

~~OFFICIAL USE ONLY – PROPRIETARY INFORMATION~~

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
FOR DIRECT AND INDIRECT TRANSFERS OF AND CONFORMING AMENDMENT
TO CONSTRUCTION PERMIT NO. CPMIF-001
RESULTING FROM THE ESTABLISHMENT OF SHINE CHRYSALIS, LLC
AND SHINE CHRYSALIS HOLDINGS, LLC
SHINE MEDICAL ISOTOPE PRODUCTION FACILITY
DOCKET NO. 50-608

Enclosure 4 contains a public version of this safety evaluation (SE) in which proprietary information is redacted and denoted by blank space enclosed in boldface double brackets, as shown here: **[[]]**. Enclosure 3 contains proprietary information withheld from public disclosure pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 2.390, "Public inspections, exemptions, requests for withholding." This information is indicated in **bold text**.

1.0 INTRODUCTION

By application dated February 4, 2026 (Agencywide Documents Access and Management System Package Accession No. ML26035A418), as supplemented on April 13, 2026 (ML26103A270), SHINE Technologies, LLC (SHINE Technologies), requested that the U.S. Nuclear Regulatory Commission (NRC or the Commission) consent to the direct transfer and indirect transfer of control of Construction Permit (CP) No. CPMIF-001 for the SHINE Medical Isotope Production Facility (the SHINE facility or the facility) currently held by SHINE Technologies. This request was made pursuant to section 184, "Inalienability of Licenses," of the Atomic Energy Act of 1954, as amended (AEA), and 10 CFR 50.80, "Transfer of licenses." SHINE Technologies stated that the transfers are necessitated by an advanced loan application with the U.S. Department of Energy (DOE) to provide funds for the completion of the construction of the SHINE facility. To facilitate the DOE loan, Illuminated Holdings, Inc. (Illuminated), of which SHINE Technologies is a wholly owned subsidiary, would form a new wholly owned subsidiary, SHINE Chrysalis, LLC (SHINE Chrysalis). The direct transfer would occur when Illuminated transfers the CP and related assets from SHINE Technologies to SHINE Chrysalis. The indirect transfer of control would occur when, concurrent with the direct transfer, SHINE Chrysalis Holdings, LLC (Chrysalis Holdings), a direct subsidiary of Illuminated, becomes the direct parent company of SHINE Chrysalis. SHINE Technologies also requested, pursuant to 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," that the NRC approve a conforming administrative amendment to the CP to reflect the proposed transfers. Specifically, the amendment would revise CP No. CPMIF-001 to reflect SHINE Chrysalis as the permit holder and the owner of the SHINE facility.

2.0 BACKGROUND

SHINE Technologies has proposed to construct and operate a facility in Janesville, Wisconsin, to produce molybdenum-99 (Mo-99) through irradiation and processing of a uranyl solution. The proposed SHINE facility would comprise an irradiation facility and a radioisotope production

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facility. The irradiation facility would consist of subcritical operating assemblies, each licensed as a utilization facility as defined in 10 CFR 50.2, “Definitions.” The radioisotope production facility would consist of hot cell structures, collectively licensed as a production facility as defined in 10 CFR 50.2. Together, these are referred to as the “SHINE facility.”

SHINE Medical Technologies, LLC (renamed SHINE Technologies in 2023 by Amendment No. 3 to CP No. CPMIF-001 (ML22292A319)), submitted a two-part CP application in 2013. The NRC issued CP No. CPMIF-001 on February 29, 2016, and construction of the SHINE facility began in May 2019. While SHINE Medical Technologies, LLC, submitted an operating license application in 2019 and the NRC published its SE of that application in 2023, the NRC will reevaluate the aspects of that evaluation that may be affected by changing the proposed holder of the SHINE facility operating license prior to any issuance of that operating license.

