below. Those that the team recommends be completed in the near term (i.e., within the next six months) are noted with an asterisk (*).

IT Capability and Reliability
- Formalize agreements with facility licensees to ensure inspectors will have continued access to plant information and other information that is controlled by the licensee and that is required for the NRC to perform oversight activities. (Recommendation 1a*)
- Provide a second computer monitor to staff for home use. (Recommendation 1b*)
- Continue to educate staff and licensees about the capabilities and benefits of available IT tools. (Recommendation 1c*)

- Action be taken to improve remote access to Safeguards Information for security inspectors and designated HQ staff who support these inspection activities. (Recommendation 1d)

Remote Inspection Practices
- Expand use of remote work practices for resident inspectors. (Recommendation 2a)
- Evaluate the current team inspection framework to determine if changes should be made to improve efficiency and effectiveness. (Recommendation 2b)

Inspection Guidance Enhancements
- Consider revisions to inspection procedures or guidance to indicate activities and inspection requirements can be performed either fully remotely, partially remotely, or onsite. (Recommendation 3a*)
- Revise ROP program documents to include best practices and guidance developed since the COVID-19 PHE began. (Recommendation 3b)

This report also identifies best practices that NRC staff may find useful as the COVID-19 PHE continues and for responding effectively to future emergencies.

1.0 Purpose

This report documents the results of an effort to identify lessons learned and best practices associated with oversight of operating reactors, operator licensing, and power reactor vendors during the Coronavirus Disease 2019 (COVID-19) public health emergency (PHE) that can be used to (1) help improve the implementation of the Reactor Oversight Process (ROP) during the continuing COVID-19 PHE; (2) ensure the oversight program is adequately prepared for future emergencies; and (3) identify those processes and actions taken during the COVID-19 PHE that can potentially be used during normal oversight conditions.[1]

Note that during the review of this report by various internal stakeholders, there were differing perspectives provided. These perspectives are provided as footnotes throughout the report.

2.0 Background

The U.S. Nuclear Regulatory Commission (NRC) employs the ROP to assess the performance of licensees and their associated nuclear facilities. This is mainly accomplished using resident inspectors, region-based inspectors, and NRC headquarters inspectors. The inspectors routinely perform onsite inspections within the Baseline Inspection Program of the ROP.

On January 31, 2020, the U.S. Department of Health and Human Services declared a PHE for the United States to aid the nation's healthcare community in responding to COVID-19. On March 11, 2020, the COVID-19 outbreak was characterized as a pandemic by the World Health Organization. On March 20, 2020, the NRC required mandatory telework for all non-mission-critical functions.

Resident inspectors continued to perform their duties with a reduced on-site presence. Other regional and headquarters-based inspectors performed inspections remotely and on-site as on-site and local area COVID-19 conditions permitted. Because COVID-19 PHE considerations caused a closer look at limiting on-site inspector presence, NRR, the NRC's ROP program office, in conjunction with the regional offices developed guidance to protect the health of inspectors and site personnel while maintaining oversight that supported reasonable assurance of adequate protection of public health and safety. Initial inspector guidance was issued in a memorandum dated March 19, 2020, and later modified on April 6, 2020, "Resident Office Site Coverage and Baseline Inspection During Maximum Teleworking for COVID-19" (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20097E538). This guidance highlighted that each operating reactor site should be visited by a resident inspector approximately once every three business days. Regional administrators had the flexibility to balance local health conditions against individual plant risk to determine the appropriate on-site presence of inspectors. Based on the guidance provided, the resident inspectors continued to perform their duties with a reduced on-site presence - not on-site every workday as is typical. IMC 2515, Appendix E, "Inspection Program Modifications during Pandemics, Epidemics, or Other Widespread Illness or Diseases" (ADAMS Accession No. ML20079E700), was also

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[1] A perspective was provided that the working group should focus on evaluating lessons learned from oversight coping mechanisms during a public health emergency, not how the ROP should be reformed for "normal" application.

updated on March 27, 2020. This manual chapter gives guidance for using a graded approach to meet the objectives of the reactor oversight process during pandemics, such as the COVID-19 PHE.

During the time from when mandatory telework began in March 2020, resident inspectors monitored plant status and performed certain inspection activities remotely for those procedures that did not require on-site observations to meet the inspection procedure requirement(s). This was the first-time resident inspectors conducted a significant portion of inspections remotely. Region based on-site inspections were performed on a limited basis and many were either postponed or portions that could be performed were completed remotely.

In April, initial reactor operator licensing exams, being critical activities to ensure a pipeline of qualified operators is maintained, were restarted activities to support licensee exams with the proper PPE while implementing social distancing to the extent possible. Considerations for conducting operator license exams, while taking into account the COVID-19 prevention guidance provided by the CDC, was provided on an internal SharePoint site to all NRC examiners. This guidance is publicly available (ADAMS Accession No. ML20323A243).

NRR began an effort in April 2020 to research all aspects of the ROP to determine if modifications were necessary to complete the ROP in 2020 while staff were in a mandatory telework status. The result of this effort was documented in a May 28, 2020, memo titled "Inspection Guidance During Transition from COVID-19 Mandatory Telework" (ADAMS Accession No. ML20141L766). The review determined that while very few modifications were required to the ROP itself, regional and headquarters managers should balance key considerations of inspector and licensee health with the need for adequate oversight of risk significant activities occurring onsite. NRR established the goal for calendar year 2020 ROP to be completed with at least the minimum inspection samples for the baseline inspection program for each site. Included in the memo was guidance for increasing on-site inspection activities due to lifting the NRC's mandatory telework status. Based on the guidance provided, the regional offices began to perform more team and individual on-site inspections and increased resident inspector on-site presence and inspection activities. The memo also encouraged inspectors to leverage existing technology to perform administrative aspects of the ROP remotely versus doing them at a licensee's facility. Additionally, an internal NRC SharePoint site, "Pandemic Inspection Guidance and Resources," was developed to provide quick access to guidance documents and dashboards and a means for inspectors to submit questions related to inspection program impacts.

The COVID-19 PHE also presented a challenge to the health and safety of NRC inspectors and examiners during the performance of their official duties at sites. It was necessary to identify methods to mitigate the COVID-19 infection risks posed to NRC employees during travel to and from inspections and examinations. Licensees implemented a wide array of COVID-19 precautionary measures and protocols (e.g., minimally invasive access screening procedures, medical and travel related questionnaires, proactive testing of asymptomatic persons, use of specific personal protective equipment). It was also necessary to establish travel-related self-isolation contingency plans for situations where one or more NRC employees developed COVID-19 symptoms or was diagnosed with COVID-19 while on travel, and to assess the applicability of travel advisories to NRC staff during the conduct of their official duties.

