



Organization of Agreement States

**Barbara Hamrick, Chair, California**  
**Paul Schmidt, Chair-Elect, Wisconsin**  
**Jared Thompson, Past-Chair, Arkansas**  
**Tom Conley, Treasurer, Kansas**  
**Alice Rogers, Secretary, Texas**  
**Steve Collins, Director, Illinois**  
**Mike Broderick, Director, Oklahoma**

---

November 3, 2005

DOCKETED  
USNRC

Ms. Annette L. Vietti-Cook, Secretary  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001  
Attn: Rulemakings and Adjudications Staff

November 16, 2005 (9:00 am)  
OFFICE OF THE SECRETARY  
RULEMAKING AND  
ADJUDICATIONS STAFF

Dear Ms. Vietti-Cook:

PRM 34-06 (70FR 76724)

On behalf of the Organization of Agreement States (OAS) and pursuant to 10 CFR 2.802, the enclosed petition is submitted to the U.S. Nuclear Regulatory Commission (NRC) to amend 10 CFR 34. The purpose of this petition is to strengthen the regulation of radioactive materials by requiring that an individual receive at least 40 hours of radiation safety training prior to using sources of radiation for industrial radiography, by clarifying the requirements for at least two individuals to be present at a temporary job site, and by clarifying how many individuals are required to meet surveillance requirements.

It is the desire of the OAS to promote an NRC/Agreement State partnership for the development and implementation of uniform and consistent regulations that promote public health and safety.

As petitioner, the OAS requests that the Commission work closely with the stakeholders and the OAS Board to achieve a resolution to the items that are the subject of this petition.

Thank you for your consideration. If there are any questions regarding this petition, please contact Steve Collins at 217-785-6982 or [Collins@iema.state.il.us](mailto:Collins@iema.state.il.us) or me at [Bhamrick@dhs.ca.gov](mailto:Bhamrick@dhs.ca.gov) or at the contact information provided below.

Sincerely,

Barbara Hamrick, Chair  
Organization of Agreement States  
California Department of Health Services  
Radiologic Health Branch  
1800 E. Lambert Road, #125  
Brea, CA 92821  
714-257-2031  
916-341-7222 (fax)

cc: Mr. Luis Reyes, Executive Director of Operations, USNRC  
Ms. Janet Schlueter, Director, Office of State and Tribal Programs, USNRC  
OAS Executive Board  
Ms. Debra McBaugh, Chair, Conference of Radiation Control Program Directors  
Mr. Thom Kerr, Executive Director, Conference of Radiation Control Program Directors



Organization of Agreement States

**PETITION FOR RULEMAKING  
TO AMEND 10 CFR 34 and  
REVISE GUIDANCE IN NUREG 1556, VOL. 2**

**I. Issue**

On behalf of its members, the Organization of Agreement States (OAS) requests that the U.S. Nuclear Regulatory Commission (NRC) amend sections of 10 CFR Part 34 and change the guidance in NUREG 1556, Vol. 2 to reflect the performance-based changes in the proposed amendments.

While the OAS agrees with a requirement for a two-person radiography crew at temporary job sites, the organization disagrees with NRC's prescriptive interpretation of the requirements for a two-person crew, the apparent conflict between NRC's surveillance requirement and two-person crew requirement, and NRC's omission of a radiation safety training requirement prior to an individual using sources of radiation. Many states have adopted industrial radiography requirements that are equivalent to those adopted by Texas in 1986. The rules adopted by Texas reflect earlier concepts adopted by Louisiana concerning testing of radiographers. Texas reviewed over 10 years of overexposure data and determined that the majority of industrial radiographer overexposures could be attributed to inadequate safety training, failure to follow established safety procedures, or equipment malfunction. These were the root causes of the large number of industrial radiographer overexposures in Texas (and other states). The 1986 Texas industrial radiography rules were developed over a period of five years with careful consideration given to radiography safety problems and with extensive input from stakeholders. Many of the states' requirements are prescriptive when addressing the root causes identified by Texas. Specifically, many states' requirements are prescriptive concerning training, equipment standards, and accountability of the individual for following safety procedures (such as escalated enforcement against an individual's industrial radiographer certification). Many of the states' requirements and enforcement of those requirements are more performance-based in other areas such as the two-person crew requirement.

