

# Remote Source Verification During a Pandemic or Similar State of Emergency

## Screening Criteria and Process Guidance

3002019436-A

2020 TECHNICAL REPORT



# Remote Source Verification During a Pandemic or Similar State of Emergency

Screening Criteria and Process Guidance

3002019436-A

Final Report with NRC Safety Evaluation, October 2020

EPRI Project Manager  
M. Tannenbaum

All or a portion of the requirements of the EPRI Nuclear Quality Assurance Program apply to this product.

YES



ELECTRIC POWER RESEARCH INSTITUTE

3420 Hillview Avenue, Palo Alto, California 94304-1338 • PO Box 10412, Palo Alto, California 94303-0813 • USA  
800.313.3774 • 650.855.2121 • [askepri@epri.com](mailto:askepri@epri.com) • [www.epri.com](http://www.epri.com)

## **DISCLAIMER OF WARRANTIES AND LIMITATION OF LIABILITIES**

THIS DOCUMENT WAS PREPARED BY THE ORGANIZATION(S) NAMED BELOW AS AN ACCOUNT OF WORK SPONSORED OR COSPONSORED BY THE ELECTRIC POWER RESEARCH INSTITUTE, INC. (EPRI). NEITHER EPRI, ANY MEMBER OF EPRI, ANY COSPONSOR, THE ORGANIZATION(S) BELOW, NOR ANY PERSON ACTING ON BEHALF OF ANY OF THEM:

(A) MAKES ANY WARRANTY OR REPRESENTATION WHATSOEVER, EXPRESS OR IMPLIED, (I) WITH RESPECT TO THE USE OF ANY INFORMATION, APPARATUS, METHOD, PROCESS, OR SIMILAR ITEM DISCLOSED IN THIS DOCUMENT, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, OR (II) THAT SUCH USE DOES NOT INFRINGE ON OR INTERFERE WITH PRIVATELY OWNED RIGHTS, INCLUDING ANY PARTY'S INTELLECTUAL PROPERTY, OR (III) THAT THIS DOCUMENT IS SUITABLE TO ANY PARTICULAR USER'S CIRCUMSTANCE; OR

(B) ASSUMES RESPONSIBILITY FOR ANY DAMAGES OR OTHER LIABILITY WHATSOEVER (INCLUDING ANY CONSEQUENTIAL DAMAGES, EVEN IF EPRI OR ANY EPRI REPRESENTATIVE HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES) RESULTING FROM YOUR SELECTION OR USE OF THIS DOCUMENT OR ANY INFORMATION, APPARATUS, METHOD, PROCESS, OR SIMILAR ITEM DISCLOSED IN THIS DOCUMENT.

REFERENCE HEREIN TO ANY SPECIFIC COMMERCIAL PRODUCT, PROCESS, OR SERVICE BY ITS TRADE NAME, TRADEMARK, MANUFACTURER, OR OTHERWISE, DOES NOT NECESSARILY CONSTITUTE OR IMPLY ITS ENDORSEMENT, RECOMMENDATION, OR FAVORING BY EPRI.

**THE ELECTRIC POWER RESEARCH INSTITUTE (EPRI) PREPARED THIS REPORT.**

THE TECHNICAL CONTENTS OF THIS PRODUCT WERE **NOT** PREPARED IN ACCORDANCE WITH THE EPRI QUALITY PROGRAM MANUAL THAT FULFILLS THE REQUIREMENTS OF 10 CFR 50, APPENDIX B. THIS PRODUCT IS **NOT** SUBJECT TO THE REQUIREMENTS OF 10 CFR PART 21.

## **NOTE**

For further information about EPRI, call the EPRI Customer Assistance Center at 800.313.3774 or e-mail [askepri@epri.com](mailto:askepri@epri.com).

Electric Power Research Institute, EPRI, and TOGETHER...SHAPING THE FUTURE OF ELECTRICITY are registered service marks of the Electric Power Research Institute, Inc.

Copyright © 2020 Electric Power Research Institute, Inc. All rights reserved.

# **NRC SAFETY EVALUATION**

---

In accordance with an NRC request, the NRC Safety Evaluation immediately follows this page.

Office of Nuclear Reactor Regulation Topical Report Safety Evaluation			
Topical Report Information		Review Information	
Report Number: EPRI 3002019436 Title: "Remote Source Verification During a Pandemic or Similar State of Emergency: Screening Criteria and Process Guidance" ADAMS Accession No: ML20205L619 and ML20205L618 EPID: L-2020-TOP-0039 Docket No.: 99902021		Division/ Branch: DRO Project Manager: J. Holonich Reviewers: A. Armstrong, P. Prescott	
Determination of Minimal Revisions			
Is this the review of very limited scope?	Yes	<input checked="" type="checkbox"/>	No <input type="checkbox"/>
Does the TR change maintain the original SE conclusions?	Yes	<input checked="" type="checkbox"/>	No <input type="checkbox"/>
Do the staff methods for establishing the original conclusions remain unaffected?	Yes	<input checked="" type="checkbox"/>	No <input type="checkbox"/>
If any of the above questions are answered no, a simplified safety evaluation cannot be used.			
Applicable Review Guidance Used			
Standard Review Plan (SRP) for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (NUREG-0800, Formerly issued as NUREG-75/087), Chapter 17.5, "Quality Assurance Program Description - Design Certification, Early Site Permit and New License Applicants" Revision 1, Dated 8/2018.			
Appendix B to Title 10 of the <i>Code of Federal Regulations</i> (10 CFR) Part 50, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants"			

Office of Nuclear Reactor Regulation Topical Report Safety Evaluation	
Topical Report Information	Review Information
Report Number: EPRI 3002019436 Title: "Remote Source Verification During a Pandemic or Similar State of Emergency: Screening Criteria and Process Guidance" ADAMS Accession No: ML20205L619 and ML20205L618 EPID: L-2020-TOP-0039 Docket No.: 99902021	Division/ Branch: DRO Project Manager: J. Holonich Reviewers: A. Armstrong, P. Prescott
<b>Description of Topical Report Content (1000 Word Maximum)</b>  <p>The Electric Power Research Institute's (EPRI's) submittal of Technical Report (TR) 3002019436, "Remote Source Verification During a Pandemic or Similar State of Emergency," provides industry guidance for performing remote source verification activities during times of pandemics and states of emergency. The EPRI TR 3002019436 was developed with industry stakeholders, which included NRC staff, to provide the option within a licensee's or vendor's QA program for remote performance of a source verification when required during exigent conditions. EPRI's report provides guidance for application of video and other real-time communication technologies for the successful performance of remote source verification. Since the capabilities of remote source verification are limited, the techniques included in the report are intended for use only in extreme circumstances such as a global pandemic, when performing on-site source verification may not be possible due to conditions that threaten the health and safety of individuals performing the verification or the work being verified. Successful use of remote source verification involves screening to ensure the activity being conducted by the supplier can be adequately verified, using remote source verification techniques, clearly defined scope and objectives, technology required to remotely witness important aspects of the activity in real time, contingency plans to address the potential for technology failures during the activity, and means for documenting the activity in a format that provides the verifying entity with objective evidence of the activity.</p>	