3.0 Scope and Methodology

A 17-member team led by NRR's Division of Reactor Oversight (DRO) was established with NRR, NSIR, and regional representatives to identify lessons learned and best practices associated with implementing the ROP during the COVID-19 PHE between March and July 2020. The team members are listed in Attachment 1 to this report. The team developed a 24-question general survey that was sent to all staff, supervisors, and managers involved in direct inspection and other activities that support the ROP. The team received 248 responses, which was about a 40 percent response rate.[2] The survey questions are provided in Attachment 2 to this report. Most of the information presented in this report is based on the responses received from this general survey.[3]

The team also used input from two additional sources: (1) the results of an IT-focused 11-question survey that was sent to all senior resident inspectors and (2) specific recommendations received from regional counsels related to inspector-related travel issues. Additionally, the team interviewed all the involved NRC Office Directors and Regional Administrators and their deputies. The interview questions are provided in Attachment 3 of this report. Key messages from the Office Directors and Regional Administrators identified during the interviews are presented in Attachment 4 of this report.

4.0 Lessons Learned & Best Practices

Despite challenges presented to the NRC as a result of the COVID-19 PHE, the regions, NRR and NSIR successfully implemented newly developed guidance to accomplish on-site and remote activities.

The staff continued to complete the baseline inspection program and initial operator licensing exams, while taking precautions recommended by the CDC to minimize exposure to COVID-19. Nationwide, the staff completed more than the minimum number of baseline inspection samples for 2020.[4] Furthermore nearly 150,000 direct baseline inspection hours had collectively been completed for all operating nuclear plants in the U.S., with a 2-unit site averaging about 2,700 hours. Certain inspection procedures, such as aspects of the refueling outage inspection and certain team inspections, were not able to be performed due to the COVID-19 restrictions.

The team developed recommendations based on the information provided in this section that can be used to:

- Improve implementation of the ROP during the continuing COVID-19 PHE
- Ensure the oversight program is adequately prepared for future emergencies

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[2] A perspective was provided that this report relies too heavily on data from the general survey administered to staff, with a relatively low response rate, which is understandable given the changing workload and increased demands of personal issues during the early response to the pandemic. This needs to be clearly stated so the conclusions of the report are not unduly extrapolated to other initiatives.

[3] A perspective was provided was that this report is too focused on survey results, and that other perspectives should have been included.

[4] The nationwide minimum number of inspection samples completed was 12,593 which is 110 percent above the required samples. The inspectors completed 89 percent of the nominal number of inspection samples.

- Identify processes and actions taken during the COVID-19 PHE that can be used during normal operations to enable the NRC to become a more modern, risk-informed regulator.

Regarding the survey results, approximately 74 percent of survey respondents expressed a desire for a reassessment of how the NRC inspects during situations with limited on-site access and during normal conditions while 47 percent of survey respondents indicated they are only in favor of doing so for targeted aspects of the existing program. The survey asked respondents to pick the top three inspection program areas where there should be priority going forward to prepare for future pandemics and/or normal conditions. Survey respondents selected IT capabilities (for both the NRC and licensees) as the number one area NRC should focus on, inspection requirements as the second, and remote inspection as the third, which was followed closely by inspector on-site presence.

Having better access to licensee data and systems via IT capabilities allows NRC to further identify and define how much on-site presence is necessary for the verification of inspection requirements as well as provide the ability to better perform remote inspections. Without sufficient IT capability, inspector on-site presence would need to be increased, or the amount of inspection activities that can be done remotely would be limited, which would limit the NRC's ability to perform effective oversight in circumstances where site access is restricted.

Based on the information from the survey, interviews, and review of regional performance, the team identified a set of recommendations in the following key areas: IT capabilities and reliability (Section 4.1); remote inspection practices (Section 4.2); and inspection guidance enhancements (Section 4.3). Section 4.4 of this report contains a summarized list of best practices identified by the team. Section 4.5 discusses one observation related to satisfaction with personal protective equipment (PPE). Section 4.6 provides several recommendations that may be implemented in about six months or less thus improving NRC oversight while the pandemic continues into 2021.

4.1 IT Capabilities and Reliability[5]

The team noted that survey respondents selected IT capabilities as the number one area NRC should focus on in the coming years. The team believed this was appropriate based on what was learned during the PHE. The four recommendations below are intended to improve the inspectors' ability to perform greater portions of its oversight activities remotely more effectively and efficiently.

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[5] A perspective was provided that the IT recommendations should be bolstered to include a standing sub-group created within the current constructs of the NRR/Nuclear Energy Institute (NEI) ROP working group. The sub-group would focus on IT solutions and include NEI, NRR, and NRC's Chief Information Office. This is an area that will evolve, and the NRC would benefit greatly from standard or uniform solutions, to the extent practicable.

Recommendation 1a: To the extent possible, establish agreements with facility licensees to ensure inspectors will have continued access to plant information and other information that is controlled by the licensee and that is required for the NRC to perform oversight activities.

While it is vital for the NRC resident inspectors to have a physical presence on-site, the PHE demonstrated that it is also important to be able to access site information remotely, particularly when physical presence is not possible. [6] According to the specific IT focused survey sent to the senior resident inspectors, all resident sites (59) currently have remote access to the licensee's programs and applications through either licensee provided equipment (57 percent), NRC-provided equipment (15 percent), or personal devices (28 percent). In some cases, residents had laptops provided by the licensee before the pandemic. In other cases, licensees issued resident inspector laptops with access to plant information during the pandemic.

Based on feedback received, a majority felt that the use and access to licensee-provided plant equipment/information was effective and allowed them to continue to perform their oversight functions with a reduced on-site presence during the COVID-19 PHE. See Figure 1 below for a summary of the responses received from the survey for additional information.

Figure 1: Effectiveness of Access to Licensee Provided Equipment

No basis 11%

Neither effective nor ineffective 3%

Effective 52%
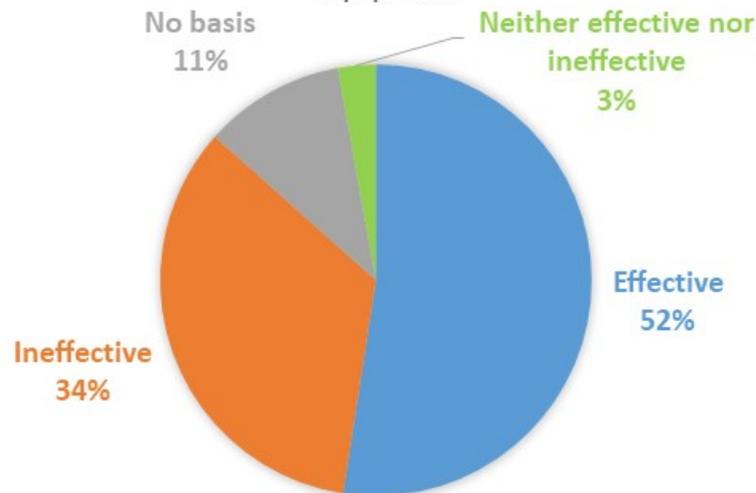
Ineffective 34%

Based on a review of comments provided by the survey respondents, the team found that the reason for selection of "ineffective" to this question was in part due to the need to provide a more permanent and consistent solution to obtain and maintain remote access to licensee plant information, plant systems, and data. Some commenters noted that other situations where access to the site may be restricted could arise and having the ability to access plant information in real-time would help ensure the NRC can perform effective oversight in any situation where site access may be limited.

