



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 21, 2020

EA-20-066

Mr. Kent S. Cole
President and CEO
NAC International
3930 East Jones Bridge Road,
Suite 200
Norcross, Georgia 30092

SUBJECT: NAC INTERNATIONAL – NOTICE OF VIOLATION; U.S. NUCLEAR
REGULATORY COMMISSION INSPECTION REPORT NO. 07201015/2020-201
DIVISION OF FUEL MANAGEMENT

Dear Mr. Cole:

This letter refers to the U.S. Nuclear Regulatory Commission (NRC) announced routine inspection at your NAC International (NAC) corporate office in Norcross, Georgia, from February 24-27, 2020, and subsequent NRC Headquarters in-office review through July 22, 2020. The purpose of the inspection was to assess the adequacy of NAC's activities with regard to the design of spent fuel storage casks in accordance with the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-level Radioactive Waste, and Reactor-related Greater Than Class C Waste." Based on the information developed during the inspection, two apparent violations were identified. The circumstances surrounding these apparent violations, and the potential severity of the apparent violations were discussed with Mr. Brad Greene of your staff during an exit meeting on July 22, 2020. Details regarding the apparent violations were provided in NRC Inspection Report No. 07201015/2020-201, dated September 3, 2020. The inspection report can be found in the NRC's Agencywide Documents Access and Management System (ADAMS) at Accession Number ML20225032. ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

In the letter transmitting the inspection report, we provided you with the opportunity to address the apparent violations identified in the report by either: (1) responding in writing to the apparent violations addressed in the inspection report, (2) participating in a Pre-decisional Enforcement Conference (PEC), or (3) participating in an Alternative Dispute Resolution mediation session, before the NRC staff would make its final enforcement decision. In your email response dated September 11, 2020 (ADAMS Accession Number ML20269A456), you requested a Pre-decisional Enforcement Conference.

A PEC was convened virtually on October 20, 2020, with you and members of your staff to discuss the apparent violations. Subsequent to the PEC, you submitted additional information for the NRC to consider as we proceeded with our enforcement decision process.

The NRC has determined that two violations of regulatory requirements occurred. This determination was based on information developed during the NRC inspection, subsequent in-office review, and information you provided during and after the PEC. The violations are cited in the enclosed Notice of Violation (Notice) and the circumstances surrounding them are described in detail in the subject inspection report (ML20225A032).

Violation 1 involved the failure to subject design changes to design control measures commensurate with those applied to the original design, as required by 10 CFR 72.146(c), "Design controls." The NRC staff determined NAC did not subject Concrete Cask version 5 (CC5) of the MAGNASTOR dry cask storage system (Certificate of Compliance No. 1031, Amendment 7) to design control measures commensurate with those applied to the original design. Specifically, NAC did not use the computer-based LS-DYNA, as performed in the original design evaluation, when performing the design basis concrete cask tip-over event analysis to determine the CC5's resulting deceleration g-loads upon pad impact.

For Violation 1, NRC staff evaluated all relevant information, including that provided by NAC during and after the PEC, to determine the severity of this violation. A concrete cask tip-over event has a very low probability to occur as it is a non-mechanistic, hypothetical accident condition that presents a bounding case for evaluation. In addition, NAC subsequently re-analyzed all the concrete cask versions for a tip-over event with a methodology consistent with that approved and documented in the MAGNASTOR final safety analysis report (FSAR), Revision 7 (as updated), involving the use of LS-DYNA. Furthermore, staff determined this violation to be of very low safety significance because the changes to the cask were ultimately determined to be bounded since the resulting deceleration g-load values were found to be less than those for the original design. Therefore, Violation 1 has been characterized in accordance with the as Enforcement Policy at Severity Level IV.

