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Subject: Submittal of the 2019 Annual Progress Report for the Corrective Measures Evaluation for Royal Demolition Explosive in Deep Groundwater

Enclosed please find two hard copies with electronic files of the "2019 Annual Progress Report for the Corrective Measures Evaluation for Royal Demolition Explosive in Deep Groundwater." This report summarizes activities Newport News Nuclear BWXT-Los Alamos, LLC, completed from October 2018 to September 2019 related to Royal Demolition Explosive in deep groundwater.

If you have any questions, please contact Pat McGuire at (505) 709-7918 (patrick.mcguire@em-la.doe.gov) or Cheryl Rodriguez at (505) 257-7941 (cheryl.rodriguez@em.doe.gov).

Sincerely,

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Enclosures:

1. Two hard copies with electronic files – 2019 Annual Progress Report for the Corrective Measures Evaluation for Royal Demolition Explosive in Deep Groundwater (EM2019-0403)

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2019 Annual Progress Report for the Corrective Measures Evaluation for Royal Demolition Explosive in Deep Groundwater




Newport News Nuclear BWXT-Los Alamos, LLC (N3B), under the U.S. Department of Energy Office of Environmental Management Contract No. 89303318CEM000007 (the Los Alamos Legacy Cleanup Contract), has prepared this document pursuant to the Compliance Order on Consent, signed June 24, 2016. The Compliance Order on Consent contains requirements for the investigation and cleanup, including corrective action, of contamination at Los Alamos National Laboratory. The U.S. government has rights to use, reproduce, and distribute this document. The public may copy and use this document without charge, provided that this notice and any statement of authorship are reproduced on all copies.

2019 Annual Progress Report for the Corrective Measures Evaluation for Royal Demolition Explosive in Deep Groundwater

November 2019

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1.0 INTRODUCTION

This report serves as the fourth annual progress report for the corrective measures evaluation (CME) and Royal Demolition Explosive (RDX) in deep groundwater. The report summarizes activities the U.S. Department of Energy (DOE) Environmental Management Los Alamos Field Office (EM-LA) and Newport News Nuclear BWXT-Los Alamos, LLC (N3B) completed from October 2018 to September 2019 (fiscal year [FY] 2019) related to the RDX deep groundwater investigation for the Technical Area 16 (TA-16) 260 Outfall (Figure 1.0-1).

DOE and Los Alamos National Security, LLC (LANS) submitted the “Corrective Measures Evaluation Report, Intermediate and Regional Groundwater, Consolidated Unit 16-021(c)-99” (hereafter, the CME report) in August 2007 (LANL 2007, 098734). The New Mexico Environment Department (NMED) issued a notice of disapproval (NOD) in April 2008 (NMED 2008, 101311), requesting additional characterization to evaluate the feasibility of the remedial alternatives proposed in the groundwater CME report and to assess the extent of contamination in perched-intermediate groundwater and in the regional aquifer.

To address the data needs identified by NMED, Los Alamos National Laboratory (LANL or the Laboratory) and N3B have conducted additional characterization of perched-intermediate and regional groundwater in recent years, including installing additional wells; conducting single-well and multiwell aquifer tests and tracer tests; and conducting geochemical, bioremediation, and natural attenuation studies. The information and data obtained from these activities was summarized in the “Investigation Report for Royal Demolition Explosive in Deep Groundwater” (deep groundwater IR) (N3B 2019, 700561) submitted to NMED on August 29, 2019. The deep groundwater investigation activities conducted during FY 2019 are discussed in this report.

2.0 DEEP GROUNDWATER INVESTIGATION ACTIVITIES

During the FY 2019 reporting period, activities conducted related to the ongoing investigation of the nature and extent of RDX contamination in perched-intermediate groundwater and the regional aquifer included the following:

- continued well completions activities, aquifer testing, groundwater sampling, and preparation and submitting R-69 well completion report,
- sampling at TA-16 260 monitoring group wells in accordance with the Interim Facility-Wide Groundwater Monitoring Plan (IFGMP),
- continued sampling to monitor tracer breakthrough in the perched-intermediate zones, and
- submission of the deep groundwater IR.

These activities are discussed below.

2.1 Monitoring Well R-69

The R-69 monitoring well was drilled in FY 2018 and sampling began in FY 2019 to address the relation of the RDX flow paths between wells R-68 and R-18, which includes an understanding of the northern extent of perched-intermediate groundwater and whether the perched-intermediate zone is hydrologically connected to the regional aquifer north of R-68. Well R-69 provides information on the hydraulics in the distal portion of the RDX plume, which is important for estimating the concentration of RDX near the water table in the R-18 area. The R-69 well will also be useful for filling in data gaps for the regional

aquifer at two discrete depth intervals and for long-term performance monitoring of any corrective action measures that may be implemented.

