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Dr. John C. Cate IV STEM Scholarship Selection Committee,

It is with great enthusiasm that I offer my highest possible recommendation for Ms. Addison Malone to receive the Dr. John C. Cate IV STEM Scholarship. I first met Addison during an outreach event for Science Accelerating Girls Engagement (SAGE) summer camp at the American Museum of Science and Energy (Oak Ridge, TN) during the summer of 2023, and we connected immediately.

As a Nuclear Security Scientist at Oak Ridge National Laboratory with a background in actinide chemistry, I've been obsessed with all things nuclear since childhood. At SAGE, I provide attendees with information about my career path, my day-to-day job experiences, and conduct hands-on experiments in nuclear science. Addison stood out instantly as she was wearing a Marie Curie shirt. Her enthusiasm was palpable, and it was clear she was hungry for knowledge. Addison already had extensive insight into the Manhattan Project, and the atomic legacy of Oak Ridge Tennessee, but she wanted more. After the lecture and experiment session at SAGE, Addison took the initiative and approached me about the potentiality of an internship at ORNL with me. I have worked with many students in the past; graduate researchers and undergraduates, but never a high school student. I wasn't sure it was even possible to host an intern at ORNL that was still in high school. But I agreed to look into it. After searching the ORNL regulations for high school interns, I found that Addison could conduct an internship, but with restrictions. Because Addison was a minor during her internship, she was unable to work in our radiological laboratories or handle radioactive material. For the budding nuclear chemist, obviously this was disappointing, and, as all materials I work with are radioactive, challenging. To navigate this challenge, Addison and I worked together to design a project that would allow her to conduct analyses of radioactive materials, in support of a Laboratory Directed Research and Development (LDRD) Nuclear Nonproliferation and Forensics project, without needing to handle the materials directly.

Addison was excited, and so was I! Starting her internship during the summer of 2024, Addison successfully completed all the required training regarding laboratory safety, and additional specialized modules pertinent to her project. I can confidently say that Addison is the only high school student I know with Department of Energy Radiological Worker I certification. Addison's research project involved the analysis of mixed-phase uranium materials using Raman spectroscopy. In this work, several different uranium materials were mechanically combined and deposited on substrates for spectroscopic analysis. This project aimed to determine best practices for identifying nuclear materials of varying chemical composition for nuclear forensic analysis. Addison was responsible for conducting spectroscopic data collections, designing methods using both single-point and mapping analysis of materials, and communicating her work in both oral and poster presentations.

Addison was a star. She quickly understood how to conduct Raman analysis, how to optimize instrument parameters, and, most importantly, how to interpret experimental

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observations. It was incredibly impressive to watch her progress. Addison became an expert in spectroscopic data collection and analysis. She learned the theory behind and operation of advanced scientific instrumentation. Addison also gained expertise in nuclear forensics, the field in which I reside. Addison immediately recognized the importance of employing analytical methods for determining the origin of nuclear materials found outside of regulatory control. She has won several awards for her project presentation which of course are well deserved. Addison interfaced with graduate students, postdoctoral researchers, and staff scientists during her time at ORNL, and did so eloquently, earning praise from multiple staff members.

Addison successfully completed all tasks related to her project ahead of schedule. She immersed herself in the literature, crafted her own creative scientific ideas, and displayed aptitude for scientific achievement that is more akin to that of a graduate student than a high schooler. Because of her self-motivation, Addison sought out work on additional projects. Given her expertise in collecting and analyzing Raman spectroscopic data, I happily provided additional materials for her to investigate. Besides her main project of analyzing mixed phase uranium materials, Addison also explored transition metal tellurite complexes and uranyl oxyhydroxhydrate minerals and inorganic phases. Both additional projects resulted in peer reviewed publications. Addison is the only high school student I know of having publications in both the Journal of Solid State Chemistry (<https://doi-org/10.1016/j.jssc.2024.125143>), and in the American Mineralogist (<https://doi.org/10.2138/am-2025-9759>).

Addison Malone is a young woman who belongs in science. She is brilliant, creative, and hungry for knowledge with a tenacity to seek out opportunities. Addison has the natural curiosity befitting of a great researcher and is one of the fastest learners I've ever encountered. She is enthusiastic, shows great promise in science communication, and is a joy to work with. Addison has expressed interest in eventually completing a PhD in Nuclear Forensics, and as a researcher in this field, I can confidently say that we need her. Students with the drive and scientific aptitude that Addison displays are the key to ensuring the future success of National Security missions.

Addison would be an excellent recipient of the Dr. John C. Cate IV STEM Scholarship. Her eagerness to learn, coupled with both determination and aptitude to rely on experience, ensures that she has a stellar future ahead of her as she begins her undergraduate studies in chemistry at the University of Tennessee.

Should you require any additional information, please do not hesitate to contact me at [spanotl@ornl.gov](mailto:spanotl@ornl.gov) or 865-241-3783.

Thank you for your time and consideration.

Sincerely,

Tyler L. Spano, PhD.