Although the resident inspectors' IT needs have been addressed for the short term, the team recommends that the agreements with licensees should be updated to include remote access to

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[6] A perspective was provided that region-based inspectors should also have remote access to plant information.

site processes. These agreements are not regulatory requirements, and discussions are needed with licensees to ensure the interests of all parties are met. This will need to be addressed to allow residents to either get access or to continue to have access to licensee networks remotely when not on-site.   The agreements should also provide for remote access for regional inspectors.

Other comments provided by the survey respondents identified the need to continue to improve and modernize IT infrastructure (including bandwidth) and efficient and compatible software (e.g., ShareFile, Dropbox, Certrec) that staff can use to communicate with external stakeholders (particularly video conferencing); these are discussed in more detail in Recommendation 1c below.

Recommendation 1b: Provide a second monitor to staff for home use.

The team noted that a moderate amount of responses to Question 1 about top challenges working remotely and some responses to Question 2 about lessons learned were related to the staff's inability to print documents. Some of the comments indicated that the issue could be resolved if the individuals had a second large computer monitor at their remote work location, which would help them to view multiple detailed documents at the same time (during document review focused inspections, such as engineering inspections). The NRC made available one large desktop monitor for each staff to use while working remotely from home, which was very helpful. The team realizes that the laptop monitor is a second monitor when working from home; however, it is much smaller compared to the large desktop monitor, and it is therefore more difficult to use it for reviewing detailed documents during certain inspection activities.

Recommendation 1c: Continue to educate staff and licensees about the capabilities and benefits of available IT tools.

The team observed that some of the comments to survey Question 1 about top challenges and to Question 6 about access to licensee-provided plant information and equipment were related to NRC inspectors being challenged to adapt to the several different forms of video communications used by the licensees (e.g., Skype, Microsoft (MS) Teams, WebEx) and having difficulty using those tools with the licensees. As a result, inspectors spent additional time finding IT tools that would work with the licensee's and the NRC's IT networks. Since the survey was issued, the NRC began using MS Teams, which may improve this situation.

The team also noted that some of the responses to Questions 1 and 6 were related to difficulties sharing large files, such as video recordings of plant system walkdowns. Some commenters noted licensees tried to use eDocs, which did not work, or tried to share files using a CD, which created another issue for the inspectors because the NRC's laptops do not have CD drives. BOX-EFSS is a tool available to NRC staff and facility licensees for transferring large files; however, survey comments indicated that regional inspectors, residents, and facility licensees may not have known that it was an option. Fourteen percent of the responses to Question 3 about best practices focused on the increased use of tools such as Box, Certrec, WebEx, and Skype, and how even though everyone was physically isolated, there was generally better communication due to sharing screens, video calls, and the increased call quality compared to normal teleconference calls.

The team concluded that the pandemic demonstrated that the NRC staff were not making full use of the IT tools that were available before the COVID-19 PHE and that some staff were not

aware of the tools that could have helped them perform their oversight activities remotely during the pandemic.   Therefore, NRC management should further promote and encourage the widespread adoption of IT tools for inspectors. In addition, NRC should ensure that facility licensees are aware of the tools that can be used for communicating remotely with NRC staff (e.g., plant staff know to use MS Teams to contact the resident and Box to share large files).

Recommendation 1d: Action be taken to improve remote access to Safeguards Information for security inspectors and designated HQ staff who support these activities.

Twenty-nine percent of respondents reported a desire for remote access to Safeguards Information[7] during a pandemic situation as shown in Figure 2, with a total of 85 percent wanting remote access among security specialists and inspectors that responded to the survey as shown in Figure 3.

Figure 2: Total respondents wanting Remote access to Safeguards Information

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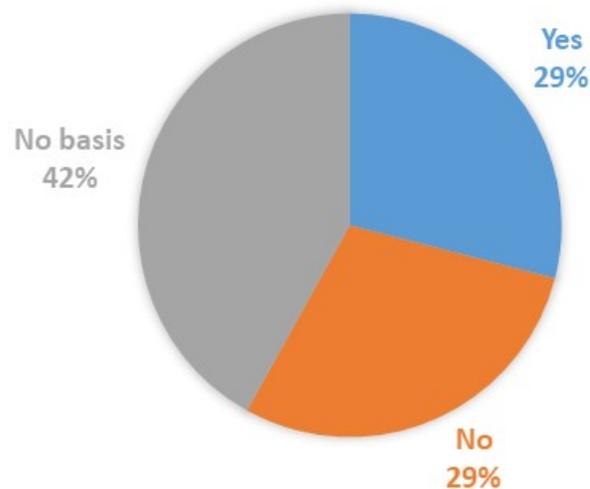
[7] Safeguards Information is a special category of unclassified sensitive information that must be protected. Safeguards Information concerns the physical protection of operating power reactors, spent fuel shipments, strategic special nuclear material, or other radioactive material.

Figure 3: Respondents with security-related positions
wanting remote safeguards access
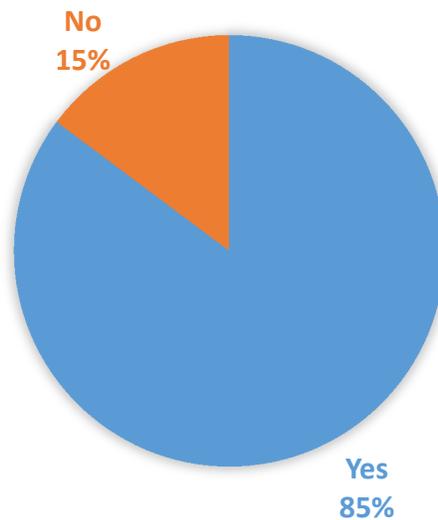
In the survey, many security inspectors indicated they experienced significant challenges during the PHE while trying to perform inspection activities during mandatory telework due to not being able to access Safeguards Information remotely. Therefore, the team recommends an action be taken to improve remote access to Safeguards Information to NRC staff responsible for performing security inspections and designated HQ staff who support these activities.

4.2 Remote Inspection Practices[8]

There seems to be universal agreement that the job of a resident inspector can never be fully performed remotely and that performing certain inspections remotely is not as effective as performing them on-site. This is mostly driven by (1) inspections that require the inspector to be in person to perform, (2) licensee staff having access to the inspector to discuss issues in a private setting, and (3) the general overall benefit of having an inspector on-site. However, the survey results also indicated that most resident inspectors believe they could perform certain aspects of their job remotely on a more routine/fixed basis. Many felt that it would be feasible to work a minimum of eight hours a week remotely without a reduction in effectiveness and efficiency during normal conditions. Additionally, the survey responses also indicate that changes to the pre-pandemic methods of performing team inspections could improve efficiency and effectiveness of future team inspections.