As described in the license transfer application, the direct transfer would transfer CP No. CPMIF-001 and related assets from SHINE Technologies to SHINE Chrysalis. The indirect transfer of control would occur when, concurrent with the direct transfer, Chrysalis Holdings becomes the direct parent company of SHINE Chrysalis. The requested conforming amendment would revise CP No. CPMIF-001 to reflect SHINE Chrysalis as the new permit holder and owner. No physical or operational changes to the SHINE facility are proposed.

3.0 REGULATORY EVALUATION

The request for approval of the direct transfer and indirect transfer of control of CP No. CPMIF-001, as discussed in this SE, is made under 10 CFR 50.80(a) which states, in part, the following:

No license for a production or utilization facility...or any right thereunder, shall be transferred, assigned, or in any manner disposed of, either voluntarily or involuntarily, directly or indirectly, through transfer of control of the license to any person, unless the Commission gives its consent in writing.

Paragraph 50.80(b) of 10 CFR requires that a license transfer application include as much of the information described in 10 CFR 50.33, “Contents of applications; general information,” and 10 CFR 50.34, “Contents of applications; technical information,” with respect to the identity and technical and financial qualifications of the proposed transferee, as would be required if the application were for an initial license.

Paragraph 50.80(c) of 10 CFR states, in part, the following:

[T]he Commission will approve an application for the transfer of a license, if the Commission determines: (1) That the proposed transferee is qualified to be the holder of the license; and (2) That transfer of the license is otherwise consistent with applicable provisions of law, regulations, and orders issued by the Commission pursuant thereto.

Additionally, consistent with 10 CFR 50.40, “Common standards,” paragraph (b), the proposed indirect transfer must not adversely affect the technical or financial qualifications of the licensee to hold the license.

Under 10 CFR 50.33(a) through (d), applicants must provide general information including the applicant’s name, address, corporate structure, citizenship, and foreign ownership, control, or

domination (FOCD) status, as applicable.

With respect to financial qualifications, 10 CFR 50.33(f) requires, in part, that each application (except for eligible electric utility applicants) provide information sufficient to demonstrate the applicant's financial qualification to carry out the activities for which the permit or license is sought. For CPs, 10 CFR 50.33(f)(1) requires information that demonstrates that the applicant possesses or has reasonable assurance of obtaining the funds necessary to cover estimated construction costs and related fuel cycle costs, including cost estimates and sources of funds to cover these costs.

Regarding the level of assurance, in CLI-99-06, dated March 5, 1999 (ML16195A533), the Commission determined that it is not within the NRC's purview to manage the finances of its licensees, and the Commission does not require absolute certainty in the financial area. The applicant must demonstrate, by a preponderance of the evidence, that it meets the financial qualification rules. This means that the applicant's cost and revenue projections must not rely on assumptions seriously at odds with governing realities and must not involve uncertainties significantly greater than those that usually cloud business outlooks.

Pursuant to 10 CFR 50.33(f)(5), the Commission may request additional or more detailed financial information. The NRC staff finds it appropriate to request that applicants for direct transfers or indirect transfers of control of a CP, including newly formed entities, provide the applicable information required of initial CP applicants in Appendix C, "A Guide for the Financial Data and Related Information Required to Establish Financial Qualifications for Construction Permits and Combined Licenses," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."

In addition to the regulations in 10 CFR Part 50, the NRC staff uses the following guidance to evaluate whether the proposed transferee is qualified to construct the facility:

- NUREG-1537, Part 1, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors: Format and Content," issued February 1996 (ML042430055)
- NUREG-1537, Part 2, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors: Standard Review Plan and Acceptance Criteria," issued February 1996 (ML042430048)
- "Final Interim Staff Guidance Augmenting NUREG-1537, Part 1, 'Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors: Format and Content,' for Licensing Radioisotope Production Facilities and Aqueous Homogeneous Reactors," dated October 17, 2012 (ML12156A069)
- "Final Interim Staff Guidance Augmenting NUREG-1537, Part 2, 'Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors: Standard Review Plan and Acceptance Criteria,' for Licensing Radioisotope Production Facilities and Aqueous Homogeneous Reactors," dated October 17, 2012 (ML12156A075)

The scope of the NRC staff's financial qualifications review for a CP, and by extension for a license transfer and conforming amendment of a CP, is limited to estimates of construction costs, estimates of related fuel cycle costs, and sources of funds to cover these costs. If, at the

time of issuance of the CP or conforming amendment, the licensee has not asked to possess special nuclear material (SNM), the NRC staff will defer evaluation of financial protection/indemnity until the licensee seeks an operating license or a 10 CFR Part 70, “Domestic Licensing of Special Nuclear Material,” license to possess SNM.