Office of Nuclear Reactor Regulation Topical Report Safety Evaluation	
Topical Report Information	Review Information
Report Number: EPRI 3002019436 Title: "Remote Source Verification During a Pandemic or Similar State of Emergency: Screening Criteria and Process Guidance" ADAMS Accession No: ML20205L619 and ML20205L618 EPID: L-2020-TOP-0039 Docket No.: 99902021	Division/ Branch: DRO Project Manager: J. Holonich Reviewers: A. Armstrong, P. Prescott
<b>Technical Evaluation</b>  <p>Source verifications are typically performed to verify successful completion of certain fabrication and testing activities related to equipment that are complex, expensive, or designated for use in nuclear safety-related applications. Regulatory requirements and guidance related to the use of source verification to accept a basic component for use, either with or without commercial-grade dedication, are provided in Criterion VII of Appendix B to 10 CFR Part 50; NRC Inspection Procedure 43004, "Inspection of Commercial-Grade Dedication Programs" (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16344A092); and EPRI TR 3002002982, Revision 1 to EPRI NP-5652 and TR-102260, "Plant Engineering: Guideline for the Acceptance of Commercial-Grade Items in Nuclear Safety-Related Applications," dated September 2014 (ADAMS Accession No. ML18199A161), which was endorsed by NRC Regulatory Guide 1.164, "Dedication of Commercial-Grade Items for Use in Nuclear Power Plants," Revision 0, dated June 2017 (ADAMS Accession No. ML17041A206), and defines source verification. In all cases, both the regulatory requirements and guidance refer to source verifications being performed "at the contractor or subcontractor source," "by direct observation," or "at the location of material procurement or manufacture," respectively.</p> <p>Given technological advances since the requirements of Appendix B were first promulgated, EPRI TR 3002019436 guidance proposed alternatives in lieu of the regulatory requirements of Criterion VII for performing source verifications. The proposed alternative provides guidance for the application of video and other real-time communication technologies for the successful performance of remote source verification. The use of this method of verification is only applicable when a pandemic or similar state of emergency has been declared restricting access or travel to and/or from those locations affected by the declaration.</p> <p>EPRI TR 3002019436 was prepared to provide licensees and vendors with guidance for using remote communication and video capabilities to perform remote source verification in extreme circumstances where it is not possible to perform onsite source verification due to conditions that threaten the health and safety of individuals performing the verification. The NRC staff reviewed EPRI TR 3002019436 and determined from its review, that implementing adequate quality controls prior to witnessing the remote source verification should address the limitations identified in EPRI TR 3002019436.</p> <p>EPRI TR 3002019436 provides a screening of the specific source verification to be performed to determine if remote source verification is appropriate for the activities</p>	

Office of Nuclear Reactor Regulation Topical Report Safety Evaluation	
Topical Report Information	Review Information
Report Number: EPRI 3002019436 Title: "Remote Source Verification During a Pandemic or Similar State of Emergency: Screening Criteria and Process Guidance" ADAMS Accession No: ML20205L619 and ML20205L618 EPID: L-2020-TOP-0039 Docket No.: 99902021	Division/ Branch: DRO Project Manager: J. Holonich Reviewers: A. Armstrong, P. Prescott
<p>being verified prior to conducting the activity remotely. The EPRI TR 3002019436 required screening employs the following six attributes with associated guidance provided:</p> <ol style="list-style-type: none"> <li>1. Is it possible to do onsite verification?</li> <li>2. Is the activity an assessment?</li> <li>3. Can the activity be adequately verified remotely?</li> <li>4. Can progress and results be captured and communicated in real-time?</li> <li>5. Can a maintainable record be created for objective evidence? and</li> <li>6. Does original requestor concur with the use of remote verification?</li> </ol> <p>Based on the implementation of adequate quality controls and adherence to the guidance of EPRI TR 3002019436, the NRC staff concluded that remote source verification will be an effective alternative for source verification activities during exigent conditions. Although remote source verification cannot, and should not, fully replace the ability to observe and verify activities at the source, the use of modern communication technologies does permit a remote source verification plan to be developed and implemented that will continue to satisfy the relevant criteria of Appendix B to 10 CFR Part 50. Therefore, EPRI TR 3002019436 guidance provides an equivalent, and acceptable level of quality control during exigent conditions.</p>	

Office of Nuclear Reactor Regulation Topical Report Safety Evaluation			
Topical Report Information		Review Information	
Report Number: EPRI 3002019436 Title: "Remote Source Verification During a Pandemic or Similar State of Emergency: Screening Criteria and Process Guidance" ADAMS Accession No: ML20205L619 and ML20205L618 EPID: L-2020-TOP-0039 Docket No.: 99902021		Division/ Branch: DRO Project Manager: J. Holonich Reviewers: A. Armstrong, P. Prescott	
<b>Conclusions</b>  Although remote source verification is not intended to replace the ability to observe and verify activities at the source, the NRC staff finds that available technologies can be effectively applied to sufficiently and successfully verify certain activities in extreme circumstances as discussed in EPRI TR 3002019436. The NRC staff has reviewed EPRI TR 3002019436 and determined that appropriate implementation of the guidance and quality controls, will continue to meet the requirements of Criterion VII of Appendix B to 10 CFR Part 50, and therefore, is an acceptable form of meeting the regulatory requirements for source verifications during pandemics or similar states of emergency			
<b>Conditions and Plant-Specific Action Items</b>  N/A			
ADAMS Accession Nos: Package: ML20244A016; Email: ML20244A108; SE: ML20244A017			
Approval	Printed Name	Signature	Date
Technical Branch Chief	Kerri Kavanagh	/RA/	Sep 10, 2020
Projects Branch Chief	Dennis Morey	/RA/	Sep 16, 2020

# ACKNOWLEDGMENTS

---

The Electric Power Research Institute (EPRI) prepared this report:

Principal Investigator  
M. Tannenbaum

This report describes research sponsored by EPRI.

EPRI would like to thank the following individuals who participated in the technical advisory committee and made contributions to the development of this report. Their valuable insights and experience were essential to the successful completion of this project.

Earl Mayhorn	Ameren UE
Sebastian Larrea	Dominion Energy
Pamela Anderson	Dominion Energy
Mark Coren	Duke Energy
Allison Read	Electric Power Research Institute
Brian Hendel	Energy Northwest
John Simmons	Luminant
Rachel Czuba	Sonic Systems International
Jim Garrison	United Controls, International
Paul Prescott	U.S. Nuclear Regulatory Commission
Kerri Kavanagh	U.S. Nuclear Regulatory Commission

---

This publication is a corporate document that should be cited in the literature in the following manner:

*Remote Source Verification During a Pandemic or Similar State of Emergency: Screening Criteria and Process Guidance.* EPRI, Palo Alto, CA: 2020. 3002019436-A.



# ABSTRACT

---

In the first quarter of 2020, many parts of the world began to experience an unprecedented pandemic due to the rapid spread of COVID-19. The global supply chain was impacted in a number of ways. Manufacturing facilities worldwide temporarily closed or experienced reduced capacity as “stay-at-home” orders restricted employees from traveling to work. Although certain nuclear suppliers and manufacturers were categorized as essential by regulatory agencies and were able to remain open, some experienced occasional shutdowns to disinfect facilities after employees tested positive for the virus or came into contact with someone who tested positive.

Due to robust supply chains and on-site inventory, nuclear plant supply chain organizations’ ability to provide spare and replacement items needed to operate and maintain plants experienced relatively low impact, even as the spring outage season approached. One impact, however, was inability to perform quality assurance activities such as audits, commercial-grade surveys, and source verifications at suppliers’ facilities. This report does not address audits or surveys. It specifically addresses source verifications. Source verifications are typically performed to verify successful completion of certain fabrication and testing activities related to equipment that is complex, expensive, or designated for use in nuclear safety-related applications.

This report was prepared to provide Electric Power Research Institute (EPRI) members and their suppliers with guidance for using remote communication and video capabilities to perform remote source verification in extreme circumstances where it is not possible to perform on-site source verification due to conditions that threaten the health and safety of individuals performing the verification.

Although remote source verification cannot replace the ability to observe and verify activities at the source, available technologies can be effectively applied to sufficiently and successfully verify certain activities in extreme circumstances.

## **Keywords**

Commercial-grade dedication  
COVID-19  
Pandemic  
Quality assurance  
Remote  
Source inspection  
Source verification



**Deliverable Number:** 3002019436-A

**Product Type:** Technical Report

**Product Title:** Remote Source Verification During a Pandemic or Similar State of Emergency: Screening Criteria and Process Guidance

---

**PRIMARY AUDIENCE:** Nuclear quality assurance, quality control, and procurement engineering professionals

**SECONDARY AUDIENCE:** Nuclear supply chain professionals

### **KEY RESEARCH QUESTION**

During extreme circumstances such as a global pandemic, performing on-site source verification may not be possible due to conditions that threaten the health and safety of individuals performing the verification or the work being verified. Could technology be used to enable remote source verification, and if so, what process should be followed to ensure successful acceptance?