Violation 2 involved NAC's failure to obtain a Certificate of Compliance (CoC) amendment prior to implementing a proposed change as required by 10 CFR 72.48(c)(2)(viii), "Changes, tests, and experiments." NAC did not utilize the method of evaluation (MOE) described in the FSAR (as updated) for the updated CC5 concrete cask design when analyzing the tip-over event. The MOE described in the FSAR (as updated) specified usage of LS-DYNA (a software modeling program), in part, for determining cask g-load (i.e., concrete cask deceleration values) impacts upon an independent spent fuel storage installation concrete pad. Instead of using the MOE described in the FSAR (as updated), NAC conducted a linear scale analysis (ratio comparison) of the angular velocities of CC5 to Concrete Cask version 1 (i.e., CC1, the original design approved by the NRC) to determine the extent of the relative differences. Based on this ratio, NAC determined that cask g-loads for CC5 were essentially the same to CC1, and that CC5's safety function for design basis concrete cask tip-over events was adequate. The staff determined that NAC's usage of an angular velocity ratioing method when determining deceleration g-loads, instead of using LS-DYNA, was a change from the MOE described in the MAGNASTOR FSAR (as updated).

NRC staff also evaluated all relevant information, including that provided by NAC during and after the PEC to determine the severity of Violation 2. The staff determined that usage of angular velocity ratioing to determine the CC5 deceleration g-load values in the tip-over event analysis is not a substitute for the use of a non-linear dynamic analysis approach like LS-DYNA. A ratio methodology does not adequately consider the complex interaction between cask and pad during a concrete cask tip-over event. The use of an angular velocity ratioing method produced inconsistent, and sometimes nonconservative results, when compared to its corresponding LS-DYNA results. Therefore, staff determined it would not have approved the MOE used by NAC

(angular velocity ratioing method) to analyze the CC5 for a cask tip-over event and that prior Commission review and approval was necessary to depart from the MOE described in the FSAR (as updated). As such, staff determined this violation impacted the NRC's ability to perform its regulatory function. Therefore, Violation 2 has been characterized in accordance with the Enforcement Policy at Severity Level III.

A base civil penalty in the amount of \$37,500 was considered for the Severity Level III violation. However, the staff determined, in accordance with the Enforcement Policy, that a civil penalty for Violation 2 is not warranted. This determination is in recognition that the violation was not willful, the absence of recent escalated enforcement action, and the staff's determination that NAC's initial corrective actions are adequate. This enforcement action may be considered in the evaluation of any future escalated enforcement action, which could result in a civil penalty. In addition, issuance of the Severity Level III violation constitutes escalated enforcement action that may subject you to increased inspection effort. The NRC includes significant enforcement actions on its Web site at <http://www.nrc.gov/reading-rm/doc-collections/enforcement/actions/>. The current Enforcement Policy is included on the NRC's website at <http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html>.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. If you have additional information that you believe the NRC should consider, you may provide it in your response to the Notice. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements. In addition, we will follow up your corrective actions during a future NRC inspection.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response, will be made available electronically for public inspection in the NRC Public Document Room and in ADAMS, accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such information, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). The NRC also includes significant enforcement actions on its Web site at <http://www.nrc.gov/reading-rm/doc-collections/enforcement/actions/>).

K. Cole

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Should you have any questions, please contact Ms. Leira Cuadrado, via e-mail at Leira.Cuadrado@nrc.gov.

Sincerely,

George Wilson, Director
Office of Enforcement

Docket No. 72-1015

Enclosure:
Notice of Violation

SUBJECT: NAC INTERNATIONAL – NOTICE OF VIOLATION; U.S. NUCLEAR
REGULATORY COMMISSION INSPECTION REPORT NO. 07201015/2020-201

DOCUMENT DATE: December 21, 2020

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ADAMS Accession Number: ML20330A281 *via email

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NOTICE OF VIOLATION

NAC International
Norcross, Georgia

Docket No. 72-1015
EA-20-066

Based on the results of an U.S. Nuclear Regulatory Commission (NRC) inspection conducted at NAC International (hereafter referred to as NAC), on February 24-27, 2020, and subsequent NRC Headquarters in-office review through July 22, 2020, a team of inspectors identified two violations of NRC requirements. In accordance with the NRC Enforcement Policy dated January 15, 2020, the violations are listed below:

Violation 1

10 CFR 72.146(c), "Design control," requires, in part, that a certificate holder shall subject design changes, including field changes, to design control measures commensurate with those applied to the original design.