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[8] A perspective was provided that the phrase "remote inspection" causes some concern among some staff and management, as it could be read to mean remote completion of all inspection procedure requirements without any on-site inspection. It was suggested to rephrase remote inspection or oversight to "hybrid" as onsite inspection remains an important part of NRC oversight.
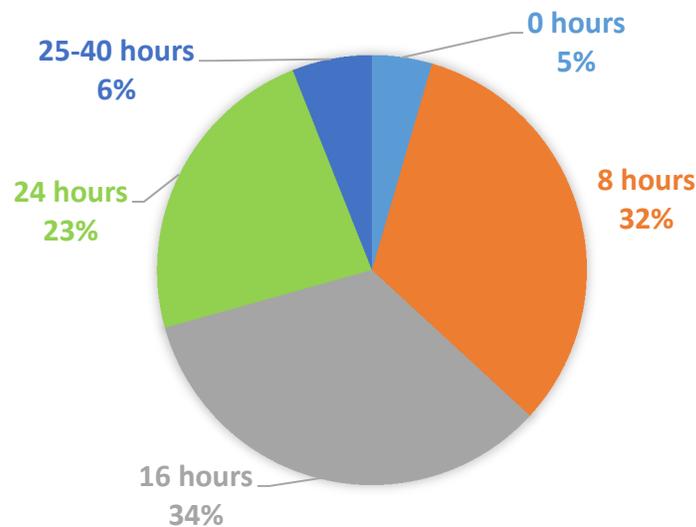
Recommendation 2a: Expand use of remote work practices for resident inspectors.[9]

For Question 1, 32 percent of the responses from resident inspectors identified the inability to go onsite as the biggest challenge faced during the pandemic. However, in response to Question 2, 29 percent of resident inspectors reported that their top lesson learned during this period was that they are just as or more efficient at completing certain tasks remotely (i.e., away from the site) that they would otherwise perform in the resident office.

The majority of the responses to Question 2 from resident inspectors (41 percent) were related to positive comments about remote work. For example, some of these respondents reported they could more easily get paperwork and inspection planning done when teleworking and spend more of their time when at the plant in the field versus in their office completing paperwork. Additionally, those inspectors who had teleworked previously were able to more easily transition to meet the new challenges brought on by the pandemic, while those that did not have that experience commented that the transition was challenging.

The survey also provided insights as to what respondents consider to be the appropriate amount of telework for resident inspectors. As shown in Figure 4, responses to Question 14 showed that 95 percent of all respondents (excluding respondents that selected "No Basis") reported that a resident inspector could routinely telework eight or more hours a week and remain effective at implementing the ROP.[10] As shown in Figure 5, a total of 98 percent of resident inspectors responded that a resident inspector could routinely telework eight or more hours each week.

Figure 4:   Resident Inspector Telework - All Responses
(excluding "no basis" responses)

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[9] A perspective was provided that this recommendation should not be to expand but rather to evaluate the use of remote work practices for resident inspectors.
[10] A perspective was provided that the group should have focused on which inspection activities could be performed remotely versus asking the number of specific hours that could be performed teleworking.

Figure 5: Resident Inspector Telework - Resident
Inspector Responses
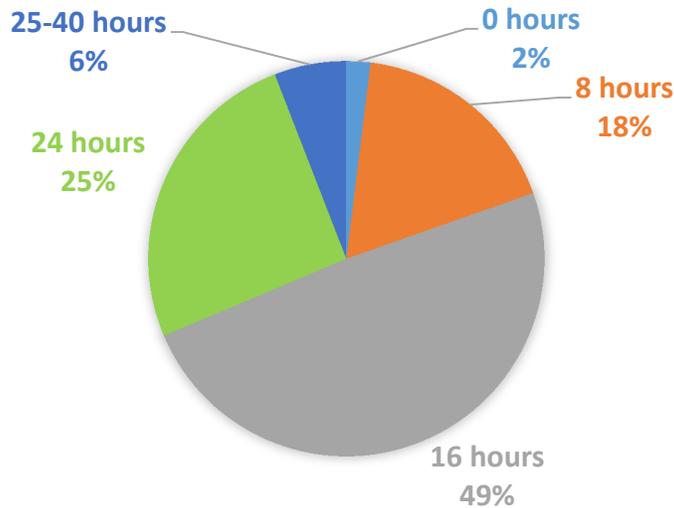
To further understand these responses, the team reviewed the comments associated with telework and contacted four resident inspectors who had provided their contact information in the survey. All the resident inspectors contacted expressed that in order to effectively do their job they believed that "reasonable" site presence was needed. Resident inspectors also expressed that operations under the COVID-19 PHE to date appear to have demonstrated that they could perform some level of remote work without a reduction in their effective implementation of the ROP. They indicated that the ability to have the option to work up to a certain number of hours per week in a telework status would provide the additional schedule flexibility and work-life balance options available to the rest of the agency that were not routinely available to resident inspectors prior to the COVID-19 PHE.

The team determined that continuing the practice of telework to some extent would be positive for current and future resident inspectors and help make the program more attractive in terms of inspector recruitment and retention. Therefore, the team recommends that resident inspectors should be permitted to routinely telework on a schedule as determined by the regions in conjunction with NRR once restrictions of on-site time are removed.[11] This recommendation should consider other oversight tasks beyond inspection normally done on-site, such as the receipt of allegations.

Recommendation 2b: Evaluate the current team inspection framework to determine if changes can be made to improve efficiency and effectiveness.

Survey Question 12 asked whether the infrastructure (e.g., scheduling, travel, inspection procedures) for team inspections should be modified to better enable effective remote inspection activities. The results are shown in Figure 6 below.

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[11] A perspective was provided that immediate action should be taken and not wait for on-site restrictions to be removed.

Figure 6: Should the insfrastucture for team inspections
be modified to include remote inspection
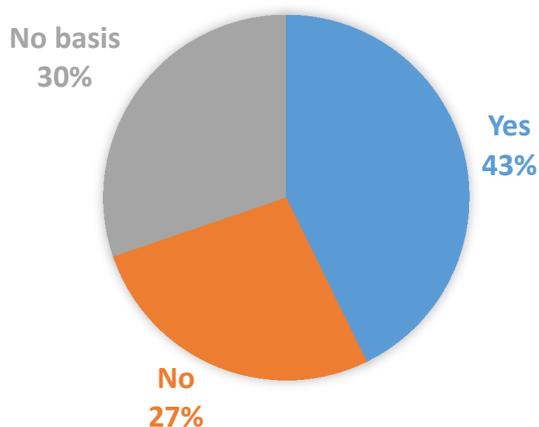
Survey Question 13 asked respondents to provide specific changes that should be considered. The primary themes in the comments were limiting the amount of inspection staff on-site and reducing the length of time of inspection by (1) conducting remote entrance and exit meetings, (2) clearly stating what parts of inspection procedures must be done on-site, (3) using the resident inspectors for certain on-site portions of the inspection, and (4) taking advantage of technology for effectiveness and efficiency. Therefore, the team recommends that NRR in coordination with NSIR and the regional offices evaluate the current team inspection framework (i.e., one week of in-office or some on-site preparation, one or two weeks on-site with all team members going on-site, and one week of in-office documentation) to determine if and how team inspections might be more efficiently and effectively performed using available technologies. The NRC could realize improvements in efficiency during non-emergency situations. Potential savings of travel costs could also be realized if some changes are made.[12]

4.3 Inspection Guidance Enhancements

The issuance of the guidance via the memos mentioned earlier and the March 2020 revision to Appendix E resolved many questions as to how to perform the oversight program during the COVID-19 PHE and supported the immediate needs of the inspectors. However, the team concluded that longer term solutions to better position the program for (1) response to future situations that limit access to the site and (2) to promote remote work during normal conditions are needed. This would require revising inspection procedures and inspection manual chapters to clearly identify which activities and inspection procedure requirements can be performed partially or entirely remotely or that need to be performed on-site. The team also recommends that the guidance that has been developed since the early stages of the pandemic and was either transmitted via multiple memos or posted to SharePoint should be included in the appropriate program guidance documents (e.g., IMC 2515, Appendix E). The best practices that have been identified for performing inspection activities during the PHE should also be added to the appropriate ROP guidance document(s).

