UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

DIVISION OF
CORPORATION FINANCE

June 7, 2022

Paul Mann
Chairman, Chief Executive Officer and Chief Financial Officer
ASP Isotopes Inc.
433 Plaza Real, Suite 275
Boca Raton, Florida 33432

Re: ASP Isotopes Inc.
Amended Draft Registration Statement on Form S-1
Submitted May 11, 2022
CIK No. 0001921865

Dear Mr. Mann:

We have reviewed your amended draft registration statement and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to this letter by providing the requested information and either submitting an amended draft registration statement or publicly filing your registration statement on EDGAR. If you do not believe our comments apply to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing the information you provide in response to these comments and your amended draft registration statement or filed registration statement, we may have additional comments.

Amended Draft Registration Statement on Form S-1, submitted on May 11, 2022

Prospectus Summary, page 1

1. We note that your summary appears to only discuss the positive aspects of the Company. The prospectus summary should provide a brief, but balanced, description of the key aspects of the Company as of the latest practicable date. Please revise the summary to also discuss any negative aspects of the Company`s experience, strategy, and prospects. In particular, please revise the prospectus summary to provide:
   - a statement that the Company has no products approved for commercial sale, has no existing customers and has not generated any revenue to date;
   - a statement that the Company has not yet built a functioning Mo-100 or U-235 manufacturing plant or even demonstrated the ability to produce Mo-100 or U-235

using the ASP technology;
- a statement that the Company has not yet sought any regulatory approval for application of Mo-100;
- a brief description of the regulatory approvals that are required for your products; and
- a statement that neither the Company nor Klydon has any existing patents, pending patent applications or copyrights.

In addition, please note that where the Risk Factor section is more than 15 pages long, you should include in the summary section a bulleted or numbered list no more than two pages long describing the principal risk factors. Please revise the "Risk Factors" section on page 2 of the prospectus to include this summary in addition to a cross reference. Please refer to Item 105(b) of Regulation S-K.

Risks Related to Our Limited Operating History, Financial Position and Need For Additional Capital

Even if this offering is successful, we will require substantial additional capital to finance our operations, which may not be available..., page 9

2. We note your disclosure on page 103 of the prospectus that, under certain circumstances where a future financing source is introduced to you by the Representative, you have agreed to pay the Representative a cash fee equal to 8.0% of the aggregate gross proceeds received by you from any financing or capital raising transaction of any kind within the 12 months following the effective date of the registration statement. Please mention this tail compensation when discussing the possibility that you may need to seek additional funds sooner than you currently plan.

Risks Related to the Development and Commercialization of Our Future Isotopes

We are early in our research and development efforts for Mo-100 and U-235 using the ASP technology. If we are unable to advance our..., page 10

3. We refer to your disclosure here that you expect to complete the proof of concept phase of the Mo-100 development plan during 2022 and your disclosure on pages 48 and 89 that the Company's management expects that it could take up to 15 months to complete the initial proof of concept phase. Please reconcile these disclosures.

Regulatory approval for production and distribution of radiopharmaceuticals used for medical imaging and therapeutic treatments may..., page 12

4. We note your disclosure on page 12 that you "may" need to obtain approval from the FDA, European Medicines Agency (EMA) or other comparable foreign regulatory authorities prior to sale of Mo-100 and your disclosure on page 74 that some of your future isotopes "will also likely be regulated" by healthcare regulators such as the Food and Drug Administration (FDA) in the USA, Health Canada in Canada, the European Medicines Agency in Europe and similar regulators in other countries. Please revise your disclosure here and throughout the prospectus to clearly state whether you believe you

will need approval from regulatory authorities in order to commercialize Mo-100. If you believe the need for regulatory approval is uncertain, please discuss the specific reasons for this uncertainty, when and how a determination will be made and the impact this uncertainty will have on your business and operations.

Risks Related to Our Intellectual Property

We may be unable to adequately protect our intellectual property and proprietary rights and prevent others from making unauthorized use..., page 16

5. We note the disclosure in Note 8. License Agreements to the Consolidated Financial Statements on page F-13 that under the Mo-100 and U-235 license agreements any development efforts improving the intellectual property performed by either Klydon or the Company will be the property of Klydon. Please expand on your disclosure in this risk factor to discuss any material risks regarding Klydon's ownership of the intellectual property used in your business. Additionally, please reconcile the fact that Klydon will retain ownership of the intellectual property with your statements on page 20 of the prospectus that you anticipate you "will file patent applications both in the United States and in other countries, as appropriate" and that you "intend to seek to protect [your] proprietary position by filing patent applications in the United States and abroad related to [your] current and future development programs and future isotopes to the extent permitted by applicable law."