As described in NUREG-1537, section 15.1, “Financial Ability to Construct a Non-Power Reactor,” construction cost estimates may be derived from facility designers, contractor bids, or costs (adjusted for inflation) for similar projects. Fuel cycle cost estimates may be based on analyses of proposed operations or vendor quotations. Applicants should identify committed and uncommitted funding sources and discuss the probability of acquiring uncommitted funds and options to secure funding through project completion.

Regarding FOCD, AEA section 103(d) provides that no license may be issued to any entity if the Commission knows or has reason to believe it is owned, controlled, or dominated by an alien, a foreign corporation, or a foreign government. Section 50.38, “Ineligibility of certain applicants,” of 10 CFR implements this statutory provision. The NRC staff evaluates FOCD consistent with the agency’s guidance on FOCD (64 FR 52355; September 28, 1999).

For the requested administrative conforming amendment, 10 CFR 50.90 requires that an amendment application fully describe the changes desired and follow, as applicable, the form prescribed for original applications. Pursuant to 10 CFR 2.1315, “Generic determination regarding license amendments to reflect transfers,” when administrative amendments are necessary to reflect an approved transfer, such amendments will be included in the transfer order, and any challenge to the administrative amendment is limited to the question of whether the amendment accurately reflects the approved transfer.

4.0 FINANCIAL QUALIFICATIONS

SHINE Technologies holds CP No. CPMIF-001 for a medical isotope production facility licensed under AEA section 103 and 10 CFR 50.22, “Class 103 licenses; for commercial and industrial facilities.” The CP authorizes construction of eight utilization facilities and one production facility for commercial production of medical radioisotopes such as Mo-99. The NRC staff finds that, as a CP holder for a radioisotope production facility, SHINE Technologies is not an electric utility as defined in 10 CFR 50.2, because it does not generate or distribute electricity. Accordingly, under 10 CFR 50.33(f), a nonelectric utility applicant must demonstrate financial qualifications to carry out the permitted activities, including showing that it possesses or has reasonable assurance of obtaining the funds necessary to cover estimated construction costs and related fuel cycle costs, with cost estimates and identified sources of funds.

Consistent with 10 CFR 50.33(f), CLI-99-06, and NUREG-1537, Parts 1 and 2, section 15.1, the NRC staff reviewed the license transfer application to determine whether SHINE Chrysalis would possess or have reasonable assurance of obtaining the funds necessary to cover estimated construction costs and related fuel cycle costs. For the indirect transfer of a license, the information must demonstrate that the transfer will not affect the qualifications of the licensee to hold the license.

In support of 10 CFR 50.33(f)(1), SHINE Technologies provided the following estimates for remaining construction costs and related fuel cycle costs:

SHINE Technologies
Estimates of the Remaining
Costs of Construction and Related Fuel Cycle Costs
(Whole Dollars)

Remaining construction costs:	[[]]
Initial low-enriched uranium inventory cost:	[[]]
Total estimated remaining cost:	[[]]

SHINE Technologies updated the bases for these estimates. As described in the license transfer application, the remaining construction costs estimate includes:

- facility structure; support facilities; and mechanical, electrical, plumbing, and piping systems
- remaining equipment procurement and startup costs (e.g., tritium gas and consumables supporting early operations)
- construction contingency and commissioning reserve to account for impacts associated with construction of a first-of-its-kind medical isotope production facility

In the license transfer application, SHINE Technologies stated, in part, that the estimated remaining costs are informed by (1) SHINE Technologies' construction group's assessment of actual prior construction costs, including commodity and labor costs, (2) SHINE Technologies' engineering group's estimates of process equipment costs, based on existing supplier contracts or prior quotes for equipment not yet under contract, and (3) vendor quotes for consumables and other equipment required for operation of the radioisotope production facility.

