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July 1, 2013

BY HAND DELIVERY
Michael C. Farrar, Chair
Dr. Nicholas G. Trikouros
Dr. Paul B. Abramson
Atomic Safety & Licensing Board
U.S. Nuclear Regulatory Commission
11535 Rockville Pike
Rockville, Maryland 20852

SUBJECT: *Filing in Operating Licensing Proceeding for Plutonium MOX
Fuel Fabrication Facility, Docket No. 70-3098*

Dear Administrative Judges:

On behalf of the Intervenors in this proceeding, I am enclosing Intervenors' Cumulative Proposed Findings of Fact and Conclusions of Law. Copies have also been provided to your law clerks, Shelby Lewman and Nicole Picard.

Please note that the attached document may contain Sensitive Unclassified Security Information ("SUNSI") or Unclassified Controlled Nuclear Information ("UCNI") and therefore should be protected from public disclosure. However, Intervenors intend to seek public disclosure of the document in the future.

Thank you for your consideration.

Sincerely,

Diane Curran

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

Docket No. 70-3098-MLA

SHAW AREVA MOX SERVICES

ASLBP No. 07-856-02-MLA-BD01

(Mixed Oxide Fuel Fabrication Facility)

July 1, 2013

REDACTED VERSION

INTERVENORS' PROPOSED CUMULATIVE FINDINGS OF FACT AND
CONCLUSIONS OF LAW REGARDING CONTENTIONS 9, 10, AND 11

Unclassified Controlled Nuclear Information Not for Public Dissemination
Unauthorized dissemination subject to civil and criminal sanctions under section 148 of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2168)
Reviewing Official: <u>RAGAN NEWELL / MOX CO</u> Name/Organization
Date: <u>7/17/13</u>
Guidance Used: <u>66-36-4 CA 7, 507-2000, DOE-00</u>

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NAME/ORG: RAGAN NEWELL DATE: 7/17/13
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DC/RO: RAGAN NEWELL / MOX CO
(Name / Organization)

Date: 7/17/13

Pursuant to the Atomic Safety and Licensing Board's ("ASLB's") instructions during the supplemental hearing on May 21, 2013, Nuclear Watch South, Blue Ridge Environmental Defense League, and Nuclear Information and Resource Service ("Intervenors") hereby submit their Cumulative Proposed Findings of Fact and Conclusions of Law regarding Intervenors' Contentions 9, 10, and 11. These Cumulative Proposed Findings supplement and are integrated with the Proposed Findings of Fact and Conclusions of Law that Intervenors submitted on May 3, 2013 and Intervenors' Surreply to Shaw Areva MOX Services' Proposed Reply Findings of Fact and Conclusions of Law (May 25, 2013). For the ASLB's convenience, the Intervenors have noted which paragraphs were previously stated in their May 3, 2013 Proposed Finding ("PF"). Intervenors respond herein to MOX Services' Proposed Cumulative Findings of Fact and Conclusions of Law (June 14, 2013) ("MOX PF") and MOX Services' Proposed Findings of Fact and Conclusions of Law (April 13, 2012) ("First MOX PF").

These proposed findings of fact and conclusions of law are organized as follows: Section I contains an introduction and summary. Section II addresses the governing legal standards. Section III describes the factual and procedural background of the case. Section IV contains Intervenors' proposed findings of fact and conclusions of law. Section V contains a proposed conclusion.

In Section IV, with respect to each contention, Intervenors' proposed findings of fact and conclusions of law separately address the adequacy of the Revised Fundamental Nuclear Material Control Plan ("FNMCP") as initially presented, and the adequacy of the Revised FNCMP as supplemented by the procedures that the ASLB requested in its Memorandum and order of June 29, 2013 ("6/29/13 Memorandum and Order").

We divide our analysis of the evidence and legal arguments into separate sections for two reasons. First, both MOX Services and the NRC Staff take the position that the 2010 Revised FNMCP and the evidence submitted through the March 2012 hearing are sufficient to support the issuance of an operating license, without any supplemental information. They have continued to argue that position, even after the ASLB suggested it might not agree in its 6/29/13 Memorandum and Order. *See, e.g.*, tr. 1661-62 and Letter from Kelly Trice (MOX Services) to Michael C. Farrar et al (June 12, 2013) ("Trice Letter").

Second, subsequent to the 6/29/13 Memorandum and Order, MOX Services changed its commitments with respect to the length of time it will take to comply with requirements for and assessment of the validity of alleged thefts.

Therefore, with respect to each contention, we separately evaluate the adequacy of the evidence and legal arguments presented by MOX Services and the Staff in support of MOX Services' license application.

I. INTRODUCTION AND SUMMARY

1.1 The issues raised by Contentions 9, 10, and 11 all relate to the adequacy of the Revised FNMCP for Shaw Areva MOX Services' proposed Mixed Oxide Fuel Fabrication Facility ("MOX FFF" or "MOX Facility") to satisfy the NRC's regulations for material control and accounting ("MC&A") of Strategic Special Nuclear Material ("SSNM"). In this case, the SSNM at issue is plutonium. Contention 9 challenges MOX Services' failure to demonstrate that it has the capability to verify, on a statistical sampling basis, the timely detection of item losses totaling two or more kilograms of plutonium, as required by 10 C.F.R. § 74.55(b). Contention 10 challenges the inadequacy of the FNMCP's measures for satisfying the alarm resolution requirements in 10 C.F.R. § 74.57(b). Finally, Contention 11 asserts that the FNMCP fails to demonstrate an ability to rapidly assess the validity of alleged thefts, as required by 10 C.F.R. § 74.57(e). (PF ¶ 1.1)

1.2 In this proceeding, MOX Services argues that the use of data from computer programs that were designed to keep track of the factory's inventory for management purposes can be relied on for verification of the presence and integrity of SSNM items as mandated by NRC's MC&A requirements. [REDACTED]
[REDACTED]
[REDACTED], it will satisfy the NRC's requirements for item monitoring, alarm resolution and the ability to rapidly assess the validity of alleged thefts.

1.3 In our Memorandum and Order of June 29, 2012 ("6/29/12 Memorandum and Order"), we found we could not rule for MOX Services based on the evidence it had presented regarding its computer programs. *See* tr. 1661-62. Therefore we asked MOX Services to provide additional information. In the supplemental arguments and evidence presented by MOX Services in response to our 6/29/12 Memorandum and Order, MOX Services offers a procedure that purportedly will verify the [REDACTED]. But MOX Services asserts that because the procedure is not required to meet the regulations, there are no requirements that such a procedure must meet. Consequently, it has not attempted to demonstrate that its procedure will guarantee that [REDACTED] enough to assure compliance with the quantitative standards for item monitoring that are specified in the regulations.

1.4 MOX Services also contends that it is capable of complying with alarm resolution requirements even though it would be physically incapable of conducting a physical search of certain storage areas for missing items within the approved time periods.

1.5 In its supplemental pleadings, MOX Services also argues that there are no quantitative standards for compliance with NRC's requirement that it establish an ability to rapidly assess the validity of alleged thefts. In addition, MOX Services now maintains that there are no specific actions that are required for rapid assessment of alleged thefts. Therefore, it has backed away from the commitment it made in the FNMCP and during the March 2012 hearing to assess the validity of alleged thefts by maintaining a capability "to enable on demand location" of a specific

item within 8 hours and to verify the presence of all stored items within 72 hours, based the quantitative timelines prescribed in NUREG-1280. MOX Services now argues that NUREG-1280's quantitative guidelines for establishing an ability for rapid assessment of the validity of alleged thefts apply only to updating records systems and not actual physical location of items. But this legal argument is based on an illogical and incomplete reading of the guidance. Thus, in responding to our questions, MOX Services has weakened its MC&A program instead of providing new evidence of its strength.

1.6 For its part, the NRC Staff presents only generalizations and conclusory statements, and completely fails to provide any detailed analysis of its reasons for asserting that the information provided by MOX Services supports a finding of regulatory compliance and issuance of a license. While the Staff brought additional witnesses to our supplemental hearing on May 21, 2013, these individuals were unable to provide any further support or meaningful explanation for the Staff's position. Given the Staff's lack of explanation for its position, its conclusions must be disregarded.

1.7. As discussed in more detail below, we conclude that MOX Services has fallen far short of meeting its burden of proving that it complies with NRC's MC&A requirements for item monitoring, alarm resolution, and rapid theft assessment. Although MOX Services claims to satisfy the regulations, the measures it proposes do not contain essential elements for regulatory compliance. The overarching issue is whether [REDACTED]

[REDACTED] We conclude that it cannot. While MOX Services would have us overlook these shortfalls on the ground that what it proposes is an improvement on the measures of physical retrieval and inspection of items that are needed for regulatory compliance, we have no authority to make such a judgment: (PF ¶ 1.2) And although we gave MOX Services an additional opportunity to demonstrate satisfaction of the MC&A regulations, nothing it has presented suffices to cure the fundamental deficiencies in its MC&A program.

1.8 Because MOX Services has utterly failed to demonstrate that it satisfies the NRC's MC&A regulations, we must reject this operating license application.

II. GOVERNING LEGAL STANDARDS

2.1 In this proceeding, we must determine whether MOX Services' operating license application satisfies the NRC's MC&A regulations for plutonium SSNM in 10 C.F.R. §§ 74.51, 74.55(b)(1), 74.57(b), and 74.57(e). MOX Services bears the burden of proving it complies with those standards. 10 C.F.R. § 2.325. The fundamental importance of these requirements to national security and the protection of public health and safety cannot be overstated. The regulations at issue are critical elements of the NRC's program to ensure that potential diversions of plutonium and other strategic special nuclear material from Category I fuel cycle facilities are

detected and assessed in a timely manner in order to enable a response before such material could be put to malevolent use. This is particularly important in the context of the bilateral MOX program with Russia, the intent of which is to increase world security by reducing the threat posed by stockpiles of separated plutonium. (PF ¶ 3.1)

2.2 The applicable requirements are as follows: Section 74.51 requires that an applicant for a license to possess and/or process SSNM must meet the following "general performance objectives:"

Each licensee who is authorized to possess five or more formula kilograms of strategic special nuclear material (SNM) and to use such material at any site . . . shall establish, implement, and maintain a Commission-approved material control and accounting (MC&A) system that will achieve the following objectives:

- (1) Prompt investigation of anomalies potentially indicative of SSNM losses;
- (2) Timely detection of the possible abrupt loss of five or more formula kilograms of SSNM from an individual unit process;
- (3) Rapid determination of whether an actual loss of five or more formula kilograms occurred;
- (4) Ongoing confirmation of the presence of SSNM in assigned locations; and
- (5) Timely generation of information to aid in the recovery of SSNM in the event of an actual loss. (PF ¶ 3.3)

2.3 Section 74.51(b) provides that in order to achieve these general performance objectives, an applicant's MC&A system must "provide the capabilities described in §§ 74.53, 74.55, 74.57 and 74.59 . . ." (PF ¶ 3.4)

2.4 Section 74.55(b)(1) provides that:

The licensee shall verify on a statistical sampling basis, the presence and integrity of SSNM items. The statistical sampling plan must have at least 99 percent power of detecting item losses that total five formula kilograms or more, plant-wide within:

- (1) Thirty calendar days for Category 1A items and 60 calendar days for Category 1B items contained in a vault or in a permanently controlled access area isolated from the rest of the material access area (MAA). (PF 3.5)

2.5 Section 74.57(b) requires that: "Licensees shall resolve the nature and cause of any MC&A alarm within approved time periods." (PF 3.6)

2.6 Section 74.57(e) requires that a licensee “shall provide an ability to rapidly assess the validity of alleged thefts.” (PF 3.7)