### **RESEARCH OVERVIEW**

A technical advisory group composed of procurement quality professionals met virtually to discuss the topic of remote source verification with regulatory staff, identify potential challenges, and develop a plan for enabling use of remote source verification during states of emergency such as a pandemic. The team developed screening criteria to determine an activity's eligibility for remote source verification. A process for planning and conducting remote source verification was also developed.

### **KEY FINDINGS**

- Although remote source verification can be considered as a reduction in commitment by regulatory agencies, a documented process can help to provide a basis for requesting regulatory relief.
- Although the capabilities of remote source verification are limited, [screening criteria](#) can be applied to ensure it is only used when appropriate.
- Remote source verification can be used successfully for certain types of activities.
- Proper planning in accordance with a [defined process](#) is essential to successful remote source verification.
- A number of [existing applications and tools](#) can be used to successfully conduct and document remote source verification.

### **WHY THIS MATTERS**

The screening criteria and process in this report can serve as a basis for successful conduct of remote source verification. This report can serve as the basis for developing effective internal processes for remote source verification in order to minimize delays of shipment and acceptance of equipment and replacement items needed to support operation and maintenance during a pandemic or similar state of emergency.

**HOW TO APPLY RESULTS**

The screening criteria and process in this report can be used to develop effective processes and procedures for remote source verification. Information in this report can also be used to help select applications that include features appropriate for the types of remote source verification activities being conducted.

**LEARNING AND ENGAGEMENT OPPORTUNITIES**

- Nuclear and nonnuclear procurement and quality professionals can benefit from the information included in this report.
- Members of ASME NQA-1, Nuclear Procurement Issues Corporation, and the Nuclear Industry Assessment Corporation may be interested in this report.

**EPRI CONTACT:** Marc Tannenbaum, Senior Technical Executive, [mtannenbaum@epri.com](mailto:mtannenbaum@epri.com)

**PROGRAMS:** Nuclear Power, P41 and Plant Engineering, P 41.05.02

**IMPLEMENTATION CATEGORY:** Category 1, Regulatory

---

*Together...Shaping the Future of Electricity®*

**Electric Power Research Institute**

3420 Hillview Avenue, Palo Alto, California 94304-1338 • PO Box 10412, Palo Alto, California 94303-0813 USA

[800.313.3774](tel:800.313.3774) • [650.855.2121](tel:650.855.2121) • [askepri@epri.com](mailto:askepri@epri.com) • [www.epri.com](http://www.epri.com)

© 2020 Electric Power Research Institute (EPRI), Inc. All rights reserved. Electric Power Research Institute, EPRI, and TOGETHER...SHAPING THE FUTURE OF ELECTRICITY are registered service marks of the Electric Power Research Institute, Inc.

# RECORD OF REVISIONS

Revision Number	Revisions
3002019436	Original issue (EPRI report 3002019436) published April 2020
3002019436-A	<p>NRC-approved version of 3002019436 published September 2020</p> <p>The report as originally published (3002019436) was revised to incorporate NRC staff's conclusion that remote source verification will be an effective alternative for source verification activities during exigent conditions.</p> <p>In accordance with an NRC request, the <a href="#">safety evaluation</a> is included in the front matter of this report and the report number includes an “-A” indicating the version of the report accepted by the NRC staff.</p> <p>Non-essential format changes were made to comply with the current EPRI publication guidelines.</p> <p>Details of the revision can be found in Appendix A which was added as part of this revision.</p>



# CONTENTS

---

<b>NRC SAFETY EVALUATION .....</b>	<b>III</b>
<b>ACKNOWLEDGMENTS .....</b>	<b>IX</b>
<b>ABSTRACT .....</b>	<b>XI</b>
<b>EXECUTIVE SUMMARY .....</b>	<b>XII</b>
<b>RECORD OF REVISIONS .....</b>	<b>XV</b>
<b>1 OBJECTIVE AND BACKGROUND .....</b>	<b>1-1</b>
1.1 Objective .....	1-1
1.2 Background .....	1-1
1.3 Terminology .....	1-2
1.4 Entities That Perform Source Verifications .....	1-2
1.5 Regulatory Perspective .....	1-3
<b>2 LEXICON AND ACRONYMS .....</b>	<b>2-1</b>
Lexicon .....	2-1
<b>3 LIMITATIONS AND APPLICATIONS OF REMOTE SOURCE VERIFICATION .....</b>	<b>3-1</b>
3.1 Limitations of Remote Source Verification .....	3-1
3.2 Typical Applications of Source Verification .....	3-1
<b>4 REMOTE SOURCE VERIFICATION SCREENING PROCESS .....</b>	<b>4-1</b>
4.1 Is it possible to do on-site verification? .....	4-1
4.2 Is the activity an assessment? .....	4-1
4.3 Can the activity be adequately verified remotely? .....	4-1
4.4 Can progress and results be captured and communicated in real time? .....	4-2
4.5 Can a maintainable record be created for objective evidence? .....	4-2

---

4.6	Does the original requestor concur with use of remote verification? .....	4-2
<b>5</b>	<b>REMOTE SOURCE VERIFICATION PROCESS .....</b>	<b>5-1</b>
5.1	Screen for Eligibility .....	5-1
5.2	Establish Scope and Objectives .....	5-1
5.3	Establish Plan to Accomplish Objectives in Real Time.....	5-1
5.4	Establish Contingency Plan .....	5-2
5.5	Establish Capability to Document .....	5-2
5.6	Conduct Trial Run of Technology .....	5-3
5.7	Schedule Verification and Participants .....	5-3
5.8	Conduct Activity .....	5-3
5.9	Confirm Verification Is Complete .....	5-3
5.10	Prepare Release for Shipping/Further Processing.....	5-3
5.11	Conduct Receipt Inspection .....	5-3
<b>6</b>	<b>REMOTE SOURCE VERIFICATION TOOLS/APPLICATIONS.....</b>	<b>6-1</b>
6.1	Verbal/Audio Communications.....	6-1
6.2	Video/Visual Communications .....	6-1
6.3	Sampling of Remote Verification Tools/Applications .....	6-2
<b>7</b>	<b>REFERENCES .....</b>	<b>7-1</b>
<b>A</b>	<b>RECORD OF REVISIONS .....</b>	<b>A-1</b>

## LIST OF FIGURES

---

Figure 4-1 Screening process for eligibility for remote source verification.....	4-3
Figure 5-1 Remote source verification process, steps 1–6.....	5-5
Figure 5-2 Remote source verification process, steps 7–11 .....	5-6
Figure 6-1 Example of image captured during a demonstration activity that was marked up with a box and text in the remote source verification tool .....	6-3



# LIST OF TABLES

---

Table A-1 Revision details .....	A-1
----------------------------------	-----

|



# 1

## OBJECTIVE AND BACKGROUND

---

### 1.1 Objective

The objective of this report is to provide guidance for the application of video and other real-time communication technologies for the successful performance of remote source verification. Since the capabilities of remote source verification are limited, the techniques included in this report are intended for use only in extreme circumstances such as a global pandemic, when performing on-site source verification may not be possible due to conditions that threaten the health and safety of individuals performing the verification or the work being verified.

Successful use of remote source verification involves:

- Screening to ensure the activity being conducted by the supplier can be adequately verified using remote source verification techniques
- Clearly defined scope and objectives
- Technology required to remotely witness important aspects of the activity in real time
- Contingency plans to address the potential for technology failures during the activity
- Means for documenting the activity in a format that provides the verifying entity with objective evidence of the activity

### 1.2 Background

In the first quarter of 2020, many parts of the world began to experience an unprecedented pandemic due to the rapid spread of COVID-19. The global supply chain was impacted in a number of ways. Manufacturing facilities worldwide temporarily closed or experienced reduced capacity as “stay-at-home” orders restricted employees from traveling to work. Although certain nuclear suppliers and manufacturers were categorized as essential by regulatory agencies and were able to remain open, some experienced occasional shutdowns to disinfect facilities after employees tested positive for the disease or came into contact with someone who tested positive.