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[12] A perspective was provided that this recommendation will require extensive coordination between the NRR program office and the regions and may be influenced by pending changes to the inspection program that are with the Commission.

Recommendation 3a: Consider revisions to inspection procedures or guidance to indicate activities and inspection requirements can be performed either fully remotely, partially remotely, or on-site.[13],[14]

Survey Question 8 asked if inspection procedures should be revised to provide more flexibility for remote completion, given reduced on-site presence for future national emergencies and/or the potential for increased telework. The results are provided in Figure 7 below.

Figure 7: Responses on need to revise inspection procedures to add flexibility for remote completion
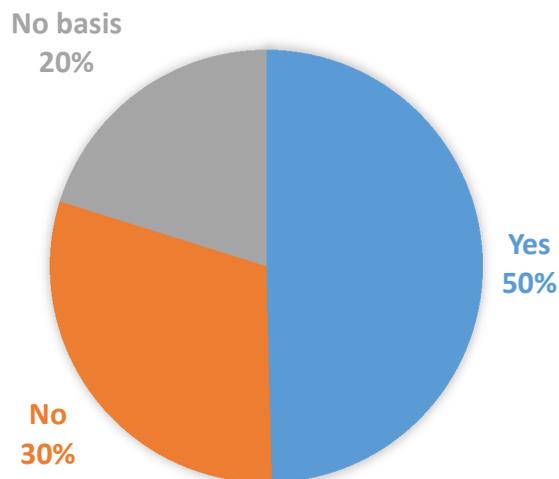
When eliminating "no basis" responses from the data shown in Figure 7, over two thirds of survey respondents indicated that inspection procedures should be reviewed for remote use; however, comments indicated that these changes are necessary in case of future site access restrictions, such as quarantines, and not as a wholesale replacement for conducting on-site inspections.
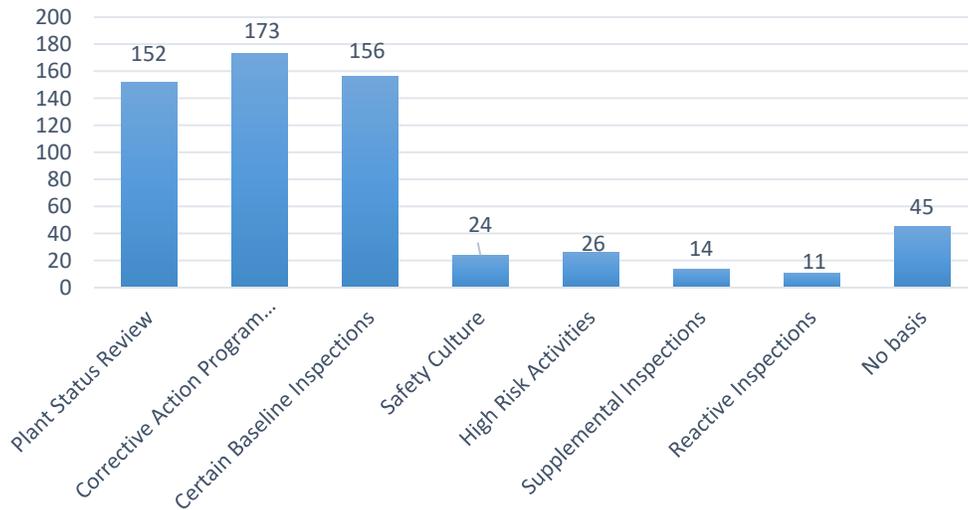
Survey Question 10 asked respondents to select the top three areas or activities for NRC to perform remotely during the period of reduced NRC on-site presence for future pandemics. The results are shown below in Figure 8.

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[13] A perspective was provided that this recommendation should apply only to situations when on-site access is limited.

[14] A perspective was provided that this recommendation would be stated as "Consider revisions to inspection procedures or guidance to indicate activities and inspection requirements that must or should be performed on-site." This suggested change is meant to provide the needed flexibility in completing inspection procedure requirements for procedures that may involve both on-site and remote completion.

Figure 8: Answers on top areas for NRC to potentially perform remotely

Survey Question 11 asked respondents which inspection activities should be emphasized if NRC incorporated more routine remote inspection activities into the baseline inspection program (irrespective of future pandemics). Nearly 50 percent of region-based staff responded "N/A" or "No" to routine remote inspection activities while 82 percent of resident inspectors were agreeable to incorporating more routine remote inspection into baseline activities. Problem identification and resolution, plant status, and inspection preparation and licensee documentation review were the activities listed most frequently to be considered for routine remote inspection. Resident inspectors responded that many of the IP 71111 series of baseline inspections should identify specific elements that can be performed remotely.

Therefore, the team recommends each ROP baseline inspection procedure be reviewed to determine (1) which oversight activities (e.g., plant status, CAP review, and certain baseline inspections) could be performed remotely to prepare for future public health emergencies and to help facilitate additional remote oversight and expanded telework and (2) which inspection procedure requirements that are suitable for remote oversight. Also, consideration should be given to add to each inspection procedure a new section that clearly identifies which portions can be performed remotely and to what extent.[15]

Recommendation 3b: Revise ROP program documents to include best practices and guidance developed since the COVID-19 PHE began.

Survey Question 4 asked, "How effective were the NRC program offices (NRR/NSIR) at developing and issuing program guidance for reactor oversight during the COVID-19 Pandemic?" The results are presented below in Figure 9.

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[15] A perspective was provided that for future review, consider evaluating efficacy of different regional approaches when deciding which inspections to perform on-site and which to modify for remote use. Some regions had more senior management involvement and others delegated more to the branch chief level. The intent is not to determine who had the "right" approach, but to determine any best practices that can be captured in program guidance.

Figure 9: Effectiveness of HQ developing and issuing guidance
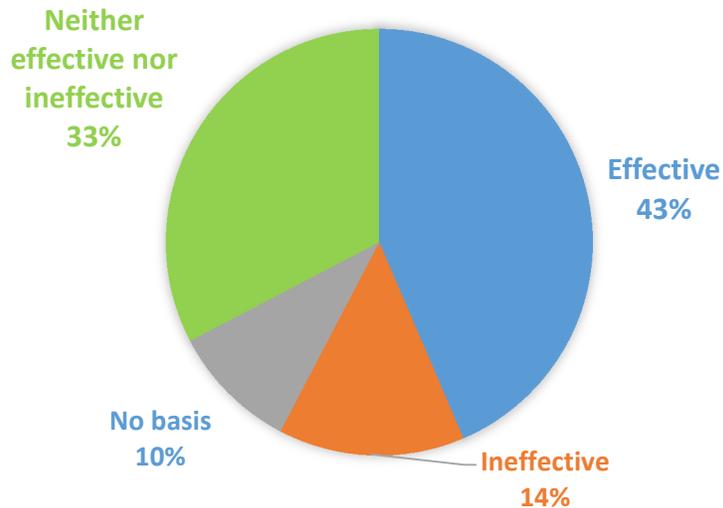
Survey Question 5 asked, "How effective was regional/HQ implementation of program guidance for the oversight of operating nuclear reactors during this time?" The results are presented below in Figure 10.