2.7 Because of the unusual circumstances involved in this proceeding -- *i.e.*, serial claims by MOX Services that it doesn't need to satisfy the MC&A regulations (original operating license application), that it is not capable of satisfying the MC&A regulations (2009 exemption request), and then that it does, after all satisfy the MC&A regulations (2010 amendment to operating license application) -- we think it is important to clarify what this proceeding does *not* involve. This proceeding does not involve a request for an exemption from the NRC's MC&A regulations, because the exemption application was withdrawn and abandoned. Therefore we must disregard arguments that the measures proposed by MOX Services are equivalent to regulatory compliance or otherwise constitute effective substitutes for regulatory compliance. Similarly, in this proceeding we may not consider whether the regulations are too strict or somehow outdated and therefore strict compliance is not warranted. Such arguments could be entertained only in a waiver hearing or a rulemaking proceeding. Our sole task is to determine whether MOX Services has satisfied its burden of proving compliance with the requirements of 10 C.F.R. §§ 74.51, 74.55(b)(1), 74.57(b), and 74.57(e). (PF ¶ 3.2)

2.8 Nor are we authorized to consider the question of whether MOX Services has a robust security system or whether that security system could be found adequate to compensate for MOX Services' failure to fulfill the NRC's MC&A requirements. In NRC regulations, the concepts of security and MC&A are distinct and covered by different sections of the NRC's regulations for fuel cycle facilities. Compare 10 C.F.R. § 70.22(b)(requiring license applications to include an MC&A program that complies with 10 C.F.R. Part 74 regulations) with 10 C.F.R. § 70.22(h)(1) (requiring applications to include a security plan that conforms to the requirements of 10 C.F.R. Part 73) with and 74). The Part 73 and Part 74 regulations are independent of each other and fundamentally different in concept. The Part 73 regulations for security require measures to prevent unlawful access to nuclear facilities. In contrast, the MC&A regulations require a verifiable means to account for the presence and integrity of plutonium items, regardless of security measures. The fact that the NRC's regulations require *both* security measures *and* MC&A measures is consistent with the fundamental principle of defense-in-depth that underlies the NRC's entire regulatory program.

2.9. We are concerned only with the question of whether MOX Services' Revised FNMCP meets the Part 74 standards. For instance, testimony provided by MOX Services' witnesses in [REDACTED] witness admitted, those requirements were not implemented specifically for MC&A purposes. Tr. 1742 (Bell). Thus these requirements do not [REDACTED] to be used to comply with the NRC's MC&A regulations.

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2.10. Even assuming for purposes of argument that we are incorrect in refusing to consider the [REDACTED] we have no lawful basis to rule on it here. [REDACTED]

[REDACTED] for compliance with NRC's MC&A regulations without reviewing MOX Services [REDACTED]. This is not a minor matter that can be relegated to unreviewable licensee procedures or referred to the NRC Staff for post-hearing resolution. *Louisiana Power and Light Co.* (Waterford Steam Electric station, Unit 3), ALAB-732, 17 NRC 1076, 1103 (1983). We take judicial notice that Cyber attack currently is viewed as a major security threat to the U.S. critical infrastructure. NRC recognizes that "Cyber threats to NRC licensees are dynamic and multi-dimensional due to the continuously evolving capabilities of potential adversaries and emerging technologies." SECY-12-088, Memorandum to the Commissioners from James T. Wiggins, Director, Office of Nuclear Security and Incident Response, re: the Nuclear Regulatory Commission Cyber Security Roadmap (June 25, 2012). However, the NRC has not yet developed regulations addressing cyber security at fuel cycle facilities. The staff has developed a cyber security roadmap that proposes initiating a rulemaking for cyber security at fuel cycle facilities, but has not yet even developed a timetable for the rulemaking. *Id.* As recently as June 27, 2013, General Martin E. Dempsey of the Joint Chiefs of Staff delivered an address to the Brookings Institution asserting that "cyber as escalated from a issue of moderate concern to one of the most serious threats to our national security." Remarks at 2 (www.brookings.edu/events/2013/06/27-defense-cybersecurity-dempsey).

2.11. At the very least, we would need to know that the NRC had signed off on the adequacy of the DOE's cyber security requirements in the Memorandum of Understanding ("MOU") between the DOE and NRC whose purpose is to "develop all kinds of relationships between NNSA and NRC related to the security matter" does "not yet exist." Tr. 1852 (Tiktinsky).

2.12. Moreover, the record contains nothing that we could review. MOX Services currently does not have a cyber security plan. Tr. 1846-49 (Bell). Thus, there is no document we could review to evaluate its alleged adequacy to support compliance with NRC MC&A regulations. Second, we do not now -- and will not in the future -- have the benefit of any Staff review of the cyber security plan. Mr. Tiktinsky testified that the NRC Staff expects to review some documents related to the cyber security plan outside of this proceeding, as part of the operational readiness review (tr. 1847), but it is not listed in the Safety Evaluation Report as a "compliance item." Tr. 1848. Therefore it does not appear the Staff will ever review the actual cyber security plan. Finally, the NRC Staff did not present any experts on security and the NRC Staff's MC&A reviewers accepted at face value MOX Services' assertions that its cyber security measures would comply with DOE security requirements. Tr. 1816.

2.13. It is possible that in an exemption proceeding, we could consider whether a particularly robust security program (including cyber security measures for MOX Services' computer

networks) could be found adequate to compensate for MOX Services' lack of compliance with Part 74 regulations. But we are not in such a proceeding, and thus such considerations are beyond our purview.

III. BACKGROUND AND PROCEDURAL HISTORY

A. Construction Authorization Proceeding

3.1. MC&A issues first arose in the design phase of the proposed plutonium MOX Fabrication Facility. Intervenors challenged the Construction Authorization Request's ("CAR's") failure to provide design bases with respect to MC&A. The applicant (at that time, Duke Cogema Stone & Webster Co.) subsequently revised the CAR to include a very limited amount of MC&A design basis information. The contention was ultimately dismissed, in part based on the testimony of the NRC Staff that the revised CAR contained adequate MC&A design basis information to support later development of an FNMCP that would meet NRC's MC&A regulations, including the capability to verify the presence and integrity of SSNM items on a statistical sampling basis within regulatory timelines. (PF 2.1)

B. Operating License Proceeding and FNMCP

3.2. In 2006, MOX Services submitted an application to operate the MOX Facility. The operating license application included the FNMCP, which addressed the NRC's MC&A regulations. In Section 2.8.3, the FNMCP addressed item monitoring. Instead of complying with the requirement to complete item monitoring checks within 30 or 60 days, MOX Services proposed not to comply with the requirement, but instead to conduct item monitoring at intervals as long as 180 days. *Id.* MOX Services claimed that the variance was "justified on the basis that covert insider theft or diversion of PuO₂ from this hardened and normally inaccessible (by humans) location is not deemed as a credible scenario." (PF 2.2)

3.3. In Section 3.1.3, the FNMCP also states that alarm resolution procedures "normally" will be completed within three days. In Section 3.3.1.6, the FNMCP claimed that in the event of alleged theft of plutonium from the MOX facility, MOX Services is capable of confirming the presence of a specific individual plutonium item within eight hours and verifying the presence of all Pu in item form in vault storage within 72 hours. (PF 2.3)

C. Exemption Request Submitted and Withdrawn


3.4. After the NRC Staff questioned the use of an 180-day time period for item monitoring, MOX Services submitted an application for a regulatory exemption on December 17, 2009. In the application, MOX Services requested exemptions [REDACTED]
[REDACTED]. MOX Services requested that the allowed time period be extended from 30 days to 180 days, a 500 percent increase. For the [REDACTED], MOX Services requested that the allowed time period be extended from 60 days to 180 days, a 200 percent increase. For the [REDACTED] MOX Services

requested that the allowed time period be extended from 30 days to 60 days, a 100 percent increase. (PF ¶ 2.4)

3.5. MOX Services stated that the requested exemptions were needed because the physical layout of the facility and the characteristics of the installed equipment prevented MOX Services from meeting regulatory timelines for item monitoring. *Id.*, Enclosure at 3 (“MOX Services cannot satisfy these time limits due to the size of the MFFF’s four storage areas, inaccessibility, and the time it takes for the automated equipment to perform the item monitoring . . .”).¹ (PF ¶ 2.5).

3.6. On March 22, 2010, intervenors submitted Contention 8, which challenged the adequacy of the exemption application to satisfy the NRC’s standard for issuance of an exemption. MOX Services responded to the contention by stating that it was moot because MOX Services intended to withdraw the exemption application. Answer of Shaw Areva MOX Services, L.L.C. Opposing Intervenor’s Motion for Admission of Contention 8 (April 19, 2010). On May 17, 2010, MOX Services served on the Board and parties copies of (a) a letter to the NRC withdrawing the Exemption Application and (b) a Revised FNMCP dated April 2010. (PF ¶ 2.6)

D. Revised FNMCP

3.7. In the Revised FNMCP, MOX Services claimed, for the first time, that it could meet the 30-day and 60-day requirements for item monitoring through an alternative approach to one involving sampling and physical inspection of items that was described in the Exemption Application. MOX Services abandoned its previous approach, and now stated 

3.8. Like the original version of the FNMCP, the Revised FNMCP stated that alarm resolution procedures “normally” will be completed within three days. *Id.* at 152. Similarly, the Revised FNMCP did not change the claim in the original FNMCP that in the event of alleged theft of plutonium from the MOX facility, MOX Services is capable of confirming the presence of a specific individual plutonium item within eight hours and verifying the presence of all Pu in item form in vault storage within 72 hours. *Id.* at 161. (PF ¶ 2.8)

E. Hearing on Revised FNMCP

3.9. The parties submitted briefs and testimony and we held a hearing on March 7 and 9, 2012.

¹ The language of the exemption application makes it clear that MOX Services viewed the exemption request as a necessity because it could not comply with the NRC’s MC&A regulations. Thus, it was not just a “better” or more “cost effective” approach than regulatory compliance, as suggested by MOX Services’ counsel during the supplemental hearing. *See* tr. 1738 (Silverman).

3.10. The testimony submitted by MOX Services showed that the data it had used in the Exemption Application to assess the length of time needed to conduct item identification within certain storage areas is no longer valid, and that these timelines are now far shorter. For example, according to the revised estimate, by utilizing [REDACTED] items, could be physically identified within [REDACTED], instead of the [REDACTED] days originally estimated in the Exemption Application. MOX PF ¶ 4.204 (also First MOX PF ¶ 4.114); Exhibit APP000025. See also Lyman Testimony, pars. 18-19; Tr. 1767. Consequently, MOX Services apparently now would be capable of complying with the item monitoring requirements by using the original approach based on sampling and physical inspection. Nevertheless, MOX Services continues to seek NRC approval of the alternative approach based [REDACTED] (PF ¶ 2.9)

F. June 29, 2013 Decision and Supplemental Hearing

3.11. On June 29, 2012, we issued a decision concluding that we did not have enough information to render a decision on MOX Services' operating license application. We asked MOX Services to provide:

a document, accompanied by supporting testimony and evidence, setting forth the approach to and criteria underlying its [REDACTED]. The Applicant may provide an amendment to the 2010 FNMCP [Fundamental Nuclear Material Control Plan], or a similarly consequential document of its choosing. In any event, this document must be easily identifiable and enforceable by future inspectors if the MOX Facility is indeed granted a possession-and-use license.

Id., slip op. at 12.

3.12. We also asked MOX Services to provide:

[REDACTED], along with supporting testimony and evidence, for assessing within the 8 and 72 hour timeframes to which Applicant has committed, an external alarm that includes an assertion that an external entity compromised the [REDACTED].