SHINE Technologies described in the license transfer application that the initial uranium inventory cost reflects the estimated cost to procure the quantity of uranium needed for initial target solution batches and makeup volumes to support early facility operations. This estimate is based on the costs and charges established in the DOE National Nuclear Security Administration's lease contract for the supply of low-enriched uranium for domestic Mo-99 production.

In accordance with 10 CFR 50.33(f)(1), the license transfer application also identified sources of funds sufficient to cover these costs. Specifically, the proposed transfers are intended to facilitate an expected DOE loan of up to \$263 million to complete construction of the facility. The application stated that loan proceeds would also be used for capital expenditures related to maintenance during ramp-up and other required financial assurance. Based on the NRC staff's review, if granted, the loan amount would fully fund SHINE's estimated construction costs and related fuel cycle costs.

Consistent with 10 CFR 50.33(f)(4) and 10 CFR Part 50, Appendix C, Section II, "Applicants Which Are Newly Formed Entities," the license transfer application provided information on legal and financial relationships among funding sources. Illuminated, the current parent of SHINE Technologies, would be the parent of both Chrysalis Holdings and SHINE Chrysalis; Chrysalis Holdings would be an intermediate holding company and the direct parent of SHINE Chrysalis.

If the anticipated loan closes, financing would be held by Chrysalis Holdings and provided to SHINE Chrysalis in tranches for permitted activities under the CP. Additionally, Illuminated would continue to submit annual financial reports to the NRC in accordance with the requirements in 10 CFR 50.71, "Maintenance of records, making of reports," paragraph (b). In these submittals, Illuminated provides annual year-end statements of assets, liabilities, and capital structure.

As shown in Exhibit A, "General Company Information for Illuminated Holdings, Inc.," Exhibit B, "General Company Information for SHINE Chrysalis Holdings, LLC," and Exhibit C, "General Company Information for SHINE Chrysalis, LLC," of the license transfer application, the principal officers of Illuminated are the same individuals serving for Chrysalis Holdings and SHINE Chrysalis. The NRC staff finds that the application has adequately identified principal officers and corporate relationships among Illuminated, Chrysalis Holdings, and SHINE Chrysalis, consistent with 10 CFR 50.33 and 10 CFR Part 50, Appendix C, Section II. The NRC staff determined that shared principal officers across parent/subsidiary entities is acceptable and does not, by itself, adversely affect organizational control of licensed activities.

Under 10 CFR 50.33(f)(4)(ii), newly formed entities must demonstrate that their owners have the financial capability to meet any contractual funding obligations incurred or proposed in support of licensed activities. Based on the anticipated DOE loan amount and the estimated remaining construction costs and related fuel cycle costs, the NRC staff finds that, if the DOE loan is granted for the amount stated in the application, SHINE Chrysalis through Chrysalis Holdings would have sufficient financial resources to satisfy funding commitments associated with the CP.

The NRC staff finds that the license transfer application contains information sufficient to demonstrate the financial qualifications of SHINE Chrysalis as the direct holder and Chrysalis Holdings as the indirect holder of CP No. CPMIF-001. Specifically, consistent with 10 CFR 50.33(f)(1), the application includes estimates of total construction costs and related fuel cycle costs and demonstrates that the applicant possesses or has reasonable assurance of obtaining the funds necessary to cover these costs. Consistent with 10 CFR 50.33(f)(4) and 10 CFR Part 50, Appendix C, Section II, the application describes the relationships among SHINE Chrysalis, Chrysalis Holdings, and Illuminated; demonstrates SHINE Chrysalis' ability to meet contractual obligations; and confirms that Illuminated continues to provide financial statements under 10 CFR 50.71. Therefore, the NRC staff concludes that SHINE Chrysalis would be financially qualified to hold the CP and that establishing Chrysalis Holdings as the direct corporate parent of SHINE Chrysalis would not adversely affect SHINE Chrysalis' financial qualifications.