Installation of the well fulfills a recommendation made in the “Groundwater Investigation Work Plan for Consolidated Unit 16-021(c)-99, including Drilling Work Plans for Wells R-68 and R-69” (LANL 2016, 601779). Groundwater chemistry data from this well and characterization within the vadose zone during drilling helps constrain the nature and extent of perched-intermediate groundwater and contamination in the regional aquifer originating from infiltration along Cañon de Valle. Water-level data from this well provides important information for the elevation of the regional water table and groundwater flow direction north of Cañon de Valle.

Well R-69 was completed as a dual-screen well, allowing evaluation of water quality and water levels at two discrete depth intervals near the depths of the well R-68 and R-18 screened intervals within the regional aquifer. Well screens are isolated by a packer as part of the permanent sampling system to hydraulically isolate each zone. Both the upper and lower 20-ft-long screen intervals are within the Puye Formation. The top of the upper screened interval is set at 1310 ft below ground surface (bgs) and the lower screened interval is set at 1375.5 ft bgs. Well R-69 was drilled to a total depth of 1443.4 ft bgs.

The well was completed on October 24, 2019, and in accordance with the NMED-approved well design. Both well screen completion zones were developed, and the regional aquifer groundwater met target water-quality parameters in both zones. Aquifer testing in both screened intervals indicates regional aquifer monitoring well R-69 will perform effectively in meeting the planned objectives. A dual-port sampling system and transducers were placed within the well, and groundwater sampling at R-69 is being performed as part of the annual IFGMP.

A report documenting R-69 well completion and first sample collection was submitted to NMED on December 14, 2018. A well completion report was submitted to NMED in March 2019. On May 5, 2019, NMED provided comments to the well completion report. DOE provided responses to NMED comments on July 12, 2019, and NMED replied on July 29, 2019, requesting additional information. DOE will provide the information in a FY 2020 submittal.

Analytical data collected from R-69 have been reported in the deep groundwater IR and the August 2019 periodic monitoring report.

2.2 IFGMP Sampling

Four groundwater sampling campaigns were conducted for the TA-16 260 monitoring group (Figure 1.0-1) during FY 2019 in accordance with the “Interim Facility-Wide Groundwater Monitoring Plan for the 2019 Monitoring Year, October 2018–September 2019” (N3B 2018, 700000). The IFGMP sampling campaigns were conducted December 4, 2018, to December 20, 2018; March 5, 2019, to March 26, 2019; May 28, 2019, to June 13, 2019; and August 6, 2019, to August 22, 2019. The analytical data from these sampling campaigns are available in Intellus New Mexico and are presented in the annual periodic monitoring reports for the TA-16 260 monitoring group.

2.3 Tracer Test Update

Tracer deployments were conducted in October and November 2015. The Laboratory discussed the status of the results from tracer monitoring in the deep groundwater IR (N3B 2019, 700561). The deep groundwater IR concluded that most of the tracers had not yet fully moved beyond the vicinity of the screens where they were deployed and no cross-well detections have occurred. However, long-term

tracer breakthrough monitoring will continue and the results of the tracer test will be reported on an annual basis in future CME progress reports.

2.4 Deep Groundwater IR

Submission of the deep groundwater IR fulfilled the requirements of the 2016 Compliance Order on Consent (Consent Order), Fiscal Year 2019 Appendix B, Milestones and Targets. Appendix B, Milestone 15, required a report characterizing the nature and extent of RDX in deep groundwater (i.e., perched-intermediate and regional groundwater).

Appendix B, Milestone 15, described the milestone as an “Investigation Report that culminates results of investigation activities associated with deep groundwater and includes a groundwater risk assessment.” The report integrated applicable information from groundwater-related investigations conducted to date in the TA-16 area and also addresses groundwater risk by incorporation of the following elements:

- Screening of groundwater data against applicable risk- and standards-based criteria
- Characterizing the extent of RDX above the NMED tap water screening level in deep groundwater, including perched-intermediate groundwater and regional aquifer
- Evaluating the extent of RDX in deep groundwater and its spatial relationship to the nearest water supply well

The purpose of the deep groundwater IR was to present a comprehensive description of the current conditions of RDX contamination in deep groundwater. The objectives of this deep groundwater IR were to summarize information on the occurrence and concentration of RDX in deep groundwater, use this information to define the nature and extent of RDX in deep groundwater, update the conceptual site model (CSM), describe current conditions, and recommend next steps. To meet the objectives, the deep groundwater IR summarized and evaluated deep groundwater analytical results collected since 2000 and presented additional information to address the uncertainties identified by NMED in their review of the 2007 CME report (LANL 2007, 098734).