Id., slip op. at 15.

3.13. Both MOX Services and the Staff submitted additional evidence and briefs in support of MOX Services' position. Shaw Areva MOX Services LLC Supplemental Statement of Position on Contentions 9 and 11 and Response to Surreply (Oct. 15, 2012) ("MOX Services' Supplemental Statement"); Shaw Areva MOX Services LLC's Clarification of Supplemental Statement of Position on Contentions 9, 10, and 11 (Dec. 5, 2012) ("MOX Services' Clarification"); MOX Services, LLC's Pre-filed Direct Testimony in Response to Board's June

29, 2012 Memorandum and Order (Oct. 15, 2012) (Exh. APP000037); Shaw Areva MOX Services, LLC's Revised Pre-filed Direct Testimony in Response to Board's June 29, 2012 Memorandum and Order (Dec. 5, 2012) (APPR000037) ("MOX Services' Revised Testimony"); NRC Staff's Response to Applicant's Supplemental Statement of Position on Contentions 9, 10, and 11 and Response to Surreply (Jan. 16, 2013) ("NRC Staff's Response"); NRC Staff's Prefiled Supplemental Testimony of Tom Pham Concerning Contentions 9 and 11 (Jan. 16, 2013) ("Pham Supp. Testimony").

3.14. In addition, Intervenor's submitted their Response to Clarified supplemental Statement of Position on Contentions 9 and 11, Reply to NC Staff's Response to MOX Services, and Reply to MOX Services' Response to Surreply (April 19, 2013) ("Intervenor's Response"). MOX Services responded in Reply to Intervenor's April 19, 2013 response to MOX Services and NRC Staff Submittals (May 3, 2013) ("MOX Services' Reply").

3.15. We held a supplemental hearing on May 21, 2013.

IV. PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW

A. Witnesses

4.1. MOX Services presented the testimony of four of its employees or contractors: Sue King, Vice President of Operations; Gary Bell, a software engineer; Gary Clark, a safeguards and security specialist, and Martha Williams, a safeguards consultant. (PF ¶ 4.1)

4.2. The Intervenor's presented testimony by Dr. Edwin S. Lyman. Dr. Lyman is a Senior Scientist with the Global Security Program at the Union of Concerned Scientists, 1825 K Street, NW, Suite 800, Washington, D.C. 20006. Dr. Lyman has extensive training and experience in nuclear safety and safeguards issues. He holds a Ph.D., a master of science degree, and a bachelor's degree in physics. For nearly twenty years, he has conducted research on security and environmental issues associated with the management of nuclear materials and the operation of nuclear power plants, including existing reactor designs and new reactor designs. He has also published articles on these topics. (PF ¶ 4.2.)

4.3. Dr. Lyman's qualifications as an expert on nuclear facility security and safety issues have been established in numerous NRC licensing cases. For example, in the NRC licensing proceeding regarding the construction authorization request ("CAR") for the proposed MOX FFF, the ASLB found that Dr. Lyman was qualified to testify on security and MC&A issues. *Duke Cogema Stone & Webster Co.* (Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 425 (2001). In a license amendment proceeding to permit the use of MOX lead test fuel assemblies at the Catawba nuclear power plant, the ASLB found that Dr. Lyman was qualified to testify on security issues. *Duke Energy Corporation* (Catawba Nuclear Station, Units 1 and 2), LBP-04-13, 60 NRC 33, affirmed, CLI-04-21, 60 NRC 21 (2004). His qualifications to testify on nuclear power plant safety and environmental issues were established in *Duke Energy Corporation* (Catawba Nuclear Station, Units 1 and 2), LBP-04-32, 60 NRC 713

(2004) and *Duke Energy Corporation* (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1 and 2), LBP-02-04, 55 NRC 49, 120-21, 127 (2002). (PF ¶ 4.3)

4.4. In 2011, Dr. Lyman was granted a "need to know" by NRC's Office of Nuclear Security and Incident Response (NSIR) to review a safeguards-level draft guidance document, DG-5033, in order to provide comments. In making its determination, NSIR concluded that his comments could prove useful to the staff. (PF ¶ 4.4)

4.5. In March 2013, Dr. Lyman was granted a "need to know" by NSIR to attend an NRC meeting classified "Secret" on technical issues related to the ongoing rulemaking on security of independent spent fuel storage installations (ISFSIs.)

4.6. In April 2013, at the request of Jim Wiggins, director of NSIR, Dr. Lyman received a staff briefing on the NRC's ongoing cybersecurity initiatives at reactors and other facilities.

4.7. In the first and second rounds of evidentiary presentations, the NRC Staff presented the testimony of Tom Pham, the NRC Staff reviewer of the adequacy of the FNMCP with respect to the NRC's MC&A regulations. At our request, the NRC Staff brought two additional witnesses to the supplemental hearing: David Tiktinsky and Thomas Grice. They did not submit written pre-filed testimony.

4.8. The NRC Staff offered Mr. Grice as a "principal expert" on MC&A issues. Tr. 1659 (Klukan). The Staff offered Mr. Tiktinsky's testimony for his expertise in "the overall process of a licensing review." Tr. 1659 (Klukan). The Staff did not propose Mr. Tiktinsky as "a principal expert" on MC&A issues. *Id.*

4.9. The Staff did not offer Mr. Pham, Mr. Grice or Mr. Tiktinsky as security experts. Tr. 1654, 1725 (Klukan).

4.10. Currently, Mr. Grice is not a reviewer in the MOX licensing program; he is team leader in NRC's program for international safeguards and nonproliferation issues. Exhibit NRC000015, Tr. 1654. In 2006, before going to work on international safeguards and nonproliferation issues, Mr. Grice worked with Mr. Pham and another staff member on the "very initial review" of the operating license application for the proposed MOX facility. Tr. 1654. *See also* tr. 1822, 1830-31. He testified that he is "routinely" consulted on MC&A issues by the reviewers of the MOX operating license application. Tr. 1654. Mr. Grice has no authority over Mr. Pham, nor does he report to Mr. Pham. They are peers. *Id.* 1656.

4.11. Mr. Tiktinsky confirmed the limited scope of his expertise during the supplemental hearing. He testified that he has been NRC's project manager for the proposed MOX facility for seven and a half years. Tr. 1652. He has "overall responsibility" for supervising the NRC's review of MOX Services' license application. *Id.* While Mr. Tiktinsky considers himself competent to understand the technical issues associated with MC&A compliance review (tr. 1658), he is "not a detailed MC&A reviewer." Tr. 1658. Nor does he consider himself an "expert." *Id.* Instead, his experience is limited to coordinating and supervising the review that is

conducted by other staff members. *Id.* Mr. Tiktinsky also testified that he has not participated in any MC&A reviews other than the review for the proposed MOX facility.

4.12. Mr. Tiktinsky also testified that he does not supervise the security review, which is handled by a different office, the NSIR. Tr. 1653. Mr. Tiktinsky's role is to coordinate the results of the security review with the results of the MC&A review. *Id.*

4.13. We conclude that all of the witnesses are qualified to testify regarding Contentions 9, 10, and 11, although for several reasons we give less weight to Mr. Clark's testimony and the NRC Staff's testimony. (PF ¶ 4.6)

4.14. First, we have some questions about the qualifications of MOX Services' witness Mr. Clark, given certain gaps in his knowledge that were revealed during the Supplemental Hearing. For instance, he repeatedly mischaracterized the NRC's definition of an item until he finally obtained and read from a copy of the regulations. Tr. 1678-1680. In addition, Mr. Clark was unable to provide a clear answer to our inquiries in his own words regarding the plain meaning of the 3% defect rate specified in MOX Services' data verification procedure. Tr. 1909-1921. Given the central role that the precise definition of an item plays in the regulations that are the subject of this hearing, we scrutinize his testimony carefully to ensure it does not confuse rather than clarify matters.

4.15. Second, we give less weight to Mr. Pham's testimony because he was unable to support the conclusions of the Safety Evaluation Report ("SER") with a documented analysis. The SER itself contains only the most conclusory statements. See SER Section 13.2. In fact, the generalizations of the SER are so rote that it is impossible to discern from the document how MOX Services proposed to satisfy the regulations or why the NRC deemed the measures adequate. Although the Staff claimed that its concerns were discussed in Requests for Additional Information ("RAIs") (Tr. 1272-75) these RAIs were not produced. As the First Appeal Board held in *Virginia Electric and Power Co.* (North Anna Nuclear Power Station, Units 1 and 2), ALAB-555, 10 NR 23, 26 (1979), "[m]anifestly it will not do for an expert witness to state his ultimate conclusions on a crucial aspect of the issue being tried and then to profess an inability – for whatever reason – to provide the foundation for them to the decision-maker as well as the other litigants." (PF ¶ 4.6)

4.16. Mr. Pham did not provide any additional insights on the stand, and indeed he confirmed that he accepted a number of important representations by MOX Services without conducting any independent analysis of their veracity or dependability. See tr. 1812 (regarding cyber security and adequacy of performance of MMIS and PLCs).

4.17. We also conclude that neither Mr. Tiktinsky nor Mr. Grice provided any meaningful support to Mr. Pham's testimony. Mr. Grice participated in only the very beginning part of the MOX licensing review in 2006, long before MOX Services submitted its exemption application or the Revised FNMCP. And Mr. Tiktinsky is neither an MC&A expert nor was he involved in the MC&A review at any level of detail; instead, he was a coordinator for other reviewers.

4.18. Finally, the Staff's supplemental testimony does not, for the most part, grapple with the problems we raised in 6/29/13 Memorandum and Order. That is because the Staff decided at the outset that the operating license application for the MOX facility was adequate and the Staff does not consider our concerns to be legitimate. Tr. 1662-63. As a result, the Staff had no meaningful opinion to offer on the question of whether and to what degree MOX Services has satisfied our concerns. See tr. At 1661 (Farrar). Instead, the Staff only testified to the question of whether MOX Services additional measures would "add benefit" to an FNMCP that was already adequate. Tr. 1664. However, without more specific testimony on exactly how it would "add benefit," we find the Staff's assertions to be hollow.