While it was encouraging that the NRC adopted requirements in 1997 similar to those that had previously been adopted by many states, it is disheartening that the NRC industrial radiography requirements in 10 CFR Part 34 do not address one of the primary factors identified as a root cause of a large number of industrial radiographer overexposures. The failure to require safety training prior to using sources of radiation is failing to address one of the root causes of industrial radiography incidents. Current

NRC requirements allow a radiographer assistant to use sources of radiation without attending a safety course that addresses the basic radiation topics outlined in rule. It is possible for an individual to work for years as a radiographer assistant and never receive radiation safety training. The NRC rules merely require that the assistant pass a written exam on the rule, license, and the licensee's operating and emergency procedures and pass a practical exam on the use of the radiographic equipment. Both written and practical exams are administered by the licensee. It is important to remember that not all radiography is conducted by the larger radiography companies who have the resources to establish and oversee adequate and often exemplary training programs.

In contrast to the NRC's minimum training requirements, many of the states' rules require that prior to using sources of radiation, an individual must complete a 40-hour safety course addressing radiation safety fundamentals specified in rule, in addition to passing a licensee-administered written exam on the rules, license conditions, and operating and emergency procedures and passing a licensee-administered practical exam on the use of the equipment. In many states this requirement applies equally to a radiographer's assistant. The OAS believes it is critical for an individual to receive radiation safety training prior to operating sources of radiation.

The NRC requirement concerning the two-person crew requires the radiographer operating the radiographic equipment to be accompanied by at least one other qualified radiographer or an assistant whenever radiography is performed at a location other than a permanent radiographic installation. The NRC rule requires the additional qualified individual to observe the operations and be capable of providing immediate assistance to prevent unauthorized entry. This rule has been interpreted in guidance document NUREG-1556, Vol. 2 to mean, "Both individuals must maintain constant surveillance of the operations and be capable of providing immediate assistance to prevent unauthorized entry to the restricted area." If the temporary job site presents a situation in which the surveillance requirement of 10 CFR §34.51 is met, the NRC interpretation means that even if a two-person crew consists of two certified radiographers, both must be with the camera; or if one of the members is in the darkroom, radiography cannot be performed. The impact of this interpretation on the industry is that companies must employ an additional third person to develop film in the darkroom while two individuals are exposing film and preventing unauthorized entry, regardless of what the situation warrants. Alternatively, the licensee must use additional time at a job site to expose film and then develop it. Either situation results in added, unnecessary cost to the industry. The OAS contends that in a temporary job site situation in which the crew consists of two qualified radiographers and the surveillance requirement can be met, the second individual is available to provide immediate assistance, whether in the darkroom or performing other job-related duties nearby.

The second sentence in 10 CFR §34.41(a) states, "The additional qualified individual shall observe the operations and be capable of providing immediate assistance to prevent unauthorized entry." However, 10 CFR §34.51 states, "During each radiographic operation the radiographer, or the other individual present, as required by §34.41, shall maintain continuous direct visual surveillance of the operation to protect against

unauthorized entry...” The requirement in §34.41(a) is designated as Compatibility B and the requirement in §34.51 is designated as Compatibility C. Use of the word “shall” in §34.41(a) mandates the function of the second individual at the job site and that function appears to be surveillance, which is addressed in 10 CFR §34.51. Use of the word “or” in §34.51 allows either individual to perform the surveillance function. Further, the word “capable” as used in §34.41(a) is not defined, is open to multiple interpretations, and is unenforceable. The OAS contends that the second sentence in §34.41(a) should be deleted.

## **II. Statement of Petitioner’s Interest**

The OAS is a non-profit, voluntary, scientific and professional society incorporated in the District of Columbia. The membership of OAS consists of state radiation control program directors and staff from the 33 Agreement States who are responsible for implementation of their respective radioactive material programs. The purpose of the OAS is to provide a mechanism for the Agreement States to work with each other and with the NRC on regulatory issues associated with their respective agreements.

Agreement States are those states that have entered into an effective regulatory discontinuance agreement with the NRC under subsection 274b. of the Atomic Energy Act (AEA). The Agreement States regulate most types of radioactive material, including reactor fission byproducts, source material (uranium and thorium) and special nuclear materials in quantities not sufficient to form a critical mass, in accordance with the compatibility requirements of the AEA. The NRC periodically reviews the performance of each Agreement State to assure compatibility with NRC’s regulatory requirements.