Risks Related to Regulatory Compliance

Our business is and could become subject to a wide variety of extensive and evolving laws and regulations. Failure to comply with such..., page 16

6. We note your disclosure here that "[t]he design, construction and operation of the Mo-100 enrichment plant are highly regulated and require government licenses, approvals and permits, and may be subject to the imposition of conditions." We also note references throughout the prospectus to the need to obtain "applicable regulatory approvals." Please expand your disclosure here and elsewhere in the prospectus to briefly explain the material governmental approvals you or Klydon need to build and operate the plant, including the status and expected timing for applying for and/or receiving such approvals.

Risks Related to Our Dependence on Third Parties

Klydon currently performs or supports many of our operating activities and will continue to do so after the closing of this offering..., page 24

7. There are several references here and elsewhere in the prospectus to PDS South Africa. It appears this entity may be the predecessor to ASP Isotopes South Africa (Proprietary) Limited. Please clarify these references.

Use of Proceeds, page 41

8. Although we note your disclosure that you intend to have broad discretion over the use of

net proceeds from the offering, please revise your use of proceeds disclosure to indicate how far in the development process you estimate that the allocated proceeds from the offering will enable you to reach. For example, please indicate if you expect to be able to fund the Phase 1, Phase 2 and/or commercialization phase of the Mo-100 development plan without raising additional capital or fund the acquisition of all of the outstanding shares or substantially all of the assets of Klydon. In this regard, we note your disclosure on page 9 of the prospectus that while you believe, based on your current operating plan, that following the offering you will have sufficient cash on hand to fund operations for at least the next 12 months you will require substantial additional capital to support your business operations.

Management's Discussion and Analysis of Financial Condition and Results of Operations
Exclusive Mo-100 License, page 47

9. Please revise your description of the Mo-100 License Agreement to describe the material terms of the agreement. In particular, please describe:
   - the nature and scope of the intellectual property rights transferred under the agreement as it appears neither the Company nor Klydon has any existing patents, patent applications or copyrights;
   - the duration of the agreement and any royalty term;
   - any termination provisions other than if the licensee ceases to carry on activities of Mo-100 enrichment for a period longer than 24 consecutive months;
   - any up-front or execution payments;
   - the aggregate amounts paid or received to date under this agreement;
   - the aggregate future potential milestone payments to be paid or received; and
   - royalty rates or a royalty range.

Exclusive U-235 License, page 48

10. Please revise your description of the U-235 License Agreement to describe the material terms of the agreement. In particular, please describe:
   - the nature and scope of the intellectual property rights transferred under the agreement as it appears neither the Company nor Klydon has any existing patents, patent applications or copyrights;
   - the duration of the agreement; and
   - any termination provisions other than if the licensee ceases to carry on activities of U-235 enrichment for a period longer than 24 consecutive months.

Letter of Intent for Klydon Shares or Assets, page 48

11. We note that on September 30, 2021, ASP South Africa entered into a letter of intent with Klydon and its largest shareholder with respect to the acquisition of all of the outstanding shares or substantially all of the assets of Klydon. Please tell us how you considered the guidance in Rules 8-04 and 8-05, as well as Article 11 of Regulation S-X in determining whether additional financial statements and pro-forma financial information of

Klydon should be included in your filing. Your response should include your significance calculation and all other relevant facts and circumstances that support your conclusion.

12. Please expand on your disclosure regarding your letter of intent with Klydon and its largest shareholder to explain the current status of this acquisition and the expected impact an acquisition of Klydon would have on your business, the offering and your various existing agreements with Klydon.

Other Material Agreements, page 48

13. We note your disclosure regarding the key terms of your other material agreements. Please file the Lease for Molybdenum Processing Plant and Political Risk Insurance Policy with Optio Group as exhibits to the Registration Statement or provide us your basis for determining it is not required pursuant to Regulation S-K, Item 601(b)(10).