4.19. We also reject MOX Services' suggestion that Dr. Lyman's testimony should be given less weight because he does not have the "specific MC&A experience or training exhibited by the other witnesses." MOX Services' PF ¶ 4.18 (also First MOX PF ¶ 4.12) (emphasis in original). Dr. Lyman's testimony shows that he fully understands the issues relevant to the question of whether MOX Services satisfies NRC regulations. We find that Dr. Lyman's expertise and experience are fully adequate to evaluate the question of whether MOX Services complies with the NRC's MC&A regulations. A great deal of MOX Services' testimony was devoted to the unrelated question of whether MOX Services' reliance on the data derived from its automated process control and inventory systems and various physical protection measures serves as an effective substitute for the verification of the presence and integrity of items required by the item monitoring regulations. While Dr. Lyman may not be as intimately familiar with the inner workings of this computer program as MOX Services' witnesses, that has no bearing on our decision. (PF ¶ 4.7)

B. Contention 9: Adequacy of Revised FNMCP Standing Alone

1. The parties' position on Contention 9

4.20 Contention 9 asserts that:

MOX Services' Revised FNMCP does not satisfy the MC&A requirements in 10 C.F.R. § 74.55(b)(1) because it does not demonstrate that MOX Services' item monitoring program has the capability to verify, on a statistical sampling basis, the presence and integrity of SSNM items. In particular, MOX Services fails to show that it is capable of detecting item losses that total 5 formula kilograms of plutonium or more plant-wide within the time frames specified by the regulation (30 calendar days for Category 1 items and 60 days for Category 1B items contained in a vault or in a permanently controlled access area isolated from the rest of the material access area (MAA)). (PF ¶ 4.8)

4.21. MOX Services proposes to 

It asserts that this constitutes an item monitoring system with greater than 99 percent power of detection of a loss of items of 1 formula quantity of SSNM or greater within one day, and

therefore it meets the verification of item presence requirements of 10 CFR §74.55(b)(1). (PF ¶ 4.9)

4.22. In making this assertion, MOX Services takes credit for [REDACTED] that ensure the accuracy of the data generated by the remote equipment. MOX Services therefore argues that the interrogation of the [REDACTED] in "sampling," in lieu of the conventional understanding of item "sampling," which would normally involve the random selection, location, removal and physical inspection of an item's identification and integrity. The NRC Staff concurs with MOX Services' conclusion. (PF ¶ 4.10)

4.23. Intervenors contend that MOX Services does not satisfy the regulation because its approach does not involve direct access to items to verify their presence and integrity by pulling cans, reading bar codes and inspecting seals, but instead relies solely on the [REDACTED] and the presence of [REDACTED]. Therefore, the approach is based on the implicit assumption that the [REDACTED] where all items are at all times, and any attempt to manipulate the data would be promptly detected. Lyman Testimony, par. A.5. (14). Put another way, the [REDACTED] data must be 100 percent accurate, in the sense of the word "accurate" used by MOX Services in its reply testimony: "The [REDACTED] an accurate reflection of the location of the items." MOX Services Reply Testimony at 15; tr. 1230-1231. (PF ¶ 4.11)

4.24. The Intervenors also provided evidence that members of MOX Services' own staff believed that in order to provide the required assurance that the [REDACTED] "an accurate reflection of the location of the items," [REDACTED] [REDACTED] Lyman Testimony, par. A.5 (11-13). Although MOX Services testifies that such validation is not necessary, it provided a data verification procedure in response to the Board's questions. However, it maintains that there is [REDACTED] and it has not shown how its procedure would provide the level of confidence in the data necessary to comply with the regulations.

2. Analysis

4.25. The resolution of this contention turns on the meaning of the word "verify" as it is used in 10 CFR §74.55(b). Our interpretation of the term must, "[a]s with all rules, begin with the language and structure of the provision itself." *Northeast Nuclear Energy Co.* (Millstone Nuclear Power Station, Unit 3), CLI-01-10, 53 NRC 353, 361 (2001) (citing *Louisiana Energy Services, L.P.* (Claiborne Enrichment Center), CLI-97-15, 46 NRC 294, 299 (1997)). As defined in the Random House Webster's College Dictionary, "verify" means:

1. To prove the truth of, as by evidence or testimony; confirm. 2. To ascertain the truth, authenticity, or correctness of, as by examination or research. 3. To act as ultimate proof or evidence of; serve to confirm.

Id. (Random House New York 1997). All three of these definitions necessarily include the concept of determining the truth of something through an additional independent means such as "evidence," "testimony," "examination," "research," or "ultimate proof." (PF ¶ 4.13)

4.26. The context in which the term "verify" is used in NRC regulation 10 CFR §74.55(b) is also relevant. *Louisiana Energy Services*, 46 NRC at 299. The context of §74.55(b) demonstrates that the verification requirement is essentially quantitative: the regulation requires the licensee to "verify on a *statistical sampling basis*, the presence and integrity of SSNM items ..." (emphasis added). The regulation also requires that the statistical sampling plan must have at least 99% power of detecting losses that total five formula kilograms or more. This language makes it clear that in addition to the above concepts of independence and additional evidence or proof, the concept of verification as used in Section 74.55(b) includes two additional requirements -- a quantitative statistical measure (*i.e.*, the random selection, location, removal and physical inspection of an item's identification and integrity, *see* Lyman Testimony par. A.5(5), and a sample size determined by quantitative analysis. (PF ¶ 4.14)

4.27. MOX Services and the NRC Staff have cited no contrary regulatory history or application of the regulations. In fact, NRC witness Tom Pham and MOX Services witness Martha Williams confirmed that the two operating Category 1 facilities in the U.S., NPS ETwin and B&W Technology, use item sampling and direct physical inspection to comply with the item monitoring requirements of 10 CFR §74.55(b). Tr. 1393-95. This is what was referred to as "the traditional approach to item monitoring ... as is done in the current Uranium facilities licensed under Subpart E" by a MOX Services employee in an e-mail introduced as an exhibit by the Intervenor (INT000007). (PF ¶ 4.15)

4.28. Thus, the clear meaning of the word "verify" as used in 10 CFR §74.55(b) is to prove or confirm, through some statistically measurable and independent evidence, the truth of the licensee's records with respect to the presence and integrity of SSNM items. (PF ¶ 4.16)

4.29. Our review of the evidence shows that MOX Services proposes no means of independently verifying the presence and integrity of SSNM items. Instead, MOX Services seeks to take credit for the asserted [REDACTED] and the rigor of its security program. (PF ¶ 4.17)

a. Verification of item presence and integrity

4.30. According to MOX Services, [REDACTED] where each item *actually is* at any given time." MOX PF ¶ 4.26 (also First MOX PF ¶ 4.19) (emphasis in original). MOX Services credits two design features

for the [REDACTED]
[REDACTED]
[REDACTED] MOX PF ¶¶ 4.64-80 (also First MOX Services PF ¶¶ 4.41-4.56). See also First MOX PF ¶ 4.21. In other words, MOX Services assumes that the [REDACTED] cannot be tampered with undetected under any circumstances. Thus, as summed up by MOX Services' counsel, "we can trust what [REDACTED] know to be accurate." Tr. 1086. MOX PF ¶ 4.26; First MOX PF ¶ 4.18.

4.31. However, MOX Services' assertion of "trust" is not sufficient to show it has satisfied its burden of proof with regard to compliance with 10 CFR §74.55(b)(1). As Ronald Reagan famously quipped, "trust but verify." MOX Services must also show that it can "verify" that the [REDACTED] represents the "truth" with regard to the actual location of items within the MOX plant. (PF ¶ 4.19)

4.32. Absent a demonstration by MOX Services that it has an independent and quantifiable means of verifying the [REDACTED], we cannot find that those systems can be used to satisfy the item monitoring regulations. Without providing detailed procedures to independently and periodically verify the performance of the [REDACTED] MOX Services has simply failed to demonstrate the [REDACTED] can operate with the astonishingly high level of accuracy required to establish that there is no daylight between the [REDACTED] data and the actual state of items in the plant. (PF ¶ 4.20)

4.33. We also find unpersuasive the five ways that MOX Services claims that it [REDACTED] that the [REDACTED] First MOX Services PF ¶ 4.58. None of them, however, satisfy the requirements that verification must be independent and statistically quantifiable. (PF ¶ 4.21)

4.34. First, MOX Services claims to verify the accuracy of the [REDACTED] "comparing [REDACTED] As Dr. Lyman testified, however, comparing the [REDACTED] shows only that [REDACTED] give the same information. It does not address the fundamental question of whether the [REDACTED] "know" where each item actually is at any given time with certainty.² During the May 2013 hearing, MOX Services confirmed the interdependence of the computer programs. As Mr. Bell stated, [REDACTED] Tr. 1715. See also tr. 1788, 1794 (Bell). (PF ¶ 4.22)

² We are not persuaded by MOX Services' argument that by [REDACTED] of the items in storage it takes a "statistical sample" of "100% of the item population." PF 4.31. This assertion only establishes that MOX Services [REDACTED] regularly to determine whether they have identified any discrepancies. MOX Services identifies no step by which it independently verifies that the [REDACTED] Dr. Lyman testified, for verification purposes the sample size is zero. Tr. 1231.

4.35. Second, MOX Services claims that [REDACTED] MOX Services PF ¶ 4.97; First MOX Services PF ¶ 4.62. According to MOX Services, "[p]reviously established [REDACTED] Id. But collecting [REDACTED] through the processing system [REDACTED] the storage areas in question; it is only confirmation of the presence and integrity of the items that are actually handled. For instance, for the [REDACTED] of the inventory would be accessed every month, whereas compliance with the item monitoring requirements would require verification of the presence and integrity of 99 percent of the items within the vault every month. See Tr. 1237, 1756-57 (Lyman). (PF ¶ 4.23)

4.36. Third, MOX Services asserts that it "has confidence in the [REDACTED] because any failure of the systems would be readily detectable." MOX Services PF ¶ 4.96; First MOX Services PF ¶ 4.63. However, MOX Services [REDACTED] the potential for an adversary to take measures to conceal any abnormalities. (PF ¶ 4.24)

4.37. Fourth, MOX Services contends that it [REDACTED] MOX Services PF ¶ 4.32 n.158; First MOX Services PF ¶ 4.64. However, the terms "verify" and "accuracy" are not quantitatively defined. (PF ¶ 4.25)

4.38. Finally, MOX Services asserts that by complying with separate "physical inventory requirements," it will [REDACTED] PF 4.65. According to MOX Services witness Gary Bell, [REDACTED] that system's capability for accuracy with respect to where items are versus where they should be." Id. However, MOX Services does not demonstrate that such operations, which would only occur that frequently in the early stages of facility operation in any event, would be sufficient to [REDACTED] the extent required so that they can be relied on for item monitoring in the periods between inventories for the entire operating lifetime of the plant. (PF ¶ 4.26).³

4.39. Thus none of these examples demonstrates that the accuracy of the [REDACTED] sufficiently high that actual physical verification of items is needed to satisfy the regulatory timelines for item monitoring. MOX Services' testimony boils down to an argument that the [REDACTED] of the MOX FFF, allows MOX Services to "know" the location and integrity of SSNM items and therefore there is no need to independently verify the information. Perhaps on the theory that the best defense is a good offense, it elides over its failure to prove that its proposal can provide the quantitative level of verification required by the regulations and asserts that "the use of the MOX facility"

³ The Trice Letter of June 12, 2013 does nothing to cure this deficiency.

[REDACTED] MOX
Services PF 4.68. (PF ¶ 4.27)

4.40. It is not our role, however, to judge whether the measures proposed by MOX Services can compensate for their demonstrated inability to meet the quantitative item monitoring requirements through being "superior" in certain qualitative respects to physical verifications. The simple question before us is whether the FNMCP, as currently presented, complies with the plain terms of the regulations. We find that it does not comply. We also find that underlying much of the evidence presented in this hearing --- starting with the language in the initial FNMCP --- is a pervasive belief on the part of MOX Services that it does not need to comply with traditional item verification requirements because of certain plant features. Such considerations of course are simply irrelevant to our decision. (PF ¶ 4.28)

b. **MOX Services' additional rationale for avoiding direct**

[REDACTED]

4.41. As we have discussed above, the item monitoring requirements of 10 C.F.R. § 74.55(b) apply to both verification of item presence and item integrity. An applicant must demonstrate the same capability to statistically sample and physically inspect items to verify their integrity as it does to verify their presence. (PF ¶ 4.29)

4.42. However, the item monitoring program proposed by MOX Services, [REDACTED] results in a need for different approaches for verification of item presence and item integrity. This is because the [REDACTED] MOX Services as its approach for item presence verification cannot be used to verify item integrity. As a result, MOX Services has proposed a new approach [REDACTED] (PF ¶ 4.30)

4.43. According to MOX Services, item "integrity" refers to the condition of the containment boundary around a discrete quantity of SSNM. PF 4.75. MOX Services contends that where the material in question is a single item, "integrity" may refer to the item packaging itself not being breached, but this can also be expanded to encompass multiple items located in storage areas that are sealed and designed to be tamper-safed or protected equivalent to tamper-safing. *Id.*⁴ (PF ¶ 4.31)

⁴ 10 C.F.R. § 74.55(a) states that "Licensees subject to § 74.51 shall provide the detection capability described in paragraph (b) of this section for laboratory samples containing less than 0.05 formula kilograms of SSNM and any uniquely identified items of SSNM that have been quantitatively measured, the validity of that measurement independently confirmed, and that additionally have been either:

4.44. In the case of the MOX facility, MOX Services has defined a [REDACTED] around each SSNM item storage location. [REDACTED] MOX Services asserts that it meets the requirements for item integrity verification in 10 C.F.R. § 74.55(b). PF 4.84. The NRC Staff agrees with MOX Services. According to NRC Staff witness Tom Pham, § 74.55(b) is satisfied by MOX Services' provisions for verifying the integrity of the vaults where the SSNM items are stored:

The vaults meet the acceptance criteria in NUREG-1280, "Standard Format and Content Acceptance Criteria for the Material Control and Accounting (MC&A) Reform Amendment - 10 CFR Part 74, Subpart E," for providing protection equivalent to tamper-safing. *As such, MOX Services can verify the integrity of items inside the vaults at the MOX Facility through verifying the integrity of the vault boundaries.* The verification of the integrity of the vault boundaries on a daily basis, as proposed by MOX services, also exceeds the regulatory requirement to verify the integrity of the items every 30 or 60 days, as required by 10 CFR 74.55(b)(1).