Figure 10: Effectiveness of regional implementation of issued guidance
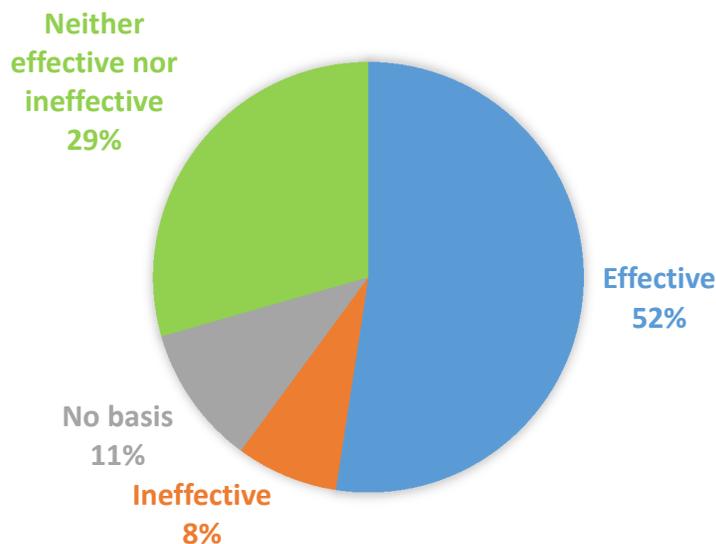
Survey Question 7 asked respondents to provide comments on their responses to Questions 4 and 5, particularly if "ineffective" had been selected as the answer to these questions. The reason for selection of "ineffective" responses to Questions 4 and 5 was primarily related to lack of guidance, late guidance, conflicting guidance, and less than effective coordination. This may be expected given the urgent need for the development of program guidance during the pandemic, when conditions and guidance from local, state, and national health authorities were changing daily.

These survey results indicate that there were some initial challenges with implementing the oversight program after the agency went into mandatory telework on March 20, 2020. It was initially unclear what could be performed remotely and how to accomplish certain inspection requirements remotely. After some minor delay, NRR/DRO issued interim guidance via two memos and revised IMC 2515, Appendix E, and developed specific guidance for managing site screening and testing requirements, travel advisories/restrictions, and the development of self-isolation contingency plans for inspectors. Therefore, the team recommends revising ROP program documents (e.g., IMC 2515, Appendix E) to include the guidance that has been developed since the start of the pandemic and was transmitted via multiple memos and/or posted to SharePoint. The information should be placed in a document that inspection staff would logically reference during the current pandemic and any future emergencies where it may be applicable. Implementation of Recommendations 3a and 3b will help ensure that guidance for implementing the ROP during situations where remote work is required due to emergent conditions is readily available to the staff.

Additionally, the team recommends that the best practices discussed in Section 4.4 below be included in the appropriate program document(s) for future situations when the NRC must respond to emergent situations that significantly impact the way the staff implements the ROP.

4.4 Best Practices

Using input from the survey and from their own individual experiences during the pandemic, the team considered what methods were effective in the development and dissemination of guidance during the first months of the pandemic. These are provided below.

- There was an increase in the frequency of communication between the NRR program office branch chiefs and the regional branch chiefs to once a week to discuss COVID-19 related topics. There was also an increase in the frequency of communication between the program office and regional division directors.
- SharePoint was used as a central access point for guidance as it was developed to address COVID-19 impacts on inspections.
- Townhalls for NRR and the regions provided for the open and timely exchange of information and answers to emergent questions. Inspector seminars were also useful for bringing all the inspectors together to share information and have questions addressed.
- Dashboards were developed to monitor several key indices, including local and site conditions, to support regional decision-making associated with the restart of inspection activities. Dashboards also provide senior-level management with data to support the tracking of COVID-19-related impacts on the NRC's ROP and operating reactor licensees.

Additionally, for Question 3, respondents provided "best practices" they identified for helping complete their work during this time period. The responses included the following practices.

- Establishing direct communication contacts between team inspectors and their licensee counterparts instead of going through a licensee point of contact.
- For team inspections, team leader on-site daily, and staggering team members on-site for one or two days per week.

- Focusing time spent during on-site days on inspections in the field and reserving meetings and other paper/electronic based inspection items for remote workdays.
- Only travel to licensee sites in personally owned vehicles, and do not travel with other inspectors. If one inspector does not meet the screening standards, all inspectors who traveled with that individual may be turned away.
- It was important to have pre-established daily phone calls with various licensee contacts to ensure information flow to complete plant status and inspection activities, including discussions with the plant manager, regulatory assurance manager, and operations staff (senior license holder or above).

4.5 Observation on Satisfaction with Personal Protective Equipment (PPE)

Overall, 62 percent of employees (excluding the ones that reported "no basis") reported that they were satisfied with the PPE provided by the NRC. Some comments were received on the timeliness of the receipt of the items at the beginning of the COVID-19 PHE and the NRC's ability to keep stockpiles in case they are needed. These comments were forwarded to the NRC COVID-19 Taskforce.

4.6 Near Term Actions for Consideration[16]

In reviewing the recommendations identified in this section, the following should be considered for near term action (i.e., less than six months). The team selected these recommendations because they will help inspectors continue to perform their jobs remotely as the pandemic continues.

IT Capability and Reliability
- Formalize agreements with facility licensees to ensure inspectors will have continued access to plant information and other information that is controlled by the licensee and that is required for the NRC to perform oversight activities. (Recommendation 1a)[17]
- Provide a second monitor to staff for home use. (Recommendation 1b)
- Continue to educate staff and licensees about the capabilities and benefits of available IT tools. (Recommendation 1c)

Inspection Guidance Enhancements
- Consider revisions to inspection procedures or guidance to indicate activities and inspection requirements can be performed either fully remotely, partially remotely, or on-site. (Recommendation 3a)

5.0 Licensee Performance and Potential Implications of Remote Oversight

To understand the potential implications of the increase in remote inspection during the COVID-19 pandemic, the staff performed a review of various licensee operational and ROP data from March through November 2020. The data includes various indicators of licensee performance such as number of reactor scrams, number of reportable events per 10CFR50.72, and the

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[16] A perspective was provided that the resident inspector telework recommendation be in the near-term list of recommendations to be addressed.

[17] A perspective was provided that this recommendation be addressed by the NRC/NEI Institute ROP working group.

number of safety system functional failures. The staff also reviewed the trend in performance indicators and inspection findings and the number of allegations received. The staff's review of the preliminary data did not indicate an appreciable impact from the pandemic, only that previously observed trends continued to occur.