5.0 DECOMMISSIONING FUNDING

Pursuant to 10 CFR 50.33(f)(1), the areas of review for a CP are estimates of construction costs, estimates of related fuel cycle costs, and sources of funds to cover these costs. Therefore, information related to the financial ability of SHINE Chrysalis to decommission the SHINE Medical Isotope Production Facility is outside the scope of the financial qualifications necessary for transferring control of CP No. CPMIF-001. Information related to SHINE Chrysalis' ability to decommission the facility will be evaluated prior to any issuance of an operating license.

6.0 TECHNICAL QUALIFICATIONS

According to the license transfer application, the proposed transfer of CP No. CPMIF-001 to SHINE Chrysalis would not negatively impact management, staff, or technical qualifications because they would be the same as they were for SHINE Technologies. The proposed transfer would not result in changes to the managers and personnel responsible for permitted activities. SHINE Chrysalis would continue to employ the same practices, staffing, management, programs, plans, procedures, and oversight implemented by SHINE Technologies. Additionally, SHINE Technologies would transfer supplier contracts to SHINE Chrysalis, including contracts for technical consulting services to support retention of technical capabilities. Finally, SHINE Chrysalis would adopt the SHINE Technologies NRC-approved quality assurance program description with only administrative changes to reflect the new permit holder (SHINE Chrysalis).

Based on the above, the NRC staff finds that SHINE has provided the information on technical qualifications required by 10 CFR 50.34(a)(9). Specifically, the NRC staff finds that the information in the license transfer application describing the management and personnel for the ongoing construction of the SHINE facility, the adoption of the SHINE Technologies' NRC-approved quality assurance program description, the contracting for technical services, and the transfer of other practices, such as staffing, programs, plans, procedures, and oversight currently implemented by SHINE Technologies, demonstrates the technical qualifications of SHINE Chrysalis to hold CP No. CPMIF-001 and to complete the construction of the SHINE facility.

7.0 FOREIGN OWNERSHIP, CONTROL, OR DOMINATION

Section 103d of the AEA, as implemented by 10 CFR 50.38, prohibits the issuance of a license to any entity the Commission knows or has reason to believe is owned, controlled, or dominated by an alien, a foreign corporation, or a foreign government.

Consistent with 10 CFR 50.33(d) and the NRC guidance on FOCD, the NRC staff confirmed that the license transfer application includes an FOCD statement. Specifically, the application states that Chrysalis Holdings and SHINE Chrysalis are limited liability companies whose members and principal officers are all U.S. citizens. The application also states that Illuminated, the holding company of SHINE Technologies, Chrysalis Holdings, and SHINE Chrysalis, has one of seven directors who is a Canadian citizen with U.S. permanent resident status. The appointment of one Canadian member to Illuminated's Board has no material impact on compliance with 10 CFR 50.38.

Based on the above, the NRC staff determined that the level of detail provided regarding FOCD satisfies 10 CFR 50.33(d) and 10 CFR 50.38 and that Chrysalis Holdings and SHINE Chrysalis would not be owned, controlled, or dominated by an alien, a foreign corporation, or a foreign government.

8.0 NUCLEAR INSURANCE AND INDEMNITY

Pursuant to 10 CFR 50.33(f)(1), the areas of review for a CP are estimates of construction costs, estimates of related fuel cycle costs, and sources of funds to cover these costs. At the time of CP issuance, the permit holder had not requested to possess SNM. Therefore, consistent with NRC implementation of AEA section 170, "Indemnification and Limitation of Liability," in 10 CFR Part 140, "Financial Protection Requirements and Indemnity Agreements," the NRC staff deferred evaluation of financial protection to the time of issuance of a 10 CFR Part 50 operating license or a 10 CFR Part 70 license to possess SNM. Further, the CP includes a condition that no operating license will be issued unless SHINE Technologies submits proof of financial protection and executes an indemnity agreement with the NRC, as required by AEA section 170.