NRC Staff Direct Testimony at 4. Mr. Pham further explains:

The integrity of an individual item is verified through inspection of the tamper-safing seal applied to the item (if a seal is applied). If a storage area provides protection equivalent to tamper-safing, it is generally acceptable for an applicant or a licensee to verify the integrity of the storage area, including the boundaries (*e.g.*, walls, floor, and ceiling), and of the tamper-safing devices on any access points (*e.g.*, doors and vents).

Id. at 11. Thus, MOX Services and the NRC Staff equate verification of integrity of storage area boundaries that have been tamper-safed or its equivalent with verification of item integrity. (PF ¶ 4.32)

4.45. Dr. Lyman has testified that the concept of verification of the integrity of "containment boundaries" is a novel concept that does not appear in the regulations or guidance related to item monitoring. Tr. 1389. Witnesses for MOX Services and the NRC Staff were unable to refute this statement. When asked to show where this concept appeared in the regulations or guidance, Mr. Pham referred to 10 CFR § 74.55(a)(1) and Section 2.1 of NUREG-1280. Tr. 1402. However, the citation from the regulations only defines the conditions for SSNM items to which

-
- (1) Tamper-safed or placed in a vault or controlled access area that provides protection at least equivalent to tamper-safing; or
 - (2) Sealed such that removal of SSNM would be readily and permanently apparent (*e.g.*, encapsulated)."

the item monitoring requirements of 10 CFR § 74.55(b) apply and makes no reference to verification of the integrity of containment boundaries. (PF ¶ 4.33)

4.46. Also, the sections of NUREG-1280 Mr. Pham referred to relate to (1) guidance on how SSNM items are defined, (2) guidance on how to confirm that vaults or permanently controlled access areas (CAAs) meet the regulations; and (3), guidance on how to define storage that provides protection at least equivalent to tamper-safing. Similarly, none of these contains any information relevant to the concept of verification of the integrity of containment boundaries proposed by MOX Services. And in fact, MOX Services itself states that the boundary checks it proposes are *not* required by the regulation. PF at 4.83.⁵ However, they credit this extra-regulatory measure as “sufficient” to comply with the regulations. (PF ¶ 4.34)

4.47. MOX Services’ witness Ms. Williams pointed to examples that she asserted demonstrated that the integrity boundary concept was not “novel.” In particular, she pointed to examples from the NFS and B&W Category I fuel cycle facilities, as well as an example from the Humboldt Bay spent fuel pool. However, we do not find these examples to be similar enough to the case at hand to shed much light on the acceptability of MOX Services’ proposal. For instance, it is hard to see how a sealed 55-gallon drum most likely containing only a small number of items could present the same item monitoring challenge as a storage area containing hundreds of items. (PF ¶ 4.35)

4.48. We find that under MOX Services’ approach, all SSNM items within a single “containment boundary” would effectively become a single “item” for the purposes of item monitoring. We find this could be cumbersome and inefficient. For instance, if the integrity of an actual item is breached, the potential consequences of such a breach are limited and the resulting alarm would likely be relatively easy to resolve within the approved time period.

~~_____~~
~~_____~~ This result clearly is not intended by either the regulatory guidance or the FNMCP. (PF ¶ 4.36)

4.49. Moreover, MOX Services’ and the NRC Staff’s interpretation of Section 74.55(b)(1) is not legally permissible because it would render the item monitoring requirements in 10 C.F.R. § 74.55(a)(1) and (b) meaningless. *Wrangler Laboratories*, 33 NRC at 513-14. See also *Hydro Resources, Inc.* (P.O. Box 777, Crownpoint, New Mexico 87313), LBP-06-1, 63 NRC 41, 56 (2006) (“where possible, a regulation should be construed in a manner that avoids internal inconsistencies.”) If it is possible to satisfy the requirement for verifying the *integrity* of items

⁵ In reviewing NUREG-1280, we observe that Section 2.1.7 contains language allowing license applicants to propose “shortcuts” for seal integrity checks. These shortcuts may be justified on the basis of “limited accessibility” or other factors. The guidance also states that these proposed shortcuts “must be reviewed for accessibility on a case-by-case basis.” *Id.* at 29. The language of this section is less than clear and we are unable to reach any conclusion as to its applicability. In any event, no attempt has been made to invoke this language.

containing SSNM by verifying the integrity of storage area boundaries, then it follows logically that it should be possible to verify the *presence* of an item in the same way. After all, if the system is sensitive enough to detect removal of the partial contents of a container it should also be sensitive enough to detect the removal of the entire container. If one knows the identity of all items within the containment boundary at any time, and it is assumed that the area has not been entered as long as the boundary remains intact, then there would never be a need to re-verify the identity of the items contained within the boundary. (PF ¶ 4.37)

4.50. As a result of this logical inference, however, much of the language in 10 C.F.R. §§ 74.55 would be superfluous, starting with the header “Item Monitoring” – because no items would need to be monitored. Similarly superfluous would be the requirement in § 74.55(b) that the licensee “shall verify on a statistical sampling basis, the presence and integrity of SSNM items” with a “99 percent power of detecting item losses that total five formula kilograms or more.” Also superfluous would be the language of § 74.55(a)(1) which requires that:

Licensees subject to § 74.51 shall provide the detection capability described in paragraph (b) within the time frames specified in § 74.55(b)(1)-(4)] for laboratory samples containing less than 0.05 formula kilograms of SSNM and any uniquely identified items of SSNM that have been quantitatively measured, the validity of that measurement independently confirmed . . . (PF ¶ 4.38)

4.51. In short, MOX Services’ and the NRC Staff’s proposed approach to item integrity verification is unacceptable because it would effectively remove item monitoring from the regulations and therefore is inconsistent with basic principles of regulatory interpretation. (PF ¶ 4.39)

c. Evidence suggests MOX Services can comply with regulations.

4.52. And now we come to a more troubling aspect of our decision. In its written testimony, MOX services presented evidence indicating that it would be fully capable of conducting item monitoring tests in the storage areas that had previously been identified as problematic in its 2009 Exemption Request. In this testimony, MOX Services shows that the actual timelines for conducting item location and identification in the [REDACTED] and three other storage areas were now short enough that they could easily meet the 30- and 60-day timeframes in the regulations, even at full capacity. However, MOX Services has not revised its approach for compliance by taking this new data into account. Lyman Direct Testimony, par. A.5(18). (PF ¶ 4.40)

4.53. In particular, the timeline for location and identification of items in [REDACTED] decreased by nearly a [REDACTED] (MOX Services Exhibit APP000025). Apparently this is because MOX Services now credits [REDACTED]. This would enable 100% item verification of a [REDACTED] days – well within the 30-day regulatory timeline. Lyman Direct Testimony, par. A.5(19). (PF ¶ 4.41)

4.54. Although a MOX Services internal e-mail introduced by the Intervenor suggests that the crane may not have the endurance to conduct item inventories (*see* Intervenor's Presentation, Exhibit INT000009), MOX Services stated on the witness stand that "the crane is capable of operating continuously, 24 hours a day." Tr. 1264 (Clark). (PF ¶ 4.42)

4.55. We are troubled by the very real possibility that MOX Services has wasted the resources of the Board and parties by advancing an obviously noncompliant MC&A plan when it could have satisfied the regulations by upgrading an existing piece of equipment. In any event, we will not approve this application as written. If MOX Services plans to rely on the bar code reader to conduct item monitoring, it must re-submit its operating license application. (PF ¶ 4.43)

3. Conclusion

4.56. Based on the evidence, we conclude that the item monitoring scheme proposed by MOX Services is deficient and does not meet the quantitative assurance standards specified by the regulations. [REDACTED]

a. It does not provide any assurance that a diverted item will be detected within the specified time periods unless MOX Services can demonstrate that the [REDACTED] in fact "knows" the location of each item in real time with 100 percent accuracy. Without providing detailed procedures to periodically verify the performance [REDACTED], MOX Services has simply failed to demonstrate the system can operate with this astonishingly high level of accuracy. (PF ¶ 4.44)

C. Contention 9: Adequacy of Revised FNMCP with Procedure

4.57. As discussed in our 6/29/12 Memorandum and Order, in its initial testimony, MOX Services claims that it can verify the presence of SSNM items by [REDACTED] *Id.*, slip op. at 8-9. In making this assertion, MOX Services also takes credit for [REDACTED]. *Id.*, slip op. at 9.

4.58. In addition, as discussed above in pars. 4.43-4.44, in lieu of verifying the integrity of items, MOX Services proposes to define a new concept called the "containment boundary" and to periodically inspect that boundary to confirm that it has not been breached. *Id.* It also variously proposes to confirm the integrity of the seal for a container containing more than one SSNM item, or to confirm the integrity of the seal for an entire storage location, depending on the nature of the items and storage areas in question. *Id.* To effectively execute and interpret these confirmation steps, MOX Services needs to rely [REDACTED]. As MOX Services' witness Gary Clark testified that in accordance with the April 2010 FNMCP the tamper-indicating devices (TIDs) MOX Services would use to seal the containment boundaries [REDACTED] Tr. 1867. We note that this testimony is in direct contradiction to MOX

Services' October 12, 2012 Supplemental Statement of Position, where it asserts that [REDACTED] are not necessary components of the integrity verification activities. Thus, questions regarding the accuracy of [REDACTED] have no bearing on MOX Services' integrity verification approach." Supplemental Statement at 10. Based on Mr. Clark's sworn testimony, we conclude that MOX Services' integrity verification approach indeed [REDACTED] and therefore all questions regarding the [REDACTED] have a bearing on that approach. If [REDACTED], the TID records in the database can also be corrupted.

4.59. Despite its reliance on these [REDACTED] in its proposed approach to complying with the NRC's item monitoring regulations, however, MOX Services' initial testimony does not present any means of verifying the accuracy of the data generated by the computer programs.

4.60. In our 6/29/12 Order, we asked MOX Services to provide:

a document, accompanied by supporting testimony and evidence, setting forth the approach to and criteria underlying its planned [REDACTED]. The Applicant may provide an amendment to the 2010 FNMCP [Fundamental Nuclear Material Control Plan], or a similarly consequential document of its choosing. In any event, this document must be easily identifiable and enforceable by future inspectors if the MOX Facility is indeed granted a possession-and-use license.