The report summarized the main elements of the physical system CSM that describe the fate and transport of RDX in the TA-16 area, with particular emphasis on pathways that affect deep groundwater. The conceptual model includes descriptions of the surface water environment, vadose zone pathways, and deep groundwater.

The deep groundwater IR concluded that RDX concentrations in perched-intermediate and regional groundwater do not pose a current unacceptable risk to human health; however, RDX concentrations in the perched-intermediate groundwater are the source of RDX that has been detected in the underlying regional groundwater. The RDX in the regional aquifer might pose a future unacceptable risk to human health if the RDX were to migrate to the public water supply well in sufficient concentration and quantities. The deep groundwater IR recommended that to assess this uncertainty and support the evaluation of potential remedial alternatives in a CME, a fate and transport groundwater model evaluation and further risk characterization should be performed. In the 2020 updates to the Consent Order's Appendix B, there is a May 2020 milestone for submission of a fate and transport modeling and risk assessment report for RDX contamination in deep groundwater.

3.0 REGULATORY, PUBLIC, AND STAKEHOLDER INVOLVEMENT

In FY 2019, activities to characterize the perched-intermediate and regional groundwater continued to be performed. Communication with the NMED Hazardous Waste Bureau and the NMED DOE Oversight Bureau were held throughout the year to discuss the deep groundwater IR. Technical meetings to discuss the deep groundwater IR occurred on November 14, 2018; December 12, 2018; February 5, 2019; March 28, 2019; and May 16, 2019

Additionally, in an effort to keep the public informed of DOE's activities regrading RDX in deep groundwater, N3B gave a presentation to the following groups:

- Los Alamos County Board of Public Utilities, November 20, 2018
- Regional Coalition of LANL Communities, December 21, 2018
- Los Alamos County Council, February 5, 2019
- Buckman Direct Diversion Board, March 7, 2019

4.0 WORK PLANNED FOR FY 2020

In FY 2019, deep groundwater CME activities will include the following:

- Perform IFGMP sampling.
- Perform a fate and transport groundwater model and risk assessment to further characterize risk, as required by the Consent Order Appendix B milestone.
- Evaluate the need for and approach for remediation.

A summary of the FY 2020 activities will be reported in the fifth annual progress report and submitted to NMED by November 2020.

5.0 REFERENCES AND MAP DATA SOURCES

5.1 References

The following reference list includes documents cited in this report. Parenthetical information following each reference provides the author(s), publication date, and ERID, ESHID, or EMID. This information is also included in text citations. ERIDs were assigned by the Laboratory's Associate Directorate for Environmental Management (IDs through 599999); ESHIDs were assigned by the Laboratory's Associate Directorate for Environment, Safety, and Health (IDs 600000 through 699999); and EMIDs are assigned by N3B (IDs 700000 and above). IDs are used to locate documents in N3B's Records Management System and in the Master Reference Set. The NMED Hazardous Waste Bureau and N3B maintain copies of the Master Reference Set. The set ensures that NMED has the references to review documents. The set is updated when new references are cited in documents.

LANL (Los Alamos National Laboratory), August 2007. "Corrective Measures Evaluation Report, Intermediate and Regional Groundwater, Consolidated Unit 16-021(c)-99," Los Alamos National Laboratory document LA-UR-07-5426, Los Alamos, New Mexico. (LANL 2007, 098734)

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5.2 Map Data Sources

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Structures; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 29 November 2010.

Unpaved road; Los Alamos National Laboratory, ER-ES, As published, GIS projects folder;
\\slip\GIS\Projects\14-Projects\14-0062\project_data.gdb; digitized_site_features; digitized_road; 2017.

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Drainage Channel; Los Alamos National Laboratory, ER-ES, As published, GIS projects folder;
\\slip\GIS\Projects\11-Projects\11-0108\gdb\gdb_11-0108_generic.mdb; drainage; 2017.

TA-16 260 Outfall, As Published, GIS project folder: Q:\14-Projects\14-0080\project_data.gdb\polygon\outfall_260

M Wall-PRB, As Published, GIS project folder: Q:\14-Projects\14-0080\project_data.gdb\line\wall_PRB

Connector piping, As Published, GIS project folder: Q:\14-Projects\14-0080\project_data.gdb\line\connector_piping

Tech areas; Los Alamos National Laboratory, Database
Connections\GIS.PUB.PRD1.sde\PUB.Boundaries\PUB.tecareas

Tech Areas line; Los Alamos National Laboratory, Database
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