Since CP issuance, SHINE Technologies has neither received an operating license nor applied for a 10 CFR Part 70 license to possess SNM. Therefore, information related to SHINE Chrysalis' ability to establish and maintain financial protection is outside the scope of this license transfer review and will be evaluated prior to any issuance of an operating license or during the review of any 10 CFR Part 70 application to possess SNM.

9.0 CONFORMING AMENDMENT

The license transfer application requested the issuance of an administrative, conforming amendment to CP No. CPMIF-001 and its Appendix A, "Environmental Protection Plan," to reflect the proposed direct license transfer. Specifically, the application proposed to change all instances of the term "SHINE Technologies, LLC" to "SHINE Chrysalis, LLC." The proposed conforming amendment does not involve any change in the design or licensing bases, facility configurations, the status of the site, or the requirements of the CP.

The NRC staff reviewed the proposed changes to the CP and determined that they involve no safety questions, are administrative in nature, and are necessary to reflect the proposed transfer. Accordingly, the NRC staff concludes that the conforming amendment is acceptable. The amendment shall be issued and made effective at the time of the completion of the proposed transfer transaction.

10.0 PUBLICATION OF OPPORTUNITY TO COMMENT, REQUEST A HEARING, AND PETITION FOR LEAVE TO INTERVENE

In accordance with Commission regulations, the NRC published its consideration of (1) issuance of an order under 10 CFR 50.80 approving the direct transfer and indirect transfer of control of the CP for the SHINE facility, currently held by SHINE Technologies, and (2) amendment of the CP for administrative purposes to reflect the proposed transfer in the *Federal Register* on March 6, 2026 (91 FR 11089). This notice provided a 30-day comment period and a 20-day period to request a hearing or petition for leave to intervene. One public comment (ML26099A079) was submitted in support of approving the license transfer. No petitions were received during the period.

11.0 STATE CONSULTATION

In accordance with Commission regulations, the NRC staff notified Wisconsin State officials of the proposed license transfers and issuance of conforming amendment by email dated March 31, 2026 (ML26090A351). The State officials had no comments.

12.0 ENVIRONMENTAL CONSIDERATION

The action that is the subject of this SE is approval of a direct transfer and an indirect transfer of control of a CP issued by the NRC and associated amendment of the CP to reflect the approval of the direct transfer of the CP. Accordingly, the action meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22, "Criterion for categorical exclusion; identification of licensing and regulatory actions eligible for categorical exclusion or otherwise not requiring environmental review," paragraph (c)(21). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared related to this action.

13.0 SUMMARY AND CONCLUSION

Based on its review, which is summarized above, of the information provided in the license transfer application, the NRC staff concludes that SHINE Chrysalis is financially and technically qualified to be the holder of CP No. CPMIF-001. Pursuant to 10 CFR 50.33(f)(1), the application included reasonable estimates for the total cost of construction and related fuel cycle costs and demonstrated that the proposed transferee possesses or has reasonable assurance of obtaining the funds necessary to cover estimated construction costs and related fuel cycle costs. Additionally, the information in the application describing that the management, staffing, technical services and consulting, procedures, programs, and oversight currently implemented by SHINE Technologies will be employed by SHINE Chrysalis is sufficient to demonstrate the technical qualifications of SHINE Chrysalis to hold CP No. CPMIF-001 and to construct the SHINE facility. The NRC staff further concludes that there are no disqualifying decommissioning funding assurance, FOCD, or nuclear insurance and indemnity issues associated with the proposed transfers of the CP. Based on the considerations discussed above, the Commission has concluded that the proposed transferee is qualified to be the holder of the license and that transfer of the license is otherwise consistent with applicable provisions of law, regulations, and orders issued by the Commission pursuant thereto.

The Commission has concluded, based on the considerations discussed above, that (1) there is reasonable assurance that the health and safety of the public will not be endangered, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

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Date: April 23, 2026