Id., slip op. at 12.

4.61. In response to our request, MOX Services presents "a specific implementing procedure" that it purports to satisfy our concerns. MOX Services' Supplemental Statement at 7. Before embarking on a discussion of the merits of the procedure, however, MOX Services makes four legal arguments that the procedure is not required. *Id.* None of these arguments has merit.

1. Legal arguments

a. Argument that procedures are not required in hearing

4.62. First, MOX Services argues that there is no regulatory requirement to develop implementing procedures at the licensing stage for the MOX Facility, and that MOX Services may wait until the "pre-operational" stage to submit them for Staff approval. *Id.* at 8. MOX Services is correct that the NRC's MC&A regulations do not require the submission of implementing procedures as part of a license application. As MOX Services acknowledges, however, we did not insist on the submission of implementing procedures. Rather, we asked MOX Services to provide a document -- of MOX Services' own "choosing" -- "setting forth the approach to and criteria underlying its planned process for verifying the [REDACTED]" *Id.*, slip op. at 12.

MOX Services, not the ASLB, chose to satisfy the ASLB's request by submitting implementing procedures.

4.63. In addition, there can be no doubt that the "approach to and criteria underlying [MOX Services'] planned process for verifying the accuracy of the data [REDACTED] are material to the NRC's determination of whether MOX Services satisfies 10 C.F.R. § 74.55(b)'s requirement to "verify on a statistical sampling basis, the presence and integrity of SSNM items," for the simple reason that MOX Services' interpretation of § 74.55(b) strays so far from the plain language of the regulations. As discussed above, it is implicit in the applicant's approach that the [REDACTED] representation of the presence of items stored in the MOX Facility. That is an astounding level of accuracy that should be supported by something more than a naked claim. By proposing to [REDACTED] of the actual presence and integrity of containers that is plainly contemplated by § 74.55(b), MOX services begs the question of how it can avoid the uncertainty that is [REDACTED]. This is not a "minor procedural or verification question[]" that can be deferred to post-hearing resolution. *Louisiana Energy Services, L.P.* (Claiborne Enrichment Center), CLI-96-8, 44 NRC 107 (1996) (citing *Consolidated Edison Co. of New York* (Indian Point, Unit 2), CLI-74-23, 7 AEC 947, 951-52 (1974); *Philadelphia Electric Co.* (Limerick Generating Station, Units 1 and 2), ALAB-836, 23 NRC 479, 494 (1986)). The "posthearing approach should be employed sparingly and only in clear cases." *Id.* (quoting *Consolidated Edison*, 7 AEC at 952).

4.64. With respect to contested issues, MOX Services' license application must stand or fall on the documents that are submitted in the hearing. *Louisiana Energy Services*, 44 NRC at 109. As discussed below, we do not believe the additional information submitted by MOX Services, in the form of implementing procedures, is sufficient to overcome the fundamental deficiencies of MOX Services' operating license application.

b. **Argument that MMIS and PLCs are irrelevant to item integrity**

4.65. Next, MOX Services argues that [REDACTED] only to verify item presence and not integrity. Supplemental Statement at 9. According to MOX Services, [REDACTED] *Id.* at 10. Therefore, MOX Services argues, "questions regarding the [REDACTED] no bearing on MOX Services' integrity verification approach." *Id.* at 11.

4.66. In making this argument, MOX Services attempts to sidestep the integral relationship between item presence verification and item integrity verification in the NRC's regulations. As discussed above, the regulations contemplate that licensees will have direct access to items to verify both their presence and integrity through random selection and physical inspection of items. An applicant must demonstrate the same capability to statistically sample and physically inspect items to verify their integrity as it does to verify their presence. MOX Services

effectively abandons any attempt to comply with the regulations and substitutes unorthodox and noncompliant measures that [REDACTED]

[REDACTED] In any event, as discussed above in par. 4.58, MOX Services concedes that it relies [REDACTED].

c. **Argument re lack of requirement to verify accuracy of item monitoring "approach"**

4.67. Offering a radically and self-servingly abbreviated paraphrasing of 10 C.F.R. § 74.55(b)(1), MOX Services argues that the regulation requires an applicant to demonstrate that it "can detect the loss of 5 formula kilograms of SSNM in item form in 30 days for Category IA items and 60 days for Category IB items." *Id.* at 10. MOX Services correctly argues that this language "does not call for a system to verify the accuracy of a licensee's item monitoring approach, and none is required to meet the rule." Supplemental Statement at 10.

4.68. But the regulation contains other requirements that MOX Services conveniently omits from its paraphrase. The regulation in its entirety requires that the applicant must verify the presence and integrity of the items on a statistical sampling basis that achieves a prescribed power of detection within a prescribed period of time.⁶ MOX Services has yet to demonstrate that it meets this standard. Nor does MOX Services explain how the "particular elements of MOX Services' chosen system for item presence verification" – *i.e.*, "a high degree of automation, limited human intervention, and robust reliability and protection features – amount to anything more than substitutes for compliance with the plain language of the regulations.

4.69. Fundamentally, the approach offered by MOX Services does not provide a means for compliance with the NRC's MC&A regulations, but is in fact an alternative to compliance, which would require an exemption. MOX Services may well be capable of meeting the standard for an exemption from the NRC's MC&A regulations. But in this proceeding, MOX Services does not seek an exemption. Instead, it claims to satisfy the regulations with substitute measures that plainly fail to address the regulations, let alone satisfy them. MOX Services' argument only serves to illustrate the [REDACTED] and cannot verify their integrity at all, could satisfy a

⁶ The full text of 10 C.F.R. § 74.55(b)(1) provides that:

The licensee shall verify on a statistical sampling basis, the presence and integrity of SSNM items. The statistical sampling plan must have at least 99 percent power of detecting item losses that total five formula kilograms or more, plant-wide within:

- (1) Thirty calendar days for Category 1A items and 60 calendar days for Category 1B items contained in a vault or in a permanently controlled access area isolated from the rest of the material access area (MAA).

regulation that requires actual verification of presence and integrity of items by using a statistical sampling plan with specified performance parameters.

4.70. In reaching this conclusion, we express no opinion on whether MOX Services uses human beings or automation to verify the presence and integrity of SSNM. Either method would be satisfactory if MOX Services could demonstrate its reliability and independence – although some human verification would be needed to ensure that the entire automated process is not corrupted, as implicitly acknowledged in the June 12, 2013 Trice Letter. [REDACTED]

[REDACTED] ons. See tr. 1828-29 (Grice) [REDACTED] What is not acceptable under the regulations, however, is to use [REDACTED] whose alleged accuracy cannot be verified by any independent means.⁷

d. Argument re lack of requirements for MMIS and PLCs

4.71. In its final legal argument, MOX Services contends that “[b]ecause NRC regulations do not require a system to [REDACTED], they also do not contain a quantitative standard by which MOX Services’ commitment must be judged.” Supplemental Statement at 11. Therefore, according to MOX Services, “[w]hile MOX Services has adopted an approach that includes a quantitative element, the ultimate test must be a common sense reasonable assurance or adequacy standard.” *Id.*

4.72. MOX Services is simply incorrect that NRC regulations lack a quantitative standard applicable to MOX Services. Section 74.55(b)(1) contains a very explicit quantitative standard for the item monitoring that must be conducted by MOX Services.⁸

4.73. Therefore, contrary to MOX Services’ argument, this is not a matter of the “level of confidence” needed to approve the application, *see AmerGen Energy Co., LLC (License Renewal for Oyster Creek Nuclear Generating Station), CLI-09-7, 69 NRC 235, 262-63 (2009)*; nor is it a question of giving “context” to the adequate protection standard, *see Union of Concerned Scientists v. NRC*, 880 F.2d 552, 558 (D.C. Cir. 1989) (cited in Supplemental Statement at 12). Instead, it is a question of whether an apple can be substituted for an orange or whether a square peg fits into a round hole.

⁷ We disregard oral testimony by MOX Services’ witnesses that they have revised the FNMCP yet again to provide for inspection of seals by facility employees [REDACTED] (tr. 1868-76) because these revisions are not before us; nor have they been submitted to the NRC Staff for approval or to the Intervenors for their review.

⁸ Not surprisingly, § 74.55(b)(1) does not contain a [REDACTED] for item monitoring was never contemplated by the regulations.

4.74. By presenting a [REDACTED] of item presence and integrity, MOX Services is defying the regulations. This constitutes grounds for denying the license application, not for deferring the review to the Staff. The only viable route by which MOX Services could seek approval of its operating license application would be to apply for an exemption from the regulations (an option that MOX Services tried in 2009 and then abandoned in 2010) or to petition the NRC to revise the regulations. But no amount of rationalizing can [REDACTED] proposed by MOX Services for tracking items lacks the capacity to verify their presence and integrity as required by the rule.

3. Factual arguments

4.75. Setting aside its legal arguments, MOX Services describes “five different methods” that purportedly [REDACTED]

[REDACTED] In addition, MOX Services has modified the FNMCP to commit MOX Services to “taking actions to ensure and verify the accuracy of item identity and location data [REDACTED]”

4.76. In support of its argument, MOX Services attaches the testimony of its expert witnesses. But this testimony does not avail MOX Services, because none of the experts claims that MOX Services will satisfy the requirement of 10 C.F.R. § 74.55(b) for a statistical sampling plan that verifies the presence and integrity of SSNM with at least 99 percent power of detecting item losses that total five formula kilograms or more, plant-wide within 30 calendar days for Category 1A items and 60 calendar days for Category 1B items contained in a vault or in a permanently controlled access area isolated from the rest of the material access area (MAA). Instead, MOX Services all but concedes that it can't or won't meet the standard. According to MOX Services, on a monthly basis “[t]he number of item verifications conducted will be comparable to that required to detect a 3% defect rate at a 99% confidence level.” Supplemental Statement at 14. See also Revised Testimony at 14-17.⁹ However, MOX Services has not shown how such a sampling plan [REDACTED] to the extent necessary to demonstrate compliance with 10 C.F.R. § 74.55(b).

⁹ The sources of MOX Services' alternative standard are “DOE Standard 1194-2011 (in conjunction with DOE Order 474.2), DOE Manual 470.4-6c-1, and DOE manual 474.1-1B. Revised Testimony at 15. But this proceeding concerns compliance with NRC regulations, not DOE guidance. To intervenors' knowledge, DOE does not have a quantitative performance standard for item monitoring comparable to 10 CFR 74.55(b), and MOX Services does not cite one. Therefore, the sampling parameters in the DOE standard were intended to support a program with different objectives than NRC's requirements and have limited relevance, at best.

4.77. It is unclear how MOX Services' proposed system would be consistent with the NRC's requirement for a statistical sampling plan with at least a 99 percent power of detecting be able item losses totaling 5 formula kilograms of Category 1A SSNM or more within 30 days. Under the standard proposed by MOX Services, for example [REDACTED], the system proposed by MOX Services would [REDACTED] before a misplaced or missing can would be detected with 99 percent confidence. Tr. 1941. It is hard to see how that level of error could provide the level of assurance required by the regulations.¹⁰ As Dr. Lyman, testified:

Now the question is, is there a level of verification of this data that would then enable one to comply with the regulations as written short of actually verifying 99 percent of the data, essentially each month for certain storage areas? And in our view ... we don't believe that anything short of the number of movements necessary to satisfy the parameters specified in the regulations would be adequate.

Tr. 1756. See also Lyman Testimony, ¶ 15.