Due to robust supply chains and on-site inventory, nuclear plant supply chain organizations’ ability to provide spare and replacement items needed to operate and maintain plants experienced relatively low impact, even as the spring outage season approached. One impact, however, was inability to perform quality assurance activities such as audits, commercial-grade surveys, and source verifications at suppliers’ facilities. This report does not address audits or surveys. It specifically addresses source verifications. Source verifications are typically performed to verify successful completion of certain fabrication and testing activities related to equipment that is complex, expensive, or designated for use in nuclear safety-related applications.

This report was prepared to provide Electric Power Research Institute (EPRI) members and their suppliers with guidance for using remote communication and video capabilities to perform remote source verification in extreme circumstances where it is not possible to perform on-site source verification due to conditions that threaten the health and safety of individuals performing the verification.

Although remote source verification cannot replace the ability to observe and verify activities at the source, available technologies can be effectively applied to sufficiently and successfully verify certain activities in extreme circumstances.

### **1.3 Terminology**

A variety of terms have historically been used to describe verification activities performed at the source. These terms include:

- Hold points
- Inspection
- Observation
- Source surveillance
- Source verification
- Verification
- Witness

While some of these terms may be broader than others, the basic precept is that verification involves the purchaser (or its agent) witnessing activities at the supplier's facilities before releasing items for shipment or further processing. Section 2 provides definitions of some of the key terms used in this report.

### **1.4 Entities That Perform Source Verifications**

Source verifications may be performed by licensees, suppliers, or third parties.

Verifications are typically performed by quality assurance, quality control, or specialized inspection personnel. However, engineers, technicians, and others can be trained and qualified to perform specific source verification tasks.

Inspection is a specific form of verification that needs to be performed by an inspector qualified in accordance with standards such as ANSI N45.2.6 [1].

## 1.5 Regulatory Perspective

Depending upon the language and interpretation of applicable regulations, performing remote source verification may require prior authorization by regulatory agencies. As an example, criterion VII of 10 CFR 50, Appendix B [2], includes clear language relating to the use of source verification to accept a basic component for use without commercial-grade dedication:

### *VII. Control of Purchased Material, Equipment, and Services*

*Measures shall be established to assure that purchased material, equipment, and services, whether purchased directly or through contractors and subcontractors, conform to the procurement documents. These measures shall include provisions, as appropriate, for source evaluation and selection, objective evidence of quality furnished by the contractor or subcontractor, **inspection at the contractor or subcontractor source**, and examination of products upon delivery. Documentary evidence that material and equipment conform to the procurement requirements shall be available at the nuclear powerplant or fuel reprocessing plant site prior to installation or use of such material and equipment. This documentary evidence shall be retained at the nuclear powerplant or fuel reprocessing plant site and shall be sufficient to identify the specific requirements, such as codes, standards, or specifications, met by the purchased material and equipment. The effectiveness of the control of quality by contractors and subcontractors shall be assessed by the applicant or designee at intervals consistent with the importance, complexity, and quantity of the product or services. [Emphasis added]*

Nuclear Regulatory Commission (NRC) Inspection Procedure 43004 [3], on source verification pursuant to accepting an item for use as a basic component using commercial-grade dedication, defines source verification as:

*Activities **witnessed at the supplier's facilities** by the purchaser or its agent before releasing the CGI [commercial-grade item] from the vendor or test laboratory facility to confirm by direct observation that the selected critical characteristics are verified by the vendor. [Emphasis added]*

ANSI N45.2.10 [4], endorsed by NRC Regulatory Guide 1.74 [5], defines source surveillance as:

*A review, observation, or inspection for the purpose of verifying that an action has been accomplished as specified **at the location of material procurement or manufacture**. [Emphasis added]*

The regulation clearly states that measures to be taken by the purchaser shall include “**inspection at the ... source**,” the inspection procedure clearly states that the activities are “**witnessed at the supplier’s facilities**,” and the ANSI standard clearly states the action is “**at the location of material procurement or manufacture**.” While the authors of these documents probably did not anticipate the availability of (and therefore did not consider the efficacy of) real-time communication technologies for remote source verification, existing regulatory language in the United States implies verification is conducted in person at the source location.



# 2

## LEXICON AND ACRONYMS

---

### Lexicon

assessment	<p>A review, evaluation, inspection, test, check, surveillance, or audit to determine and document whether items, processes, systems, or services meet specified requirements and perform effectively. ASME NQA-1, Part II, Subpart 2.22, Section 101 [6][7].</p> <p>An all-inclusive term that may include review, evaluation, inspection, test, check, surveillance, or audit to determine and document whether items, processes, systems, or services meet specified requirements and perform effectively. ASME NQA-1, Part I, Introduction, Section 400 [6][7].</p>
checks	<p>The tests, measurements, verifications, or controls placed on an activity by means of investigations, comparisons, or examinations to determine satisfactory condition, accuracy, safety, or performance. ASME NQA-1, Part II, Subpart 2.8, Section 101 [4][6][7].</p>
examination	<p>An element of inspection consisting of investigation of materials, components, supplies, and services to determine conformance to those specified requirements that can be determined by such investigation. Examination is usually nondestructive and includes simple physical manipulation, gaging, and measurement. ANSI N45.2.10 [4][7].</p>
inspection	<p>Examination or measurement to verify whether an item or activity conforms to specified requirements. ASME NQA-1, Part I, Introduction, Section 400 [6][7].</p>
inspector	<p>A person who performs inspection activities to verify conformance to specific requirements. ASME NQA-1, Part I, Introduction, Section 400 [6][7].</p>
remote source verification	<p>A method used by the purchaser or its agent to witness activities, in real time, using technology (such as video communication) in lieu of in-person activities to verify that specified requirements are met.</p>
source surveillance	<p>A review, observation, or inspection for the purpose of verifying that an action has been accomplished as specified at the location of material procurement or manufacture. ANSI N45.2.10 [4], as endorsed by NRC Reg. Guide 1.74 [5].</p>

source verification	Activities witnessed at the supplier's facilities by the purchaser or its agent before releasing the CGI from the vendor or test laboratory facility to confirm by direct observation that the selected critical characteristics are verified by the vendor. EPRI Report 3002002982 [8].
special process	A process, the results of which are highly dependent on the control of the process or the skill of the operators, or both, and in which the specified quality cannot be readily determined by inspection or test of the product. ASME NQA-1, Part I, Introduction, Section 400 [6][7].
surveillance	The act of monitoring or observing to verify whether an item or activity conforms to specified requirements. ASME NQA-1, Part I, Introduction, Section 400 [6][7].
testing	An element of verification for the determination of the capability of an item to meet specified requirements by subjecting the item to a set of physical, chemical, environmental, or operating conditions. ANSI N45.2.10 [4], as endorsed by NRC Reg. Guide 1.74 [5].
verification	The act of reviewing, inspecting, testing, checking, auditing, or otherwise determining and documenting whether items, processes, services, or documents conform to specified requirements. ASME NQA-1, Part I, Introduction, Section 400 [6][7].

## **Acronyms and Abbreviations**

ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
CFR	Code of Federal Regulations
COVID-19	coronavirus disease 2019
EPRI	Electric Power Research Institute
M&TE	measuring and test equipment
NIAC	Nuclear Industry Assessment Corporation
NQA	nuclear quality assurance
NRC	U.S. Nuclear Regulatory Commission
NUPIC	Nuclear Procurement Issues Corporation (formerly Nuclear Procurement Issues Committee)

# 3

## LIMITATIONS AND APPLICATIONS OF REMOTE SOURCE VERIFICATION

---

### 3.1 Limitations of Remote Source Verification

Source verification involves witnessing an activity in person. The verifier is able not only to observe the activity itself, but also to review the actual documents and procedures as well as preparations, equipment, personnel, and other things going on in the vicinity of the activity. Since the verifier is present, they have the ability to simply ask questions during the process, request adjustments, double-check measurements, and so forth.