Liquidity and Capital Resources
Future Funding Requirements, page 52

14. We note your disclosure here that your commercial revenues, if any, will be derived from sales of Mo-100 which you do not expect to be commercially available "until at least 2024." On page 57 of the prospectus, you note that you "expect to commence commercialization of Mo-100 in 2023." Please reconcile these disclosures. Additionally, we note your statement on page 66 of the prospectus that you "expect limited commercial activity for Mo-100 in the United States during the next two to three years" and "anticipate that most of [your] initial revenues from future sales of [your] Mo-100 will be derived form countries in Asia and EMEA (Europe, Middle East and Africa)." To the extent you anticipate sales will initially be derived from these countries, please state this clearly in the prospectus summary and risk factors section.

Critical Accounting Policies and Significant Judgments and Estimates
Stock-Based Compensation, page 54

15. Once you have an estimated offering price or range, please explain to us how you determined the fair value of the common stock underlying your equity issuances and the reasons for any differences between the recent valuations of your common stock leading up to the initial public offering and the estimated offering price. This information will help facilitate our review of your accounting for equity issuances including stock compensation. Please discuss with the staff how to submit your response.

Business
Our Strategy
Complete development and commissioning of Mo-100 enrichment facility located in Pretoria, South Africa., page 57

16. We note your statement that you intend to leverage your unique technical expertise to complete the development of your first Mo-100 enrichment facility located in Pretoria,

South Africa. However, you appear to be outsourcing this work the Klydon. Please provide clear disclosure throughout regarding which entity will be constructing and commissioning the enrichment facility.

Mo-100 produced using ASP technology could support an alternative and potentially more convenient production route for Tc-99m, page 58

17. We note your disclosure here that "[a]ssuming that the Mo-99 produced from our Mo-100 is determined to be equivalent to currently available Mo-99 and the technetium generator has already received regulatory approval with relevant healthcare regulators, we believe this route to market will not require additional regulatory approvals from the relevant healthcare regulator." Please expand on this disclosure to explain which regulatory agency or agencies would need to determine that the Mo-99 produced from your Mo-100 is equivalent to currently available Mo-99 and the process and expected timing for receiving such a determination.

Continue identifying potential offtake customers and strategic partners for Mo-100, page 58

18. We note your statement that you have had or are currently in active dialogue or entered into non-binding LOIs with over four potential offtake customers. Please provide an approximate range or a specific number of such potential offtake customers. Additionally, please revise your disclosure to name the strategic advisor with whom you have entered into a consulting and sales commission agreement to support your efforts to identify potential customers in China.

Our Strengths

Proven ASP technology developed by Klydon, page 59

19. Please remove the reference to "proven" ASP technology and balance your disclosure regarding the efficacy and commercial scalability of the ASP technology to note that you have not demonstrated the ability to produce Mo-100 or U-235 using the ASP technology. Additionally, we note your disclosure here and elsewhere in the prospectus that you have exclusive worldwide licenses from Klydon for the production of Mo-100 and U-235 and your disclosure on page 72 of the prospectus that you are "currently conducting a feasibility study with respect to constructing an enrichment facility in either the United States or an international location." However, on page 17 of the prospectus you note that your exclusive license from Klydon is limited to South Africa for the development of the ASP technology and production of the Molybdenum-100. Please reconcile these disclosures here and elsewhere in the prospectus.

The Mo-99 Market, page 66

20. We note your reference to estimates prepared by Future Market Insights Inc. regarding the size of Molybdenum 99 market revenues in 2020. Please tell us whether the Company commissioned such estimates from Future Market Insights Inc. To the extent it was

commissioned by the Company, please file such party's consent as an exhibit to the registration statement. Please see Securities Act Rule 436.

Management

Executive Officers and Directors, page 76

21. For the Chairman and each Non-Employee Director, please briefly discuss the specific experience, qualifications, attributes or skills that led to the conclusion that such person should serve as a director of the Company. Please also disclose the ages of Mr. Donfeld and Dr. Strydom. Please refer to Items 401(a) and 401(e).

Chief Scientific Adviser Agreement with Dr Ronander, page 89

22. We refer to your disclosure that Dr. Ronander has agreed to serve as chief scientific adviser to the board of directors. Elsewhere in the prospectus, you refer to Dr. Ronander as "your Chief Scientific Adviser." Please clarify if Dr. Ronander is providing services to the Company or the board of directors. Additionally, please tell us what consideration you gave to whether Dr. Ronander is an "executive officer" of the Company as such term is defined in Rule 3b-7 of the Exchange Act or a "named executive officer" of the Company pursuant to Item 402(a)(3) of Regulation S-K.