4.78. Not only is the standard to which MOX Services has pegged its program inconsistent with the NRC's regulations in the extreme, but it has appalling implications for the security of plutonium at the MOX Facility.

4.79. Given MOX Services' failure to even assert that it can detect SSNM losses with the level of confidence required by NRC regulations, and given the disturbing implications of the low standard it has set for itself, we have no basis for concluding that MOX Services has supplemented its license application in a manner that is sufficient to justify issuance of an operating license.

4.80. Other aspects of MOX Services' supplemental information further illustrate the extreme degree to which it fails to satisfy the NRC's MC&A regulations. For instance, MOX Services witness Gary Bell asserts that [REDACTED], MOX Services will . . . [REDACTED] Revised Testimony at 11. According to Mr. Bell, MOX Services [REDACTED] in an unauthorized fashion. *Id.* at 12. But Mr. Bell's testimony begs the question: [REDACTED]

4.81. In addition, MOX Services proposes to [REDACTED] ^{ity}
[REDACTED]
[REDACTED]
[REDACTED]
rather they were developed for purposes of managing the MOX Facility inventory. Thus, the relationship between the [REDACTED]

[REDACTED]. Accordingly, MOX Services lacks a legal basis for asserting that compliance with ASME NQA-1 standards is sufficient for the application it proposes.

D. Contention 10: Revised FNMCP Standing Alone
1. The parties' position on Contention 10

4.82. NRC regulation 10 CFR §74.57(b) requires that Category I fuel cycle facility licensees "shall resolve the nature and cause of any MC&A alarm within approved time periods." In the FNMCP, MOX Services states that its alarm resolution procedures "will normally be completed within three calendar days after an item is declared missing." This time period was approved by the NRC Staff in the MFFF SER. (PF ¶ 4.45)

4.83. Contention 10 asserts that:

The Revised FNCMP is inadequate to satisfy the alarm resolution requirements in 10 C.F.R. § 74.57(b), which requires that licensees "shall resolve the nature and cause of any MC&A alarm within approved time periods." In the event that alarm resolution requires an inventory of one of the four item storage areas identified in MOX Services' December 17, 2009 Exemption Request, MOX Services has not demonstrated that it can meet its commitment to normally resolve the alarm within three days. Revised FNMCP at 152. (PF ¶ 4.46)

4.84. The intervenors challenge the ability of MOX Services to meet its time commitment to resolve "any MC&A alarm" within three calendar days should the resolution of such alarm require an item inventory of the storage areas [REDACTED] that MOX Services previously demonstrated in its intervention request could not meet the much longer timelines (30 to 60 days) for completion of item monitoring tests. Such tests would require operations equal to or less time-consuming than an actual inventory (which may require re-measurement of item contents). (PF ¶ 4.47)

4.85. MOX Services asserts that the excessive length of time needed to locate and identify all items in storage [REDACTED] does not render it incapable of meeting the NRC alarm resolution requirements for two reasons. First, it claims that the regulations do not require

it to specify any particular method to resolve an alarm, so the fact that it could not conduct an item verification, much less a full quantitative inventory, within three calendar days is irrelevant. Second, it claims that the statement that it can “normally” complete alarm resolution within three days absolves it from the responsibility to resolve alarms in a timely fashion under any conditions that MOX Services believes are abnormal or atypical. (PF ¶ 4.48)

2. Analysis

4.86. MOX Services concedes that it could [REDACTED] First MOX PF 4.114. Nevertheless, MOX Services makes several arguments that this does not preclude a finding of noncompliance with Section 74.57(b). (PF ¶ 4.49)

4.87. First, MOX Services contends that there is no requirement that timely alarm resolution be performed by any one particular means, such as an inventory, and that it can rely on a combination of measures rather than just an inventory. First MOX PF 4.91. But we do not find MOX Services’ reasoning to be persuasive. As Dr. Lyman testified, it is reasonable to envision circumstances in which the only way to resolve an alarm is to conduct an inventory of the entire plant, and that no combination of other methods will suffice. Tr. 1465-66. (PF ¶ 4.50)

4.88. In this context, we note that Mr. Pham stated that the NRC Staff would not have approved the FNMCP if it had not contained a provision for resolution of an alarm by use of a plant inventory. Tr. 1446 (Pham) (“If the inventory is not on the list, it’s not sufficient enough.”) Simple logic dictates that if the list is insufficient if it does not include performing an inventory, then there are circumstances under which an inventory would be essential for resolving the alarm. (PF ¶ 4.51)

4.89. We are also disturbed by what we perceive to be a rather complacent attitude on the part of MOX Services and the NRC staff with regard to the critical capability of timely alarm resolution. This attitude appears to arise in part from a belief that the MOX Facility is so secure that the most likely cause of an alarm would be human error rather than an actual diversion of SSNM. Tr. 1443 (King). Thus, MOX Services argues that it is likely to have resolved the alarm before it gets to the extreme point of having to do a plant inventory. First MOX PF 4.92 – 4.93; 4.119-120. For the same reasons that we do not believe the [REDACTED] with the item monitoring requirements of 10 CFR. § 74.55(b), we do not believe that the regulatory scheme allows us to approve an FNMCP whose provision for the use of a plant inventory to resolve an alarm would be ineffectual. (PF ¶ 4.52)

4.90. MOX Services’ second major argument is that the word “normally” as used in NUREG-1280 and the FNMCP indicates “typical” conditions while the plant is operating. First MOX PF 4.99. According to MOX Services, “normal” values and conditions can be contrasted with “design parameters, maximum/minimum capacities, worst-case analyses, etc., which bound the ‘normal values, but are generally more extreme than the ‘normal’ values expected during facility operation.” PF 4.99. For the greatly reduced inventory that it argues will be present under

"normal conditions," MOX Services now asserts that it would be able to conduct item inventories of the storage areas in question in less than three calendar days. For instance, the time needed to verify the identity of the [REDACTED] that would "normally" be in storage in the [REDACTED]

[REDACTED] ¹¹ (PF ¶ 4.53)

4.91. We reject this argument as a matter of law. MOX Services has written its application in a way that it will not have to obtain a license amendment if it increases the inventory of the plant beyond what is currently expected. Under the circumstances, we cannot approve an FNMCP that is effective only at capacities that may be changed without further notice or permission from the NRC. MOX Services must show that it meets the NRC's MC&A regulations for the design capacity of the facility as it is described in the application. If MOX Services believes that it cannot resolve an alarm by a plant inventory in less than three days unless the plant is operating at a fraction of the design capacity, then it should amend its application to so state. (PF ¶ 4.54)

4.92. In any event, minor deviations from MOX Services' assumptions of "normal" conditions could easily lead to a situation where an inventory could exceed the three calendar day time period. [REDACTED] percent increase in the assumed number of [REDACTED] events that should be anticipated as part of the "normal" operation of any large industrial facility – could challenge the ability of MOX Services to comply with the regulation based on item location and identification times alone. (PF ¶ 4.55)

3. Conclusion

4.93. In summary, MOX Services has not demonstrated that it is capable of resolving "any MC&A alarm" within the approved time period of three calendar days should an item inventory of certain storage areas, [REDACTED], be required, and if the alarm occurs under circumstances slightly different than those it asserts to be "normal." We conclude that as long as the possibility exists that an inventory may be needed (and there is surely such a circumstance in the broad universe encompassing "any" MC&A alarm), then MOX Services needs to show that it can be completed within the approved time period, at the design capacity of the facility. Otherwise we must reject the application. (PF ¶ 4.56)

E. Contention 10: Evidence and Arguments Subsequent to First Round

¹¹ We note here that the calculations presented by MOX Services to support these timelines refer only to the time needed to physically access and identify each item. They do not take into account the time needed to perform other activities that would be conducted during a physical inventory, including assay of the contents. These are typically time-consuming and could well increase the time to conduct an [REDACTED] beyond the 3-day limit, even under the conditions asserted as "normal" by MOX Services.

4.94 On May 25, 2012, intervenors submitted a surreply to two incorrect statements made by MOX Services in its Proposed Findings of Fact and Conclusions of Law. MOX Services disputes intervenors' assertions in its Supplemental Statement at pages 26-30. The first incorrect statement relates to the alarm resolution issue. The second incorrect statement relates to the issue of assessment of threats of theft, and is discussed in Section G.

4.95. The first incorrect statement appears in footnote 133 on page 30 of MOX Services' Proposed Findings, where MOX Services states that it has "not represented – in testimony or in legal statements of position – any intention of conducting a physical inventory or measuring items as part of alarm resolution." Intervenor asserted that this statement was inconsistent with representations made in Sections 3.1.3, 3.1.4.2, and 3.1.4.3 of the FNMCP.

4.96. MOX Services contends that Sections 3.1.3, 3.1.4.2, and 3.1.4.3 of the FNMCP do not refer to "physical inventories," and therefore there is no inconsistency between the FNMCP and MOX Services' proposed findings on that score. But item inventory is a subset of a physical inventory. Item inventory is functionally equivalent to physical inventory of items if item integrity is maintained as MOX Services alleges, because there would be no question that the documented quantity of material within a particular item is the correct quantity, and the "piece count" of a particular set of items would be directly related to the total SSNM content within those items.

4.97. With respect to item measurement, the FNMCP also makes commitments that are repudiated in the proposed findings. For instance, Section 3.1.3 refers to the procedures in Section 3.1.4.2 "for the remeasurement of a compromised item" that are "normally completed within two working days." Similarly, Section 3.1.4.2 [REDACTED] These statements are inconsistent with the assertion in MOX Services' Reply Proposed Findings that it has not represented [REDACTED] part of alarm resolution."¹² Section 3.1.4.3 states that when process storage has been determined as compromised, among other things, [REDACTED] MOX Services contends that [REDACTED] Supplemental Statement at 31. However, MOX Services has not explained what additional measures would be employed for [REDACTED] The FNMCP only states that "MC&A procedures are in place that include "inventory procedures for sealed sources and containers, or vaults containing SSNM that assure reliable identification and quantification of contained SSNM ..." 2010 FNMCP, Section 4.5 at 269. Therefore we conclude that MOX Services has failed to demonstrate that it meets the NRC's MC&A regulations for alarm resolution.

¹² We credit MOX Services' assertion that FNMCP § 3.1.4.1 is not relevant because it relates to processing rather than storage.

F. **Contention 11: Revised FNMCP Standing Alone**

1. **The parties' position on Contention 11**

4.98. NRC regulation 10 CFR § 74.57(e) requires that Category I fuel cycle facility licensees "shall provide an ability to rapidly assess the validity of alleged thefts." This is a crucially important requirement because it mandates, for example, that licensees be able to rapidly confirm the credibility of a terrorist threat that could be used for blackmail or to cause panic. MOX Services commits in the FNMCP to comply with § 74.57(e) in part by maintaining the capability to locate any randomly selected item within a vault within 8 hours and to locate all items within a vault within 72 hours. (PF ¶ 4.57)

4.99. Contention 11 asserts that:

At page 161 [of the Revised FNMCP], MOX Services claims that in the event of alleged theft of plutonium from the MFFF, it is capable of confirming the presence of a specific individual plutonium item within eight hours and verifying the presence of all Pu in item form in vault storage within 72 hours. But MOX Services does not support this assertion with any information that would show how such confirmation and verification will be carried out in the specified timelines. In addition, as discussed above in Contentions 9 and 10, other statements by MOX Services in its exemption application and RAI responses strongly indicate that in fact, MOX Services is not capable of meeting these timelines with respect to certain categories of plutonium in vault storage. Therefore MOX Services has not demonstrated that it satisfies [10 C.F.R. § 74.57(e).]¹³ (PF ¶ 4.58)

4.100. According to the data that MOX Services provided in its 2009 Exemption Request, it would have been physically impossible to meet the 72-hour (3 calendar days) timeline for conducting an inventory of the [REDACTED] since the time needed to locate and verify the identity of all [REDACTED] was estimated at [REDACTED] Direct Testimony, par. A.7(3). Even with the greatly revised timeline presented in MOX Services' testimony, based on utilization of the [REDACTED] that was not credited in the original FNMCP, it would take [REDACTED] days to complete the inventory of a fully loaded vault. *Id.* (citing MOX Services Exhibit APP000025). (PF ¶ 4.59)

2. **Analysis**

4.101. MOX Services asserts in its testimony that it can meet the requirement to rapidly assess the validity of alleged thefts through its reliance on the [REDACTED] area, including [REDACTED]

¹³ The original contention's citation to 10 C.F.R. § 75.57(e) (a nonexistent regulation) was a clerical error.