The staff will review the impacts of the COVID-19 PHE on implementation of the ROP in the Calendar Year 2021 ROP self-assessment process, which is defined in IMC 0307, "Reactor Oversight Process Self-Assessment Metrics and Data Trending," to be reported in the 2022 ROP Self-Assessment SECY.

6.0 Conclusion

The team concluded that the NRC's continued oversight of nuclear power reactors during the COVID-19 PHE was appropriate considering the circumstances, mostly as a result of the NRC staff and management's ability to adapt to telework and the challenges the PHE presented. NRC inspectors, staff and management learned a great deal in a very short time and the lessons learned and best practices identified should prove highly beneficial for future emergencies that limit or prevent access to nuclear plant sites.

COVID-19 Lessons Learned and Best Practices Team Members

Marc Ferdas – Management Sponsor
Russell Gibbs NRR/DRO – Team Leader
Dan Merzke NRR/DRO – Team Member
Steve Campbell NRR/DRO – Team Member
Zack Hollcraft – Team Member
Julie Winslow NRR/DRO – Team Member
Dong Park NRR/DRO – Team Member
Lauren Nist NRR/DRO – Team Member
Josh Kaiser NRR/DSS – Team Member
Frederick Scot Sullivan NSIR/DSO - Team Member
Josephine Ambrosini Region 1 - Team Member
Rodney Clagg Region 1 - Team Member
Brad Bishop Region 2 - Team Member
Diana Betancourt Region 3 - Team Member
Roy Elliott Region 3 - Team Member
Dariusz Szwarc Region 3 - Team Member
Ray Azua Region 4 - Team Member

COVID-19 Lessons Learned and Best Practices for Oversight of Operating Reactors

The purpose of this anonymous survey is to get feedback on the oversight of operating power reactors during the COVID-19 Pandemic and the associated mandatory/maximum telework period. Please allow about 30 minutes to complete the survey. The survey results will be evaluated by the COVID-19 Pandemic Lessons Learned and Best Practices Working Group for possible recommendations to: (1) modify the Reactor Oversight Process and related oversight functions (i.e., OpE, operator licensing, QA and vendor inspections) and (2) revise certain oversight policies and procedures that affect all involved inspectors. The recommendations will be considered for both pandemic and non-pandemic situations taking into account NRC Principles of Good Regulation. The survey will remain open through July 15, 2020. Once you submit the survey, you cannot alter your responses. However, there will be an additional opportunity to provide feedback at a later time.

Required

1.What was the biggest challenge you faced while performing your ROP and/or related oversight work functions during this period of time?
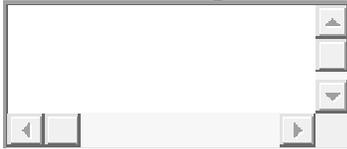
2.Provide any lessons learned relating to your ROP and/or related oversight work functions during this period of time.
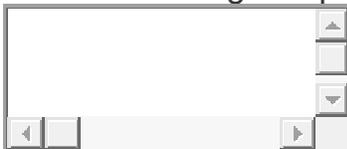
3.Identify any best practices you came across during the implementation of your ROP and/or related oversight work functions during this period of time.

4.How effective were the NRC program offices (NRR/NSIR) at developing and issuing program guidance for reactor oversight during the COVID-19 Pandemic?

⬭ Effective

Neither effective nor ineffective

☐ Ineffective

☐ No basis

5.How effective was regional/HQ implementation of program guidance for the oversight of operating nuclear reactors during this time?

☐ Effective

☐ Neither effective nor ineffective

☐ Ineffective

☐ No basis

6.How effective was the use and access to licensee-provided plant equipment/information to provide effective oversight during the mandatory telework period?

☐ Effective

☐ Neither effective nor ineffective

☐ Ineffective

☐ No basis

7.For Questions 4, 5, and 6, please provide any amplifying comments you deem important, especially for ineffective responses.

8.Given reduced onsite presence for future national emergencies and/or the potential for increased telework, should inspection procedures be revised to provide more flexibility for remote completion?

☐ Yes

☐ No

☐ No basis

9.For Question 8 above, please identify the top (3) inspection procedures which have the most potential for being effectively performed remotely. If you selected no basis respond with "not applicable."

10.During the period of reduced NRC onsite presence for future pandemics, select the top (3) areas or activities for NRC to perform remotely.

☐ Plant status review

☐ Corrective action program review

☐ Certain baseline inspections

☐ Safety culture

☐ Higher risk activities

☐ Supplemental inspections

☐ Reactive inspections

☐ No basis

11.If NRC incorporated more routine remote inspection activities into the baseline inspection program (irrespective of future pandemics), which inspection activities should be emphasized? If you have no basis, respond with "not applicable."
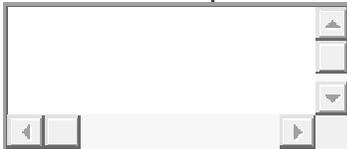
12.Should the infrastructure (e.g., scheduling, travel, inspection procedures) for team inspections be modified to better enable effective remote direct inspection activities?

⬤ Yes

⬤ No

⬤ No basis

13.If you answered Yes to Question 12 above, please provide specific changes that should be considered. Otherwise, respond with "not applicable."

14.Considering your experience over the past 3 months, in your opinion how many hours in a 1-week period could a resident inspector routinely telework and remain effective at implementing the ROP?

⬤ 0

⬤ 8

⬤ 16

⬤ 24

☐ 25-40

☐ No basis

15.Should NRC provide remote access to Safeguards Information during a pandemic situation to better enable you to accomplish your work?

☐ Yes

☐ No

☐ No basis

16.Regarding completing the inspection program, which aspect(s) should there be priority going forward to prepare for future pandemics and/or normal conditions? You may select up to (3) responses.

☐ Inspection requirements

☐ Communications

☐ Remote inspection

☐ Inspector onsite presence

☐ IT capabilities (both NRC and licensee)

☐ Memoranda of understanding expectations

☐ Protocols for information sharing

☐ No basis

17.For the selections you made in Questions 16 above, please identify which aspect(s) NRR should coordinate with industry to consider for broader adoption? If you have no basis, respond with "not applicable."

18.Should NRC undertake a fundamental re-assessment of what and how we inspect given the paradigm shift that we have been experiencing in the COVID-19 public health emergency?

☐ Yes, absolutely

☐ Yes, but only for targeted aspects of the existing program

☐ No, we need to get back to the way things were pre-COVID-19

19.If you answered Yes to Question 18 above, please provide specifics on what and how we should inspect. If you answered No, please provide your basis.

[text box]
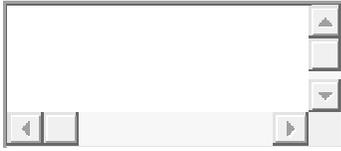
20. How satisfied were you with the NRC's issuance of personal protective equipment (PPE) provided to you for onsite activities?

☐ Satisfied

☐ Neither satisfied nor dissatisfied

☐ Dissatisfied

☐ No basis

21. Taking into account your previous responses to this survey, please provide any recommendations from your ROP and/or related oversight work experience during mandatory telework that should be considered for future pandemic and non-pandemic situations.