Agreement States issue radioactive material licenses, promulgate regulations and enforce these regulations under the authority of each individual state’s laws. The Agreement States exercise their license and enforcement programs under direction of their governors in a manner that is compatible with the licensing and enforcement programs of the NRC. The 33 existing Agreement States currently license and regulate approximately 16,800 radioactive material licenses, whereas the NRC regulates approximately 4,400 licensees.

In the report of the NRC/State Working Group on the National Materials Program, the concept of “Centers of Expertise” was introduced. The concept optimizes resources of federal, state, professional, and industrial organizations and reduces duplicate efforts. Some Agreement States and NRC regions have, over time, developed considerable experience and expertise with specific uses of radioactive materials. Examples of areas of expertise include well logging, industrial radiography, positron emission tomography, and intravascular brachytherapy. Agreement States and NRC regions that have developed expertise in specific uses should be identified and used as a resource by other regulatory programs.

The Centers of Expertise concerning industrial radiography regulation are the states, specifically those states with a large oil and gas industry because industrial radiography is

closely tied to that industry. Texas is one of those states and was a leader in promulgating comprehensive industrial radiography requirements in 1986.

### **III. Background**

The NRC's two-person rule in 10 CFR 34.41(a) became effective on June 27, 1998. When the two-person rule was developed, there was strong and sustained support from the states, licensees, and industry for the concept of having at least two qualified individuals present whenever radiography is performed at temporary job sites. This support came as no surprise, since Texas has had a requirement for a two-person crew since 1986, which was adopted at that time along with specific training requirements. By the effective date of the NRC rule, seven states were already nationally recognized as having comparable industrial radiography program components and were issuing industrial radiographer certifications.

The NRC's two-person rule requires that, "[T]he additional qualified individual shall observe the operations and be capable of providing immediate assistance to prevent unauthorized entry." The expectation of the two-person rule, as expressed in the Statements of Considerations (SOC), is that, at a temporary job site, the second qualified individual would be able to secure the restricted area and the source and provide aid, as needed. In the SOC, the Commission stressed that having a second qualified individual is particularly important when radiography is performed where a radiographer alone may not be able to control access to the restricted area. Additionally, the second person should be trained in order to provide a safe working environment for radiography personnel, workers, and other members of the public at a temporary job site.

Safety was the basis for having two individuals at a job site; and, requiring a trainee/assistant to have more extensive training (e.g., completion of a 40-hour radiation safety training course) before handling radiographic equipment increases the probability that he or she would be able to observe the area and provide assistance if needed.

While there were many comments on the desirability of the trainer/trainee or radiographer/assistant crew combination as opposed to the two radiographer crew, and an acceptance of the requirement that the trainee/assistant be under the direct supervision of the trainer/radiographer, the issue regarding whether both individuals of a two radiographer crew had to be physically present during actual exposures was never addressed by the NRC. In several states, if a two-person crew consists of two radiographers, one may be in the darkroom while the other is exposing film, provided the surveillance requirement is met.

During the NRC's 2001 Integrated Materials Performance Evaluation Program (IMPEP) review of the Texas radioactive materials program, the draft IMPEP Report concluded that the Texas implementation of its two-person rule in Title 25, §289.255(v)(7)(G) was not compatible with the NRC's two-person rule in 10 CFR §34.41(a), which is designated as a Category B for compatibility purposes. The IMPEP review team submitted the Texas two-person rule to the NRC's Office of General Counsel (OGC) for their review.

Because the Texas rule allowed for a different interpretation, OGC concluded that the Texas rule was not compatible.

Texas indicated in its response to the IMPEP Report that its rules were a comprehensive set of requirements implemented to directly and prescriptively address the identified root causes of the large number of overexposures that occurred in that state before it implemented the requirements in 1986. Texas made several revisions to its industrial radiography rules that became effective April 1999. Texas sent the proposed revisions to the NRC for review on October 23, 1998, and received no comments concerning the two-person crew rule. The NRC found the Texas rules to be compatible in this area at that time.