Remote source verification conducted using technology such as video cameras clearly does not permit the same flexibility as in-person verification, as the verifier's field of vision and ability to observe and verify are limited by the frame of the camera or video screen. This ability is also limited by the capabilities of the video equipment and the individuals operating it.

### 3.2 Typical Applications of Source Verification

Source verification is a quality activity that can be used to verify a wide variety of activities.

Section 701 of ASME NQA-1, Part III, Subpart 3.1-7.1, "Implementing Guidance for Part I, Requirement 7: Control of Purchased Items and Services" [6][7] includes the following language about source verification:

*Among the methods used in the nuclear industry to accept an item or service from a Supplier are:*

#### *701 Source Verification*

*Acceptance by source verification may be most desirable when the item or service is one of the following:*

- (a) vital to plant safety*
- (b) difficult to verify quality characteristics after delivery*
- (c) complex in design, manufacture, and test*

*Source verification may not be necessary when the quality of the item can be verified by review of test reports, inspections upon receipt, or other means.*

*The source verification activities may include the following checks.*

*701.1 Documentation has been submitted as required and provides verification of approvals, material, applicable inspections, and tests.*

*701.2 Fabrication procedures and processes have been approved and complied with and the applicable qualifications, process records, and certifications are available.*

*701.3 Components and assemblies have been inspected, examined, and tested as required and applicable inspection, test, and certification records are available*

*701.4 Nonconformances have been dispositioned as required.*

*701.5 Components and assemblies are cleaned, preserved, packed, and identified in accordance with specified requirements.*

Remote source verification may not be an effective alternative for the full range of source verification activities. Therefore, screening should be performed to determine if remote source verification is appropriate for the activities being verified prior to conducting such verification.

# 4

## REMOTE SOURCE VERIFICATION SCREENING PROCESS

---

Figure 4-1 below illustrates a remote source verification screening process. The steps in Figure 4-1 are numbered to correspond with the narrative below. The results of the screening process should be documented.

### 4.1 Is it possible to do on-site verification?

If it is possible for the individual(s) performing the verification to be on site, the activity is not eligible for remote source verification. If on-site verification cannot be performed, the reason for this should be documented, and screening may proceed.

The intent is to limit remote source verification to situations where an on-site presence is not possible due to restrictions imposed by authorities (such as stay-at-home orders) that are related to the safety of individuals performing the source verification. A “no” answer shall not be based on factors such as cost savings, expediting, or ordinary unavailability of personnel.

### 4.2 Is the activity an assessment?

Remote source verification is not intended to be used to conduct quality assessments such as audits or commercial-grade surveys. If the answer to this question is yes, the activity is not eligible for remote source verification. If the answer is no, screening may proceed.

### 4.3 Can the activity be adequately verified remotely?

The intent of this question is to determine if the activity can be adequately verified using remote source verification. If the activity cannot be adequately verified remotely, it is not eligible for remote source verification. If it can be adequately verified remotely, screening may proceed.

Certain types of activities and special processes may require in-person inspection. An example might be an inspection that is highly dependent on visual examination or requires very close observation, such as a weld inspection. Examples of activities that could be adequately verified remotely would include witnessing a calibration or acceptance test.

Another consideration when determining if an activity can be adequately verified remotely is confidence in the ability of the organization performing the activities being verified to understand the objectives and be willing to enable successful completion of the verification activities. Factors to consider include:

- Previous experience with the supplier
- The supplier’s capability and willingness to conduct source verification remotely

- The complexity of the activity being performed
- Ability of the supplier to implement controls to ensure successful completion and documentation of source verification

#### **4.4 Can progress and results be captured and communicated in real time?**

The intent of this question is to determine if technology can be used to capture the progress and results of the activity remotely, in real time (while the activity occurs), with two-way communication. Considerations may include the ability of cameras to capture all important aspects of the activity, the ability of the person doing the verification to have an appropriate level of control over the process, and so on. For example, remote source verification cannot be based on previously recorded video. The verifier must be able to communicate with the entity performing the activity while it is being performed.

If the answer is no, the activity is not eligible for remote source verification. If the answer is yes, screening may proceed.

#### **4.5 Can a maintainable record be created for objective evidence?**

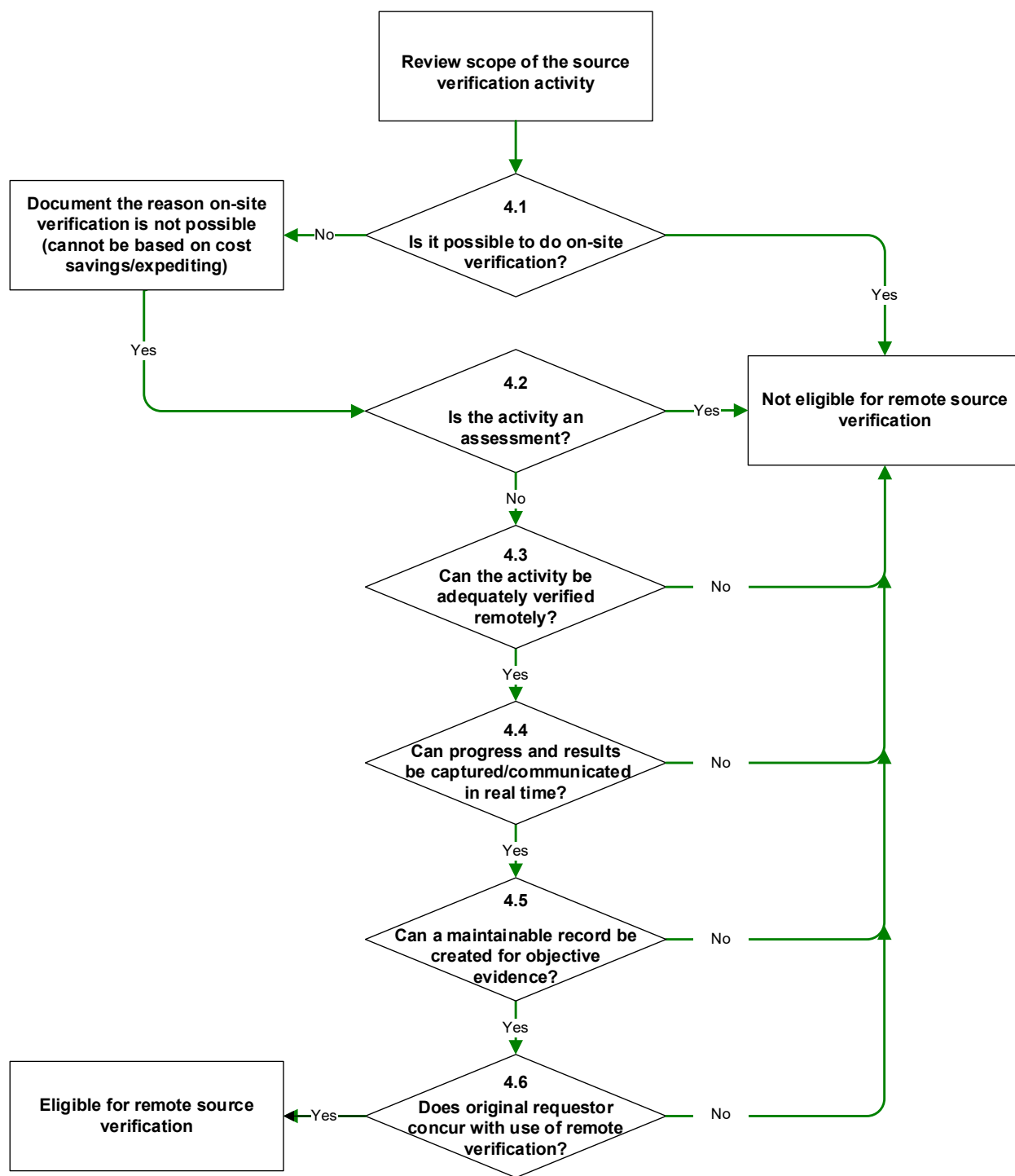
The purpose of this question is to determine if the verifier can document the activity in a format the verifier can maintain and control as objective evidence in a quality record. If the answer is no, the activity is not eligible for remote source verification. If the answer is yes, screening may proceed. Another consideration is the ability to uniquely identify the item so that traceability to the verification results can be ensured.