Consulting Agreements with Dr Strydom and Dr Ronander, page 89

23. Please revise your description of the Consulting Agreements with Dr. Strydom and Dr. Ronander to describe the material terms of the agreements. In particular, please describe:
- the amount and timing of cash payments in connection with licensing upfront payments are paid to the company;
- the termination provisions of such agreements; and
- the nature of the potential licensing transaction relating to the enrichment of uranium.

Indemnification Arrangements with Drs Ronander and Strydom, page 89

24. Please expand on your disclosure regarding your agreement to indemnify Drs. Ronander and Strydom for up to $3.2 million in connection with any claim by a creditor of Klydon. Please explain the circumstances that led to these indemnities and whether you view any payment obligation under these indemnities as probable. Please disclose whether Klydon is providing indemnity against these claims as well.

Letter of Intent for Klydon Shares or Assets, page 89

25. Please identify the the shareholder of Klydon with whom you have entered the letter of intent.

Principal Stockholders, page 90

26. Please revise the footnotes to the beneficial ownership table to disclose the natural persons who hold voting and/or dispositive control over the shares held by Broadband Capital

Investments LLC and the entities affiliated with Titan Multi-Strategy Fund I, Ltd.

Description of Capital Stock
Registration Rights, page 92

27. We note your reference to an Investor Rights Agreement on page 92. This section includes a cross reference to the "Shares Eligible for Future Sale" section of the prospectus. However, the Investor Rights Agreement does not appear to be discussed in that section. Please clarify or revise your disclosure as appropriate. Additionally, please file the Investor Rights Agreement as an exhibit to the Registration Statement or provide us your basis for determining it is not required pursuant to Regulation S-K, Item 601(b)(10).

Exclusive Forum, page 94

28. We note your disclosure on page 94 and elsewhere in the prospectus that the exclusive forum provision in your amended and restated certificate of incorporation will not apply to suits brought to enforce a duty or liability created by the Exchange Act. Please ensure that the exclusive forum provision in your amended and restated certificate of incorporation states this clearly.

Representative's Warrants, page 102

29. We note that you plan to issue representative's warrants but do not see them listed in the fee table. Please tell us whether you plan to register the representative's warrants and the shares of common stock underlying the warrants and revise the fee table accordingly.

1. Organization, page F-7

30. Please disclose your accounting for the October 2021 acquisition of the assets of Molybdos by your South African subsidiary for ZAR 11,000,000 (approximately USD $734,000.) Disclose the nature of and the valuation for the assets purchased. Explain how this transaction is reported in your statements of cash flows on page F-6. In your response please identify the specific paragraphs within the authoritative literature that you have relied upon to support your accounting and presentation, for example, the ASC 805 framework. Please assure that you have provided all of the required disclosures in your financial statements as applicable.

8. License Agreements, page F-13

31. Please revise the filing to include the disclosures required by ASC 850-10-50 for all the related party transactions with Klydon.

9. Stockholders Equity
Common Stock Warrants, page F-14

32. You explain that in September 2021, you issued warrants fair valued at $1,735,841, and awarded founder stock fair valued at $500,000 for no cash consideration. Please tell us

your consideration of disclosing the information related to these awards on the face of your Consolidated Statement of Cash Flows as non-cash transactions similar to your presentation of the Right-of-use assets obtained in exchange for lease liability. Refer to ASC 230-10-50-3 and 50-4.

33. We note that one of the significant inputs in the Black-Sholes model is the estimated fair value of your common shares. Please revise to disclose the estimated fair value of the common shares at each common stock warrant valuation date.

Exhibits and Financial Statement Schedules, page II-3

34. We note that you intend to file an Advisory Agreement by and between the registrant and ChemBridges LLC, dated October 27, 2021 as exhibit 10.8 to the registration statement. Please include a description of the Advisory Agreement in the prospectus.

General

35. Please provide us with supplemental copies of all written communications, as defined in Rule 405 under the Securities Act, that you, or anyone authorized to do so on your behalf, have presented or expect to present to potential investors in reliance on Section 5(d) of the Securities Act, whether or not you retained, or intend to retain, copies of those communications.

You may contact Ibolya Ignat at 202-551-3636 or Kevin Kuhar at 202-551-3662 if you have questions regarding comments on the financial statements and related matters. Please contact Conlon Danberg at 202-551-4466 or Christopher Edwards at 202-551-6761 with any other questions.

Sincerely,

Division of Corporation Finance
Office of Life Sciences

cc: Mr. Donald Ainscow, Esq.