Based on the IMPEP evaluation criteria, the review team recommended in 2001 that Texas' performance with respect to the indicator, Legislation and Program Elements Required for Compatibility, be found satisfactory. The Management Review Board (MRB) believed that the Texas program presented sufficient information to warrant reconsideration of how the rule could be implemented.

Therefore, in June 2002, the Office of Nuclear Materials Safety and Safeguards coordinated with the Office of State and Tribal Programs, the CRCPD and the OAS to establish a Working Group (WG) to re-evaluate the two-person rule to assess the effectiveness of the intended outcomes, including experience from past events, and propose a strategy and rule interpretation that best achieves the goal of safety.

The WG made the following observations during its review of the rule:

- Since its effective date, the NRC has consistently implemented the two-person rule to require both qualified individuals to maintain continuous direct visual surveillance when radiographic operations are being conducted.
- The WG interviewed nine Agreement States that are also radiographer certifying states regarding the implementation of their two-person rule. Six of nine Agreement States allow licensees the flexibility to determine if radiographic operations can be conducted safely when the first radiographer is able to observe operations and prevent intrusion into the restricted area while the second radiographer is involved in a related activity nearby. The three remaining states indicated that they required both radiographers to provide direct visual surveillance during radiographic operations.

The actual words of the two-person crew requirement read very similarly for each of these certifying states, and each state is committed to the underlying safety objective for the two-person rule. The differences lie in the latitude given by the various states to their licensees in how efficiency in operations can be accomplished without sacrificing safety. Worksite characteristics are considered, whether it is in a populated or remote area, or is a multi-level structure, and that the darkroom must be close by.

The nine states interviewed are the Centers of Expertise in the industrial radiography and certification arenas. They, together with Texas, have the clear majority share of the radiography licenses and activity in the U.S. The potential for differences in worksite settings in these states is great. Allowing one of two radiographers to work in the darkroom will not work in all instances. Some of these states have incorporated the opportunity to accommodate these differences in their interpretation of this rule, using a performance-based approach that offers flexibility in the appropriate situations, with accountability, to their licensees.

- The WG was not able to attribute events involving industrial radiography to the failure of the two-person rule, much less to isolate the surveillance component of the regulation, because the effectiveness of the two-person rule has not been isolated from the other components in the regulatory framework.
- The WG found that risk information obtained from NUREG/CR-6642 does not support the manner in which the NRC requires the two-person rule to be implemented as a requirement to enhance safety. The WG found that during routine operations, the requirement to have an additional qualified individual present may actually increase overall worker occupational radiation exposure, thereby increasing the overall societal latent cancer risk from routine operations.
- The WG found that using only two persons to provide surveillance of radiography operations may not always be adequate to prevent unauthorized access to restricted areas by members of the public. However, to be present and to be exposed to the radiation field in instances when radiographic operations are performed at temporary job sites merely to meet the requirements of the two-person rule, would not be considered As Low as is Reasonably Achievable (ALARA).
- When the two-person rule was enacted under the previous compatibility designations, the SOC indicated Agreement State compatibility for operational safety standards, i.e., Subpart D- Radiation Safety Requirements, which includes §34.41, as Division 2 Matters of Compatibility. In 1997, the Joint Working Group on Adequacy and Compatibility transposed those compatibility determinations to the current designations. While reviewing the compatibility designations, the WG noted a difference in the designations between §34.41 and §34.51 for the same essential objective, surveillance. In §34.41 the surveillance component is designated compatibility Category B while in §34.51, it is designated Category C.

The WG noted that the SOC, which discusses the requirements for a second qualified individual, also states that this individual should be able to provide the required assistance when required, rather than whenever radiographic operations are being conducted.

The consensus opinion of the WG provided risk-informed, performance-based implementation guidance for the surveillance component of the two-person rule. It recommended that the NRC issue guidance in a Regulatory Information Summary (RIS), modifying the NRC's current interpretation of the two-person rule, but involving no rulemaking. The RIS would indicate that the second qualified individual must remain at the temporary job site and must be cognizant of the site-specific circumstances when radiographic operations are in progress. However, licensees would have the flexibility to allow the qualified individual to engage in other related activities such as developing film in a nearby darkroom, rather than being required to maintain constant visual surveillance when the radiographer, alone, can observe the restricted area and prevent unauthorized entry into it. Under this option, the NRC and the Agreement States would align inspection and licensing guidance with the RIS.

