



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

January 14, 2022

APPLICANT: Niowave, Inc.

SUBJECT: SUMMARY OF PUBLIC MEETING ON NOVEMBER 9, 2021, WITH NIOWAVE

On November 9, 2021, an Observation meeting was held between the U.S. Nuclear Regulatory Commission (NRC) staff and representatives of Niowave Inc. (Niowave) via Microsoft Teams. Niowave requested this meeting with the NRC staff to present status update and plans for licensing its proposed commercial project. A portion of the meeting was closed to the public for discussion of proprietary information. The meeting notice and agenda, dated October 29, 2021, are available in the Agencywide Documents Access and Management System (ADAMS) at Accession No. ML21302A056. The presentation used in the meeting is also available in ADAMS at Accession No. ML21356B719. A list of meeting attendees is provided as an enclosure to this summary.

Niowave began the presentation with discussion of company's background including the company's history, its current organizational chart, and pathway for its radioisotopes program. Niowave then provide an overview of its isotope program which consists of three main areas: the molybdenum-99 (Mo-99) program, reactor program, and the actinium-225 (Ac-225) program.

The Mo-99 program and the Ac-225 program use the superconducting electron linear accelerator to produce radioisotopes from uranium and radium targets. The reactor program includes the use of used nuclear fuel or target placed in other research reactors and to extract radioisotopes such as strontium-90 or lutetium-177, respectively.

Niowave covered its plans to scaling up to commercial scale for its Mo-99 program. Niowave described the working of its accelerator technology including the electron source, superconducting electron linear particle accelerator, liquid metal system, and the uranium target assembly (UTA).

Niowave representatives then discussed in detail the operational aspect of the UTA and its supporting systems. Following this discussion, Niowave stated that it is currently in the Phase 2 out of three phases of the Mo-99 program, UTA-2, Pilot Scale system. The design of Phase 2 system consists of 230 watts fission power which require a 20 MeV/10 Kw electron beam to drive the fission. The assembly is about 4.5 kilograms uranium (kgU) of low-enriched uranium (LEU) and about 15 kgU of natural uranium (NU). Niowave clarified that the LEU serves as a multiplication medium and the NU is where the fission occur in which the Mo-99 is chemically extracted. Niowave indicated that the neutronics and shielding design is completed and mechanical design and construction for Phase 2 is underway.

Niowave then discussed in detail the chemistry processes. Niowave described its commercial scale fuel cycle process which start with the linac irradiating the uranium, pulling the uranium out of the UTA and allow them to cool for one day, splitting the uranium into several batches,

where upon in parallel, dissolve the uranium and extract the fission gases. The solution then go thru a modified UREX process to separate the fission products from the U/Np/Pu [uranium/neptunium/plutonium]. The Mo-99 then can be extracted from the fission products. The U/Np/Pu solution from the batches are then recombined and allow to cool for two weeks. The process continued with uranium recovery and turning it back to  $U_3O_8$  powder, then to the target fabrication process in which the powder is pressed into pellets and reload back into the UTA for further irradiation. Niowave briefly discussed its demonstrated scale fuel cycle process. At the conclusion of the public meeting, Niowave provided a status update of its isotope programs.

There were no comments from members of the public at this meeting.

Please direct any inquiries to Linh Tran at 301-415-4103, or [Linh.Tran@nrc.gov](mailto:Linh.Tran@nrc.gov).

Sincerely,



Signed by Tran, Linh  
on 01/14/22

Linh N. Tran, Senior Project Manager  
Non-Power Production and Utilization Facility  
Licensing Branch  
Division of Advanced Reactors and Non-Power  
Production and Utilization Facilities  
Office of Nuclear Reactor Regulation

Docket No. 99902029

Enclosure:  
As stated

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DATED: JANUARY 14, 2022

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**NRC-001**

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NAME	JBorromeo	LTran	
DATE	1/13/2022	1/14/2022	

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## LIST OF ATTENDEES

NOVEMBER 9, 2021, MEETING WITH NIOWAVE, INC

<u>Name</u>	<u>Organization</u>
William Peters	Niowave, Inc.
Terry Grimm	Niowave, Inc.
Mike Zamiara	Niowave, Inc
Matt Burba	Niowave, Inc
Robert Wahlen	Niowave, Inc
Nathan Johnson	Niowave, Inc
Alex Bakken	Niowave, Inc
Kristin Shannon	Niowave, Inc
Joshua Borromeo	U.S. Nuclear Regulatory Commission
Jacob Zimmerman	U.S. Nuclear Regulatory Commission
Michael Balazik	U.S. Nuclear Regulatory Commission
Linh Tran	U.S. Nuclear Regulatory Commission
Steven Lynch	U.S. Nuclear Regulatory Commission
Molly-Kate Gavello	U.S. Nuclear Regulatory Commission
Jennifer Tobin	U.S. Nuclear Regulatory Commission
Cassandra Frazier	U.S. Nuclear Regulatory Commission
Robert Orlikowski	U.S. Nuclear Regulatory Commission
Frank Tran	U.S. Nuclear Regulatory Commission
Mitzi Young	U.S. Nuclear Regulatory Commission
Jeremy Wachutka	U.S. Nuclear Regulatory Commission
Kevin Roach,	U.S. Nuclear Regulatory Commission
Nicolas Mertz	U.S. Nuclear Regulatory Commission
Jessie Quintero	U.S. Nuclear Regulatory Commission
Carolyn Wolf	U.S. Nuclear Regulatory Commission
Bill Maier	U.S. Nuclear Regulatory Commission
Max Postman	National Nuclear Security Administration

Note: Attendance list based on information from Microsoft Teams.

Enclosure