[REDACTED] MOX Services Direct Testimony, A. 58. The NRC Staff agrees with MOX Services. MOX First PF 4.132. (PF ¶ 4.60)

For the same reasons we disapproved MOX Services' proposed methods for complying with the item monitoring requirements of 10 C.F.R. § 74.55(b), we also find its proposed method for resolving alleged thefts deficient. Just as for item monitoring, so also for resolution of theft does [REDACTED] in the MFFF. To that end, MOX Services assumes that the system is [REDACTED] and [REDACTED] at. As a result it effectively takes the [REDACTED], even in the face of an alleged theft. With respect to Contention 9, we concluded that such an assumption could not be relied on unless MOX Services demonstrated that it could be independently and quantitatively verified. But MOX Services has not made provision to do that. Lyman Direct Testimony, par. A.5(6). (PF ¶ 4.61)

4.102. The hearing testimony also [REDACTED] [REDACTED] [REDACTED] [REDACTED] Lyman Direct Testimony, par. A.7(5); tr. 1525-26. (Lyman). [REDACTED] [REDACTED] Lyman Direct Testimony, *Id.* As Dr. Lyman observed during the hearing:

We haven't seen any details about the ability to actually rule out the [REDACTED]. If, for instance, the applicant were able to show that they have two options, either they can show within eight hours to everyone's satisfaction that [REDACTED]

If they can physically locate any randomly selected item within eight hours through retrieval of the item, then they meet it, but they don't meet these timelines if they don't have a demonstrated and credible way of resolve the issue of data tampering within eight hours.

Tr. 1527. (PF ¶ 4.62)

4.103. On the witness stand, MOX Services said for the first time that it was capable of visually counting items in the [REDACTED] within the required timelines without having to access each individual item by observing how many positions were occupied in each well. Tr. 1515-1519 (King). But Dr. Lyman pointed out that [REDACTED] may not resolve an alleged theft. Tr. 1521. This was confirmed by Mr. Pham, who said that it may also be necessary to identify specific items. Tr. 1521-22. Dr. Lyman also pointed out that such a

[REDACTED]
Tr. 1529. (PF ¶ 4.63)

4.104. Moreover, there is an 8-hour requirement to identify any specific item which would [REDACTED]
[REDACTED] Tr. 1521 (Lyman). This could require a full-scale inventory of all items in the storage area. *Id.* This procedure could not be conducted within the timelines that MOX Services committed to in the FNMCP. Lyman Direct Testimony, par. A.7(3). (PF ¶ 4.64)

4.105. When all is said and done, MOX Services simply has [REDACTED]
[REDACTED] MOX Services commits only to *commencing* a physical inventory within 24 hours, [REDACTED]
[REDACTED] Tr. 1511 (King). Ultimately, all MOX Services is left [REDACTED]
[REDACTED] Tr. 1506 (Clark). (PF ¶ 4.65)

4.106. We therefore conclude that MOX Services' approach of [REDACTED]
[REDACTED] thefts falls far short of what is necessary to demonstrate compliance with regulatory requirements. [REDACTED]
[REDACTED] Therefore we must reject MOX Services' operating license application in this respect. (PF ¶ 4.66)

G. Contention 11: Revised FNCMP With Procedure

4.107. NRC regulation 10 C.F.R. § 74.57(e) requires a license applicant to "provide an ability to rapidly assess the validity of all alleged thefts." In NUREG-1280, the Staff defines rapid assessment as locating on demand any specific tamper-safed or encapsulated item or an unencapsulated item stored in a vault equivalent to tamper-safing within 8 hours, and verifying the presence of all items in a vault within 72 hours. NUREG-1280 at 49. MOX Services has stated that it intends to rely on the MMIS and PLC computer systems to fulfill these requirements.

4.108. In our 6/29/12 Memorandum and Order, we expressed concern about MOX Services' [REDACTED]
[REDACTED] "considering that the [REDACTED]
[REDACTED]" *Id.*, slip op. at 14. Therefore it requested MOX Services to provide:

a contingency plan, along with supporting testimony and evidence, for assessing within the 8 and 72 hour timeframes to which Applicant has committed, an external alarm that

includes [REDACTED]

Id., slip op. at 15.

4.109. In response to our request, MOX Services denies that the regulations require it to locate one item within 8 hours and all items within 72 hours. Supplemental Statement at 19. In any event, MOX Services claims that its program — [REDACTED] — is consistent with the regulatory guidance.

4.110. MOX Services claims to comply with NRC guidance, but has seriously misread the plain language of the standard. As MOX Services characterizes the guidance, it recommends that licensees demonstrate:

That the records of the identity and location of every item can be updated with sufficient speed to support the commitment[] that any randomly selected item within a vault can be located within 8 hours The capability also exists to locate all items within a vault within 72 hours

Id. (citing NUREG-1280, § 3.3.1). But MOX Services is only quoting from a portion of § 3.3.1, the Acceptance Criteria. MOX Services asserts that it does not need to separately comply with the Affirmation portion of § 3.3.1.

4.111. In the “Acceptance Criteria” for § 3.3.1, recordkeeping is used to “support” the applicant’s “commitment[] that any randomly selected item within a vault can be located within 8 hours” and that all items can be located within 72 hours. The Acceptance Criteria are given context in the “Affirmations” section of § 3.3.1:

[REDACTED] equivalent to tamper-safing within 8 hours, and to verify the presence of all items in a vault within 72 hours.

4.112. Notably, the Affirmations section does not have language regarding record-keeping.

4.113. MOX Services has watered down its commitment in a way that doesn’t make sense. The commitment to establish the contingency capability as described in the Affirmations section necessitates [REDACTED]. MOX Services says licensees cannot [REDACTED].

Supplemental Statement at 20. Likewise, however, simply knowing what material licensees expects to have on hand is of little use in assessing the validity of alleged thefts unless licensees are also able to confirm that they *actually* have what they *expect* to have. If one’s house is burglarized, in order to figure out what was stolen the police not only need to know what one owns, but also what can’t be located. MOX Services, by claiming that its commitment “is

essentially all about a licensee's records system," (Supplemental Statement at 21), leaves out that crucial step, and thereby is inconsistent with the guidance. Such disregard for the NRC's guidance is only permitted if the applicant offers an acceptable alternative for satisfying the regulation can a license applicant avoid compliance with the Staff's guidance. *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 & 2), ALAB-644, 13 NRC 903, 937 (1981). MOX Services may not reject the guidance of NUREG-1280 without providing a reasonable justification.

4.114. Finally, in response to the Board's request for information as to how it would assess an [REDACTED] MOX presents four specific sets of actions. MOX Services admits, however, that these actions could only be completed "within a matter of days," and in one case, "in several days." Revised Testimony at 51, 47. "Several" days is a much longer time period than 8 hours and could even be longer than 72 hours. Thus MOX Services likely would be unable to meet even its revised, watered down commitment to update its records system in time to rapidly assess the validity of an alleged theft, should that allegation also contain a claim that the records system itself has been compromised.

4.115. MOX Services attempts to justify this additional retreat by alleging that it is not required to meet any quantitative timelines at all, stating that "asking MOX Services to assess an alleged theft within 8 or 72 hours is simply beyond the scope of MOX Services' commitment, NUREG-1280's recommendation, and the regulation's requirement." Revised Testimony at 29. We reject MOX Services' attempt to nullify its past commitments at this stage in the licensing proceeding.

4.116. In summary, MOX Services has backed away from its original commitment in the FNMCP [REDACTED] Yet MOX Services then admits that it could take several days to update the records if there were an allegation that the records were compromised. So even after eviscerating the standard, MOX Services cannot meet it. And as a final trapdoor, MOX Services denies having to meet any quantitative standard at all.

4.117. We conclude that these developments have fatally undermined MOX Services' claim that it is capable of rapidly assessing the validity of alleged thefts in accordance with NRC's requirements.

4.118. On May 25, 2012, Intervenors submitted a surreply to two incorrect statements made by MOX Services in its Proposed Findings of Fact and Conclusions of Law. MOX Services disputes Intervenors' assertions in its Supplemental Statement at pages 26-30. The first incorrect statement is discussed above in Section E. The second incorrect statement is discussed below.

4.119. MOX Services' second incorrect statement appears in ¶ 3.67 on page 35 and note 164 of its Reply Proposed Findings, where MOX Services implicitly asserts, for the first time, that NRC regulations addressing theft of SSNM are concerned only with theft of entire containers of

~~MAY CONTAIN SENSITIVE OR PROPRIETARY INFORMATION~~

~~Withhold in accordance with 10 C.F.R. 10 C.F.R. § 2.396~~

~~MAY CONTAIN UCN~~

SSNM and not with theft of SSNM *from* containers. This interpretation is inconsistent with the language of 10 C.F.R. § 74.57(e), which broadly requires licensees to “provide an ability to rapidly assess the validity of alleged thefts.” In its Supplemental Statement, MOX Services has conceded that it made an error in stating in its Reply Findings that “verification of item integrity is not a component of 10 C.F.R. § 74.57(e) ...”. However, it maintains that “verification of item integrity” is not a component of the contention at issue (i.e. Contention 11). This statement is also incorrect. Contention 11 addresses the ability of MOX Services to meet its commitment to rapidly assess the validity of alleged thefts” by, inter alia, “verifying the presence of all Pu in item form in vault storage within 72 hours.” Since this commitment refers to the presence of plutonium and not simply the presence of items, the need to verify integrity of items is implicit.

V. SUMMARY OF CONCLUSIONS OF LAW

5.1. As discussed above with respect to Contentions 9, 10, and 11, based on the evidence before us, and giving MOX Services the burden of proof, we find that MOX Services has failed to demonstrate that it complies with NRC’s MC&A requirements for item monitoring, 10 CFR §74.55(b), alarm resolution, 10 CFR §74.57(b), and rapid assessment of alleged thefts, 10 CFR §74.57(e). Therefore we reject MOX Services’ operating license application as inadequate to satisfy the NRC’s regulations.

Respectfully submitted,



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July 1, 2013

**UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
ATOMIC SAFETY AND LICENSING BOARD**

In the Matter of)

Shaw AREVA MOX Services)

(Mixed Oxide Fuel Fabrication Facility)
Possession and Use License))

Docket No. 70-3098-MLA

ASLBP No. 07-856-02-MLA-BD01

CERTIFICATE OF SERVICE

I certify that on July 1, 2013, copies of Intervenor's Cumulative Proposed Findings of Fact and Conclusions of Law were served on the following parties by hand or by Federal Express, in conformance with the Atomic Safety and Licensing Board's Protective Order of December 31, 2008. I also certify that copies of the cover letter and certificate of service were sent by e-mail to the NRC's Rulemakings and Adjudications Staff in order to publicly record that the documents were filed.

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