The MAGNASTOR dry cask storage system FSAR, Revision 7, Section 3.7.3.7, "Concrete Cask Tip-Over," states, in part, that the concrete cask tip-over analyses are performed using LS-DYNA.

The MAGNASTOR dry cask storage system FSAR, Revision 7, Section 3.10.4.4, "Concrete Cask Finite Element Model for Tip-Over Evaluation," states, in part, that the concrete cask, concrete pad, and soil subgrade are constructed of solid brick elements using the LS-DYNA program for cask tip-over evaluation.

Contrary to the above, on December 30, 2016, NAC (Certificate of Compliance No. 1031) implemented a design change for their MAGNASTOR dry cask storage system, Concrete Cask version 5 (CC5) without ensuring that design control measures were commensurate with those applied to Concrete Cask version 1 (CC1) of the design. Specifically, NAC failed to use the computer-based LS-DYNA, as described in the MAGANASTOR FSAR, when performing the design basis tip-over event analysis. NAC determined CC5's resulting deceleration g-loads without inputting angular velocity and mass moment of inertia into LS-DYNA; instead, NAC used a ratioing method to compare the angular velocity of CC5 to the angular velocity of the original design (CC1).

This is a Severity Level IV violation (NRC Enforcement Policy, Section 6.5.d.1).

Violation 2

10 CFR 72.48(c)(2)(viii), "Changes, tests, and experiments," requires, in part, that a certificate holder shall obtain a CoC amendment pursuant to 10 CFR 72.244, prior to implementing a proposed change that would result in a departure from a method of evaluation described in the FSAR (as updated) used in establishing the design bases or in the safety analyses.

The MAGNASTOR dry cask storage system FSAR, Revision 7, Section 3.7.3.7, "Concrete Cask Tip-Over," states, in part, that the concrete cask tip-over analyses are performed, in part,

using the computer analysis program LS-DYNA.

Contrary to the above, on December 30, 2016, NAC (Certificate of Compliance No. 1031) failed to obtain a CoC amendment from the NRC, pursuant to 10 CFR 72.244, prior to implementing a design change that was a departure from a method of evaluation described in the MAGNASTOR FSAR (as updated). Specifically, for the MAGNASTOR dry cask storage system, Concrete Cask version 5 (CC5), NAC performed a structural evaluation of a design basis tip-over event without using the computer analysis program (LS-DYNA) specified in Section 3.7.3.7 of the FSAR. NAC completed a 10 CFR 72.48 determination, "NAC-16-MAG-018," dated December 30, 2016, which contained a screening and a 72.48 evaluation that incorrectly concluded the design change did not involve revising or replacing an evaluation methodology described in the FSAR; which resulted in the failure to submit a license amendment request to the NRC in accordance with 72.244.

This is Severity Level III violation (NRC Enforcement Policy, Section 6.1.c.6).

Pursuant to the provisions of 10 CFR 2.201, NAC is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555 with a copy to Leira Cuadrado, Chief, Inspection and Oversight Branch, Division of Fuel Management, Office of Nuclear Material Safety and Safeguards, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation or severity level; (2) the corrective steps that have been taken and the results achieved; (3) the corrective steps that will be taken to avoid further violations; (4) your plan and schedule for completing short and long term corrective actions and (5) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or a Demand for Information may be issued as to why the CoC should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS), accessible from the NRC Web site at <https://www.nrc.gov/reading-rm/adams.html> to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the

level of protection described in 10 CFR 73.21. If Classified Information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR Part 95. In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days of receipt.

Dated this 21st day of December 2020.