#### **4.6 Does the original requestor concur with use of remote verification?**

This question applies when the entity performing the screening is different than the organization or individual that originally requested the traditional source verification. It is intended to determine whether the original requestor agrees the activity can be successfully accomplished remotely.

This ensures the original requestor does not object to use of remote source verification after the verification is completed. It also provides the original requestor with an opportunity to identify an alternative acceptance method. For example, if the source verification activity was to witness a pressure test, the original requestor might determine the purchaser could do the pressure test after delivery instead.

If the answer is yes, screening is complete, and the activity is eligible for remote source verification. If the answer is no, the activity is not eligible for remote source verification.



**Figure 4-1**  
Screening process for eligibility for remote source verification



# 5

## REMOTE SOURCE VERIFICATION PROCESS

---

Figures 5-1 and 5-2 below illustrate a remote source verification process. The steps in Figures 5-1 and 5-2 numbered to correspond with the narrative below.

### 5.1 Screen for Eligibility

Screen the activity to be verified to determine if it is eligible for remote source verification. The screening process is illustrated in Figure 4-1 and described in Section 4 of this report.

### 5.2 Establish Scope and Objectives

Establish or review the scope and objectives of the activity in the source verification plan and determine if they need to be adjusted to account for additional activities and resources needed to accomplish verification remotely. Additional activities and resources might include:

- Setup and operation of video capabilities
- Setup of primary and secondary communication
- Ability to broadcast/communicate/record the activity

### 5.3 Establish Plan to Accomplish Objectives in Real Time

Develop a plan for accomplishing the verification objectives in real time during the remote source verification. Discuss the activity with the affected stakeholders to ensure that they concur with the use of remote source verification and that the plan addresses their objectives.

Planning may include:

- Identification and review of existing processes and procedures to determine if modification is necessary to facilitate remote verification. This might include:
  - Review of verification plans, commercial-grade dedication technical evaluations, and related documents to assure they accommodate variations in techniques applied during remote source verification
  - Addition to existing procedures of steps or hold points to permit verbal concurrence before an activity begins; that is, specification of points in the activity where the verifier can ask questions or request changes
  - Addition of steps to enable confirmation that items verified are identified or marked in a way that can be used at receipt to confirm the items shipped were, in fact, the items verified

- Addition of steps to communicate when to begin broadcasting, recording, and other actions
- Addition of frequent verbal checks to ensure the remote source verification equipment is working and providing the visuals needed by the verifier
- Identification of equipment and instrumentation that need to be visually available to complete the verification
- Identification of the types and quantities of video and communication equipment needed to provide adequate visual observation:
  - Cameras to look at equipment
  - Cameras to look at people
  - Cameras to enable measuring and test equipment (M&TE) changes
  - Means of obtaining visuals (for example, software, applications, and tools; see Section 6)
  - Means of opening multiple sessions of the application simultaneously
- Development of a protocol for communication (such as audio) so that activities can be stopped as needed, questions can be asked during activities, etc.
- Development of a protocol for resolution of nonconformances identified during the remote source verification
- Identification of documents and procedures that can be reviewed prior to conduct of the activity (for example, personnel qualifications, M&TE records, test procedures)
- Identification of M&TE and how its status will be verified prior to the start of the activity
- Consideration of additional receipt inspection activities if necessary

## **5.4 Establish Contingency Plan**

Establish primary and secondary forms of communication during the activity to ensure means of signaling/recovering if communication fails. Consider options such as:

- A second verifier
- Means to record or capture photos of the activity being witnessed (several of the tools identified in Section 6 include such capabilities)
- Use of several tools at once, such as a web conference in addition to a remote video verification tool

Identify contingency communication protocols. Determine who will contact whom, and by what means, in the event power, internet, or cell phone signal is lost. Consider including contact and other information in the remote source verification plan, procedures, or a documented backup plan.

## **5.5 Establish Capability to Document**

Establish a method of documenting the activity and results.

## **5.6 Conduct Trial Run of Technology**

Working with the supplier, perform a trial run to verify that primary and contingency equipment, including items such as the following, work as expected:

- Two-way audio communication
- Video
- The contingency equipment and communication plan (confirming the capability to recognize when an individual or location involved in the activity loses power, phone, etc., as well as to reestablish communication)

## **5.7 Schedule Verification and Participants**

Establish the scheduled date and time for the verification.

Schedule resources that will be participating. Consider participation needs if multiple things need to be monitored. Participation by more than one verifier may also be part of contingency planning to address communication/technology failures at one verifier's location.

## **5.8 Conduct Activity**

The activity should be conducted as planned in step 5.3 and can emulate normal source verification processes.

Good practices include the following:

- Conduct pre-job brief (remind about communication, procedure, special aspects)
- Verify the training/qualification of the person performing the activity
- Confirm/document item traceability (identification)
- Review M&TE and other related records
- Review procedure/test/special process/sequence
- Conduct activity

## **5.9 Confirm Verification Is Complete**

Confirm that the verification activities included in the verification plan are complete.

## **5.10 Prepare Release for Shipping/Further Processing**

A release for shipping or further processing will need to be prepared by the verifier and transmitted to the supplier.