[text box]

22. Please provide your organization

☐ Region 1

☐ Region 2

☐ Region 3

☐ Region 4

☐ NSIR

☐ NRR

23. Please provide your job type.

☐ Resident inspector

☐ Region-based inspector

☐ HQ inspector

☐ Supervisor/manager

☐ Administrative

☐ Region-based project/reactor engineer

☐ HQ project/reactor engineer

☐ Security inspector

☐

24.If you would like to discuss this survey or your responses, please provide your name here.

Attachment 3
COVID-19 Lessons Learned and Best Practices
Interview Questions for Office Directors and Regional Administrators

Note: The context of these questions is in the oversight of nuclear power plants.

1. What has been the most difficult issue you experienced since the NRC went to mandatory/maximum telework? What do you believe should be done to address the issue?

2. What is one success story that you have been involved in and would care to share?

3. Taking into account any lessons you may have learned, what are your plans to address them going forward?

4. Considering what the agency has learned these last several months, what do you believe should be considered for non-pandemic situations (i.e., our new normal)?

5. Do you have one or two specific recommendations that you believe will help us better prepare for future pandemics or other national emergencies?

6. Regarding telework, what are your views on its effectiveness? Do you believe telework should be more routine for all inspectors and oversight staff in the future?

7. What is one area that the agency should focus on to improve oversight during future pandemics or other national emergencies?

8. If you have taken the COVID-19 Lessons Learned and Best Practices Survey, what are your views on its effectiveness? Are there other areas or activities that should be explored further?

Do you have anything else that you would like to share?

Attachment 4
NRC Executive Perspectives and Insights

Team members interviewed their respective Office Director/Regional Administrator and their deputy to get perspectives, insights and recommendations on how the NRC responded to the COVID-19 PHE. The survey questions are provided in Attachment 3 of this report. Provided below are the high-level results of these interviews.

Region 1 Key Messages:

- While NRC seems able to complete the procedural requirements, it is not clear how effective we have been in a virtual environment versus physical on-site inspection presence. Some inspections, particularly medical inspections (which are outside the scope of this lessons learned report) and those requiring air travel, have been difficult to achieve.

- Remote inspection effectiveness is difficult to measure in the short term and it is important not to draw any conclusions until we know how effective our oversight program has been during this period of telework. Nuclear power is a complex business and there is often a lag time between the modification of a requirement or a change in oversight before the impact is recognized and understood. While licensees are currently performing in an acceptable manner, it is too soon to know if NRC reduced on-site presence will have a detrimental effect on licensee performance.

- Pandemics and national emergencies should be treated similar to incident response. Specifically, NRC should define a reporting structure with roles and responsibilities. In doing so, it will clarify expectations from all levels of the organization including from the Commission early in the process.

Region 2 Key Messages:

- Are we getting oversight outcomes consistent with our mission objectives? Outcomes should drive our innovation. Routine inspection samples that have been done on-site hundreds of times do not necessarily equate to safety.

- A new paradigm for our work should be created with new integrated performance metrics. NRC should "swing for the fences" with regards to innovation. NRC should set goals beyond what we may realistically achieve.   Outcomes should be clearly defined.

- Define what we need for oversight during a pandemic and then redefine the program and support structure to identify the specific resident inspector role and expectations. Setting aside biases, what do we need to accomplish and are we getting what we need?

- What is the value to the agency of face/face interactions (i.e., relationships with the licensee's operating crews, department heads, members of the public)?   What is the outcome (engagement/team building)? What can we do to influence the outcome? How do we grow the organization?

- Given that the inspection program was reduced for a period of time, the NRC should take a critical review to determine how, or even if, the decrease in face to face interface resulted in a decrease in our effectiveness. If not, NRC should look very critically at our program, through this "new normal" lens, and make changes accordingly, particularly to the Resident Inspector Program.

Region 3 Key Messages:

- There is a need to revise the COOP/Pandemic plan to address situations like the one we recently faced with COVID-19 and that we should look into ways of incorporating the things we have learned into our new normal. For example, extended use of telework, streamlining how we do work and innovating. We should also explore better and more permanent remote access to licensee's systems for both residents and regional inspectors and the use of videocalls/technology.

- Regarding the role of the resident inspectors and long-term use of telework. The use of telework can be normalized (maybe 1 day a week). On-site presence is still important as the value of the residents also comes from their presence on-site and their ability to interact day-to-day with the licensee's staff.

- Not to be afraid to state that things that worked during the pandemic might not be the most efficient way to meet our mission. We need to understand what is more efficient and what is less efficient while working remotely and capture those lessons learned. We need to examine how to be more personally engaged when teleworking.

Region 4 Key Messages:

- There is a high interest that the agency capture lessons learned from the overall experience, including telework, site resident coverage criteria, remote inspections, processes for stocking materials (masks, hand sanitizer, etc.) and managing electronic media and communications both within the agency, and with the licensee's at large. Also, the agency's Pandemic Plan needs to be revised, seeing that we never met the entry level criteria set forth in the plan. We should apply the lessons learned from this pandemic response to the revised plan.

- Regarding telework during the COVID-19 PHE, it appears that the staff was able to perform well, under the circumstances. This was due in part to the fact that we started from a good place i.e., everyone knew and trusted everyone (Trust Tax). As an agency, we need to continue to develop and maintain this trust environment.

- Regarding telework, although work performance and effectiveness was considered high at the beginning of the mandatory work-at-home effort, there are signs that this effectiveness may erode over time. As a result, even though there will be an interest by the staff to increase the use of telework in future, and an increase in pressure to approve more telework agreements, there should also be a strong interest on keeping an eye on work effectiveness over time.

NRR Key Messages:

- The NRC's response to the pandemic was impressive mostly as a result of the NRC staff and management's ability to quickly adapt to mandatory telework and the challenges it presented.

- Mandatory/maximum telework was surprisingly effective and efforts should be pursued to consider lessons learned during the pandemic for possible changes to work practices.

- NRC should prepare for more severe pandemic situations than presented by COVID-19.

- The ability to perform remote oversight was mostly influenced by the existing remote access to licensee plant information and programs. However, efforts should be placed on improving NRC capability to perform remote inspections.

- Pandemic and Continuity of Operations situations should be re-examined to improve and integrate their respective purposes.

- NRC needs to better prioritize its activities in a rapidly changing environment and look forward more effectively.

- Virtual meetings were surprisingly effective but there were too many which added to staff fatigue and increased stress levels.

NSIR Key Messages:

- The ability to ensure important issues should receive immediate attention and the ability to glean new ideas on high priority topics. Focused issues should get quicker response. Incident Response Program (IRP) has historically required 70 individuals in person, yet it has been determined this can be achieved with 8-10 persons remotely [right sizing IRP].

- NRC needs to evaluate the telework agreements program and it should provide stricter and more clear guidance on the acceptability for telework rather than leaving it up to the individual offices to set the standard.

- Advancements in technology are extremely important. Microsoft Office Teams (Skype was formerly used) should be used to its full potential. Not interacting with people in person makes it hard to read body language and observe various ques that lead to ensuring alignment. Skype was helpful but it is not perfect. Expanded telework has had a negative impact on knowledge management and it slows the development of new and junior staff.