One member of the WG also provided a differing view, which indicated that another approach was not needed to make the rule more effective. The differing view recommended that the NRC notify the Agreement States to align their implementation to be essentially identical to that of the NRC.

The MRB did not accept the WG's consensus recommendation or the differing view. Instead, the MRB recommended that the State of Texas, or OAS, file a petition for rulemaking in accordance with 10 CFR §2.802 to revise 10 CFR §34.41(a). In the meantime, the MRB agreed that until the final decision is made on the petition for rulemaking, the staff would defer compatibility findings on the implementation of the surveillance component of the Two-Person Rule in Texas and any other state that is implementing 10 CFR §34.41(a) in a similar way.

#### **IV. Proposed Actions**

The OAS proposes the following amendments to 10 CFR 34 and conforming change to guidance document NUREG 1556, Vol. 2. The proposed amendments would require that an individual receive at least 40 hours of radiation safety training prior to using sources of radiation, would clarify the requirements for at least two individuals to be present at a temporary job site, and would clarify how many individuals are required to meet surveillance requirements. Proposed additions to the regulations are indicated in **bold letters** and deletions indicated by ~~strikeout~~.

1. Amend 10 CFR §34.41(a) as follows:

- (a) Whenever radiography is performed at a location other than a permanent radiographic installation, the radiographer must be accompanied by at least one other qualified radiographer or individual(s) who has at a minimum met the requirements of §34.43(c). ~~The additional qualified individual shall observe the operations and be capable of providing immediate assistance to prevent unauthorized entry.~~ Radiography may not be performed if only one qualified individual is present.

2. Amend 10 CFR §34.43(a)(1) as follows:

(a) The licensee may not permit any individual to act as a radiographer until the individual--

(1) **Has successfully completed an accepted course of at least 40 hours on the applicable subjects outlined in paragraph (g) of this section,** ~~Has received training in the subjects in paragraph (g) of this section,~~ in addition to a minimum of 2 months of on-the-job training, and is certified through a radiographer certification program by a certifying entity in accordance with the criteria specified in appendix A of this part. (An independent organization that would like to be recognized as a certifying entity shall submit its request to the Director, Office of Nuclear Materials Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001.)

3. Amend 10 CFR §34.43(c) as follows:

(c) The licensee may not permit any individual to act as a radiographer's assistant until the individual--

(1) **Has successfully completed an accepted course of at least 40 hours on the applicable subjects outlined in paragraph (g) of this section;**

~~(2)(1)~~ Has received copies of and instruction in the requirements described in NRC regulations contained in this part, in §§30.7, 30.9, and 30.10 of this chapter, in the applicable sections of 10 CFR parts 19 and 20 of this chapter, in applicable DOT regulations as referenced in 10 CFR part 71, in the NRC license(s) under which the radiographer's assistant will perform industrial radiography, and the licensee's operating and emergency procedures;

~~(3)(2)~~ Has developed competence to use, under the personal supervision of the radiographer, the radiographic exposure devices, sealed sources, associated equipment, and radiation survey instruments that the assistant will use; and

~~(4)(3)~~ Has demonstrated understanding of the instructions provided under ~~(c)(2)~~ ~~(e)(1)~~ of this section by successfully completing a written test on the subjects covered and has demonstrated competence in the use of hardware described in ~~(c)(3)~~ ~~(e)(2)~~ of this section by successful completion of a practical examination on the use of such hardware.

4. Amend 10 CFR §34.51 as follows:

During each radiographic operation, the radiographer, ~~or the other individual present, as required by §34.41,~~ shall ensure continuous direct visual surveillance of the operation to protect against unauthorized entry into a high radiation area, as defined in 10 CFR part 20 of this chapter, except at permanent radiographic installations where all entryways are locked and the requirements of §34.33 are met.

5. Change guidance document NUREG 1556, Vol 2. In the first paragraph under the Discussion, Temporary Job Sites, change the words “Both individuals must maintain” to “The radiographer must ensure”.