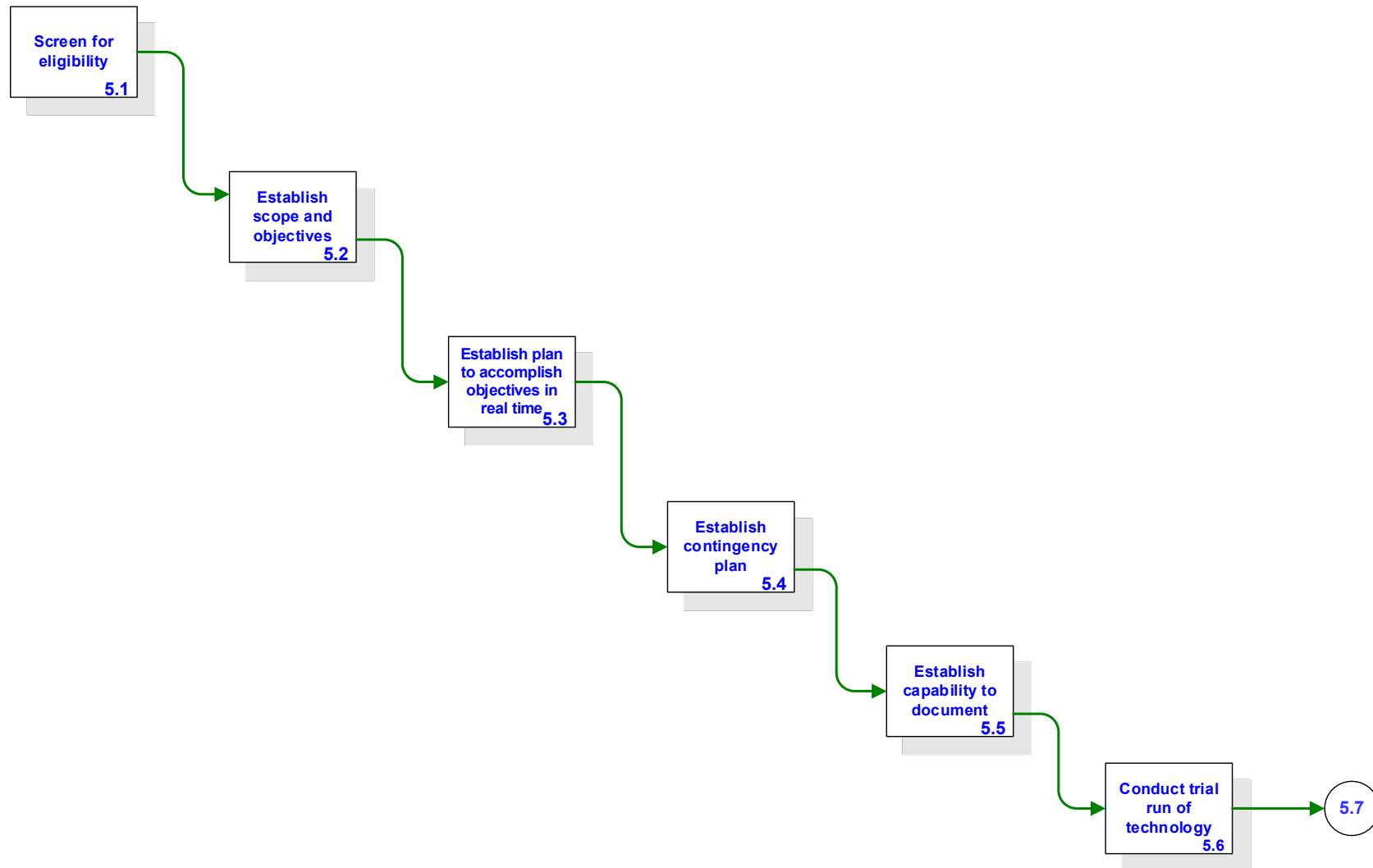
## **5.11 Conduct Receipt Inspection**

Receipt inspection should verify the items received are the items verified during remote source verification and may include a review of documentation.

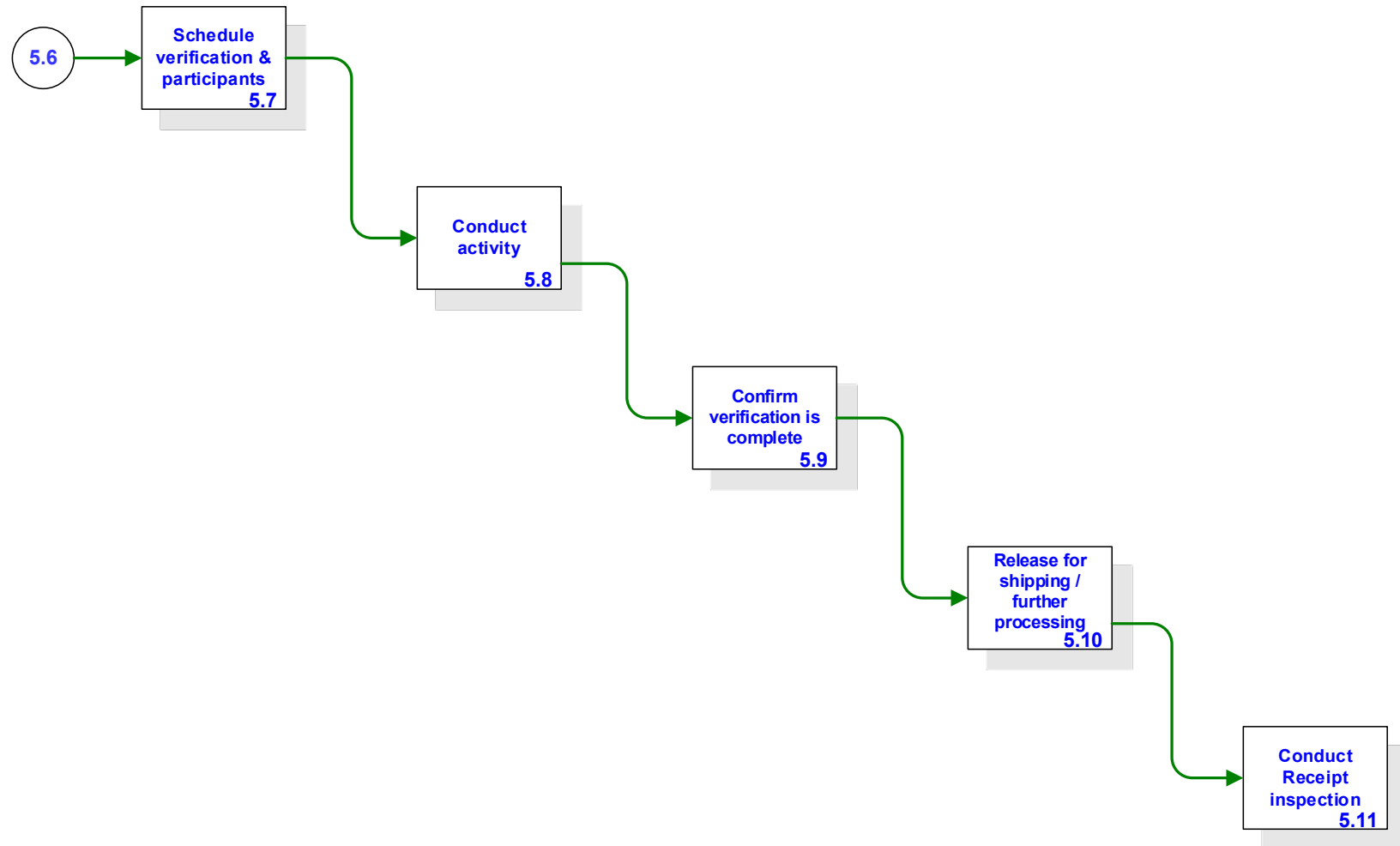
In certain cases, enhancements to receipt inspection may be appropriate, such as:

- Post installation testing
- Notification to the maintenance organization that the item was accepted using remote verification

Enhanced receipt inspection should be appropriately documented.



**Figure 5-1**  
Remote source verification process, steps 1–6



**Figure 5-2**  
Remote source verification process, steps 7–11

# 6

## REMOTE SOURCE VERIFICATION TOOLS/APPLICATIONS

---

Appropriate remote source verification tools should be selected to accomplish the objective of the verification. In addition to audio or verbal communication tools and applications, many video-based products are available. The products reviewed during preparation of this report are either free or subscription based, or charge per use based on increments of time.

Although the products identified in this section are representative of those available, many more exist. Mention in this report does not indicate endorsement or vetting of the products for use.

### 6.1 Verbal/Audio Communications

When selecting primary and contingency audio communication tools, consider options that might not fail at the same time as video communication tools. For example, if there is a chance that internet bandwidth might cause poor quality or cessation of internet-based audio, a mobile phone, landline, or satellite phone might be a good choice for contingency or even concurrent communication during the activity. Audio communication tools include:

- Satellite phones
- Mobile phones
- Internet-based applications such as Skype, FaceTime, and WeChat

### 6.2 Video/Visual Communications

A wide variety of video communication tools and applications exist that can be up and running very quickly. When selecting a product, verify compatibility with the equipment that will be used by the verifier and the organization performing the activity. Although standard office-variety tools might suffice for some activities, specialized remote verification applications offer features that may enable a greater range of activities. Some of these features include:

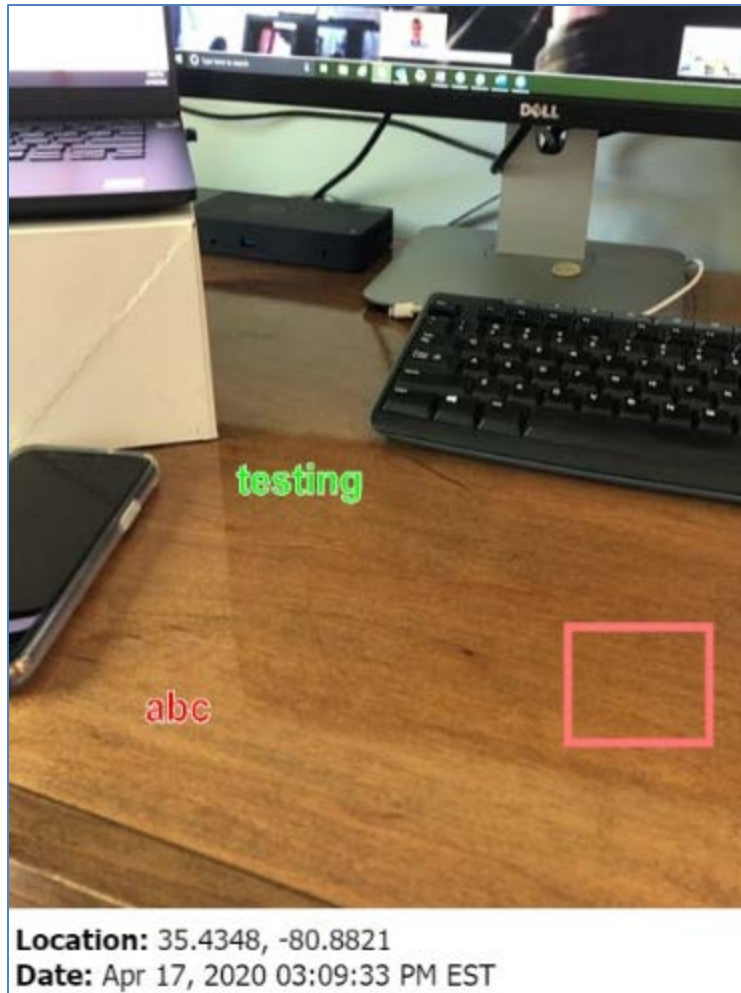
- Ability to accommodate multiple users at the same time
- Ability to display, share, and review documents on-screen
- Ability to switch the source of video feed to any person connected
- Ability to capture photos or snapshots and mark them up while the verification is being performed, as illustrated by the box and text added to the image in Figure 6-1
- Timestamping and geotagging of photos and videos (objective evidence)
- Ability to capture and download video of the verification
- Use of smart phone cameras as the means of video communication

- Ability to plug external cameras (including specialized cameras such as borescopes and infrared) into mobile devices or laptops for a better picture
- Ability for the remote verifier to zoom in on demand
- Ability for the remote verifier to point to objects on the video display to communicate with individuals performing the verification via video display at the verification location
- Ability to save images and video directly to the verifier's cloud-based file storage location
- Ability to take notes during the verification
- Support for "smart glasses" devices
- Ability to invite multiple organizations to see the record of the activity

### **6.3 Sampling of Remote Verification Tools/Applications**

Some of the products available at the time this report was developed are:

- Avatour
- Blitzz
- Google Meet
- GoToAssist Seeit
- Skype
- SnapInspect
- Zoom



**Figure 6-1**  
Example of image captured during a demonstration activity that was marked up with a box and text in the remote source verification tool



# 7

## REFERENCES

---

1. ANSI N45.2.6, Qualifications of Inspection, Examination, and Testing Personnel for Nuclear Power Plants. American National Standards Institute, Washington, DC: 1978.
2. U.S. Code of Federal Regulations, Title 10, Chapter 1, Part 50, Domestic Licensing of Production and Utilization Facilities. Office of the Federal Register, National Archives and Records Administration, U.S. Government Printing Office, Washington, DC.
3. Inspection Procedure 43004—Inspection of Commercial-Grade Dedication Programs. NRC Inspection Manual. U.S. Nuclear Regulatory Commission, Government Printing Office, Washington, DC: January 2017.
4. ANSI N45.2.10, Quality Assurance Requirements Terms and Definitions. American National Standards Institute, Washington, DC: 1973.
5. Regulatory Guide 1.74, Quality Assurance Terms and Definitions. U.S. Nuclear Regulatory Commission, Washington, DC: February 1974.
6. ASME NQA-1-2015. Quality Assurance Requirements for Nuclear Facility Applications. American Society of Mechanical Engineers, New York, NY: 2015.
7. ASME NQA-1-2019. Quality Assurance Requirements for Nuclear Facility Applications. American Society of Mechanical Engineers, New York, NY: 2019.
8. *Plant Engineering: Guideline for the Acceptance of Commercial-Grade Items in Nuclear Safety-Related Applications: Revision 1 to EPRI NP-5652 and TR-102260*. EPRI, Palo Alto, CA: 2014. 3002002982.



# A

## RECORD OF REVISIONS

Revision Number	Revisions
3002019436	Original issue (EPRI report 3002019436) published April 2020
3002019436-A	<p>NRC-approved version of 3002019436 published September 2020</p> <p>The report as originally published (3002019436) was revised to incorporate NRC staff's conclusion that remote source verification will be an effective alternative for source verification activities during exigent conditions.</p> <p>In accordance with an NRC request, the <a href="#">safety evaluation</a> is included in the front matter of this report and the report number includes an "-A" indicating the version of the report accepted by the NRC staff.</p> <p>Non-essential format changes were made to comply with the current EPRI publication guidelines.</p> <p>Details of the revision can be found in Appendix A which was added as part of this revision.</p>

**Table A-1**  
**Revision details**

Required Revision	Source of Requirement for Revision	Description of Revision Implementation
Add "-A" to the report number on report cover	NRC Safety Evaluation Topical Report Condition General Information on Topical Reports (nrc.gov)	Document number updated from 3002019436 to 3002019436-A
Add NRC Safety Evaluation behind title page	NRC Safety Evaluation Topical Report Condition General Information on Topical Reports (nrc.gov)	Added NRC Safety Evaluation to report front matter after Disclaimer page.
Add "-A" to report number in citation instructions on Acknowledgements page in report front matter	NRC Safety Evaluation Topical Report Condition General Information on Topical Reports (nrc.gov)	Document number updated from 3002019436 to 3002019436-A

---

*Record of Revisions*

<b>Required Revision</b>	<b>Source of Requirement for Revision</b>	<b>Description of Revision Implementation</b>
Add full program number in Executive Summary	EPRI publishing practices	Full EPRI program number added to Executive Summary
Add Record of Revisions to report front matter	EPRI publishing practices	Record of Revisions section added to report front matter after Executive Summary section.
Add List of Tables to report front matter	EPRI publishing practices	List of Tables added to report front matter
Update Table of Contents to include new Appendix A	EPRI publishing practices	Table of Contents updated to include Appendix A, Record of Revisions
Add Appendix A	EPRI publishing practices	Appendix A added
Revision bars	EPRI publishing practices	Revision bars added in margins to visually identify all changes associated with the “-A” revision (with exception of report cover)



**The Electric Power Research Institute, Inc.** (EPRI, [www.epri.com](http://www.epri.com)) conducts research and development relating to the generation, delivery and use of electricity for the benefit of the public. An independent, nonprofit organization, EPRI brings together its scientists and engineers as well as experts from academia and industry to help address challenges in electricity, including reliability, efficiency, affordability, health, safety and the environment. EPRI also provides technology, policy and economic analyses to drive long-range research and development planning, and supports research in emerging technologies. EPRI members represent 90% of the electricity generated and delivered in the United States with international participation extending to nearly 40 countries. EPRI's principal offices and laboratories are located in Palo Alto, Calif.; Charlotte, N.C.; Knoxville, Tenn.; Dallas, Texas; Lenox, Mass.; and Washington, D.C.

Together...Shaping the Future of Electricity

***Programs:***

Nuclear Power

Plant Engineering

© 2020 Electric Power Research Institute (EPRI), Inc. All rights reserved. Electric Power Research Institute, EPRI, and TOGETHER...SHAPING THE FUTURE OF ELECTRICITY are registered service marks of the Electric Power Research Institute, Inc.

3002019436-A

**Electric Power Research Institute**

3420 Hillview Avenue, Palo Alto, California 94304-1338 • PO Box 10412, Palo Alto, California 94303-0813 USA  
800.313.3774 • 650.855.2121 • [askepri@epri.com](mailto:askepri@epri.com) • [www.epri.com](http://www.epri.com)