## **V. Justification**

The petitioners consider the requirement for a two-person crew to be an important safety requirement, but believe the surveillance component of that rule is more appropriately implemented and enforced as a performance-based requirement, rather than the current prescriptive interpretation of the rule. At least six Agreement States are currently implementing this component differently than the NRC. A shift in the NRC’s focus to a performance-based implementation of this rule, based on its acceptance of the expertise in this arena derived from the states, fosters a regulatory partnership that benefits the licensed community by minimizing confusion for those licensees who operate in multiple jurisdictions.

More than 10 years of information/data exist to demonstrate that the OAS’s recommended implementation of the surveillance component of the rule is viable and achieves the safety goals of the regulation. The WG’s review of the incidents that occurred in Texas from January 1986 through May 2002 indicated that 349 incidents involved industrial radiography at temporary field sites. Of the 349 total during this 16-year period, 82 resulted in overexposures > 5 rem. Causes of the incidents generally fell into the following categories:

- \* failure to survey/improper survey - 22%
- \* unable to determine cause - 23%
- \* badge in exposure area/not on individual - 27%
- \* reporting delays from badge processor/heavy workload - 11%
- \* improper work techniques (other than surveys) - 9%
- \* equipment malfunction - 6%
- \* deliberate badge exposure - 2%

Of the 82 incidents that resulted in overexposures >5 rem, 17 occurred from June 1998 (the effective date of the NRC’s rule) through May 2002. Causes for these 17 incidents are categorized as:

- \* failure to survey/improper survey - 4 incidents
- \* unable to determine cause - 5 incidents
- \* badge in exposure area/not on individual - 2 incidents
- \* reporting delays from badge processor/heavy workload - 5 incidents
- \* improper work techniques (other than surveys) - 1 incident

None of the overexposure incidents in Texas were directly attributable to a lapse in safety due to one certified radiographer being unavailable, e.g. in the darkroom, while the other certified radiographer was using the radiographic equipment. No negative performance

regarding the Texas implementation of the two-person crew requirement surfaced that would warrant a different surveillance strategy.

The Nuclear Materials Event Database (NMED) information reviewed by the WG did not break the data down to specify what effects the components of the two-person rule had as a cause or a contributing factor (or as a prevention factor) for radiation exposure events involving industrial radiography personnel or members of the public. Although NMED contained numerous incidents that involved industrial radiography during a 7-year period from 1995 through 2002, according to the WG report, the event descriptions do not correlate the incidents to the two-person rule.

Similarly, the WG reviewed data from the Enforcement Action Tracking System (EATS), in which 67 cases occurred that involved industrial radiography during the same 7-year period. Nine cases cited violation of the two-person rule, however, none of the cases involved radiation over-exposures to radiography personnel or workers at the site and other members of the public.

The petitioners agree with the opinion of the WG that the apparent inconsistency in the surveillance component of §34.41(a) and the surveillance section of Part 34, i.e., §34.51, along with the conflicting guidance found in NUREG-1556, Volume 2 raise substantial doubts as to whether the NRC's current interpretation of the rule is, in terms of safety, the most efficacious approach.

The recommended language that amends §34.51 puts the access control responsibility squarely with the radiographer but allows him the latitude to use additional personnel to control radiographic operations if needed. This additional personnel may include persons not qualified as a radiographer or radiographer's assistant but capable of providing needed support to control access to the restricted area while remaining at the perimeter of the restricted area. As recommended, the rule does not require two persons to constantly monitor operations nor does it limit it to two persons. It allows the radiographer in charge to make that decision.

The petitioners can find no justification for imposing additional costs and negative impact on an industry that has not demonstrated performance that would warrant such cost and impact.

To assess the additional cost of implementing the two-person crew as the NRC does, Texas contacted several of its licensees who have both Texas and NRC licenses. The cost of an additional person would be a minimum of \$200 per day (including travel and per diem). The cost of additional time would be \$10-12 per hour (not including overtime pay). The licensees contacted indicated that an even greater impact of enforcing the two-person crew as the NRC does would be the lack of availability of industrial radiographic personnel to do the work. The licensees indicated that not only are there not enough certified radiographers to do the amount of work the companies had at that time (one licensee indicated that an average work week is 65 hours), there is a shortage of people interested in obtaining the training and becoming certified.

## **VI. Conclusion**

The proposed actions will use risk-informed, performance based requirements to ensure safety of workers and the public, eliminate current compatibility discrepancies, provide uniformity in regulations nationwide, and ensure consistency in surveillance requirements.