

NATIONWIDE ECLIPSE BALLOONING PROJECT (NEBP)

PROPOSAL SOLICITATION

In partnership with the NASA Space Grant network and funded by the NASA Science Mission Directorate Science Activation program, the NEBP requests proposals from higher education institution faculty and/or other adult mentors to lead a team of students through a mission involving learning and stratospheric ballooning campaigns during the October 14, 2023 annular and April 8, 2024 total solar eclipses. NEBP requests proposals to 1) ensure potential teams are thinking about and planning for necessary participation actions and 2) capture essential agreements that allow us to grant substantial equipment, supplies, and support to participating institutions. **Proposals are due October 28, 2022.**

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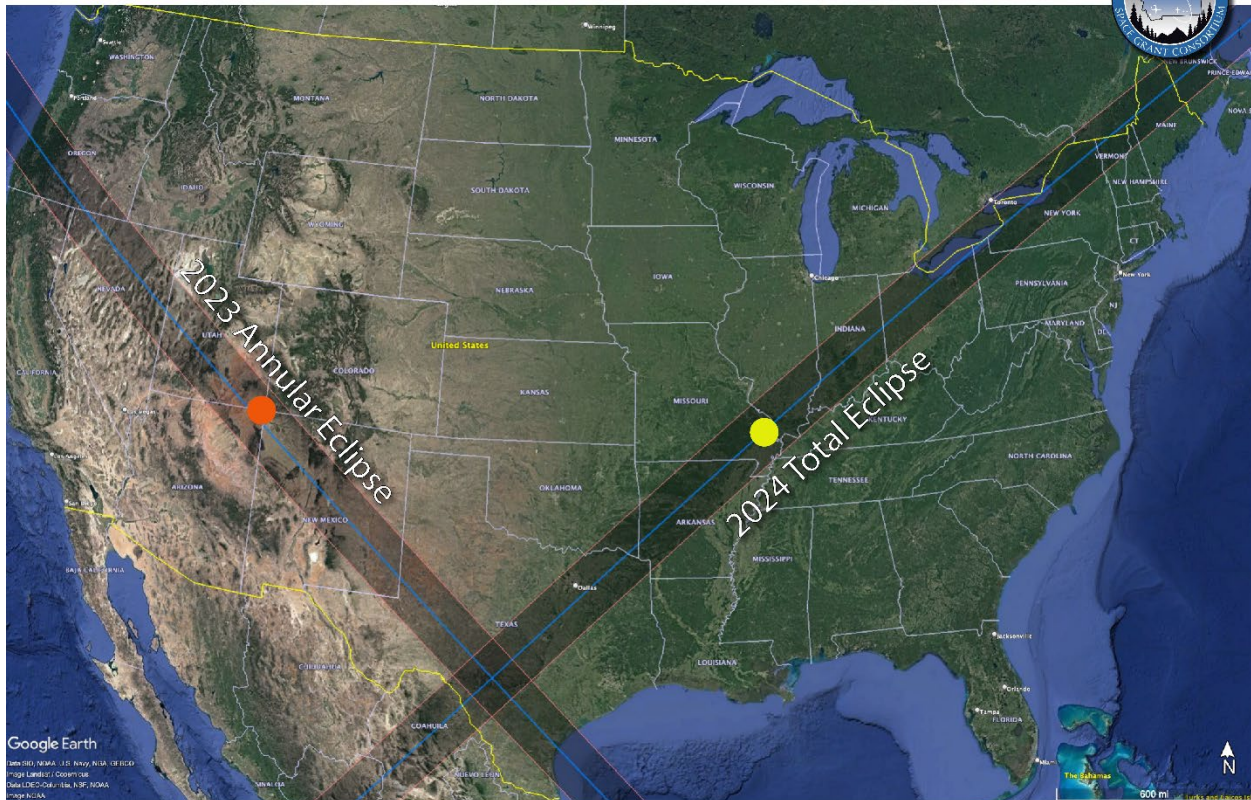
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PROGRAM OVERVIEW

The Nationwide Eclipse Ballooning Project (NEBP) will immerse teams from a range of higher education institutions in an innovative NASA mission-like adventure in data acquisition and analysis through stratospheric ballooning during the 10/14/23 annular and 4/8/2024 total solar eclipses. NEBP teams across the U.S. will conduct scientific field campaigns during the two eclipses, flying helium-filled balloons carrying science and engineering payloads — such as meteorological instruments (radiosondes), still and video cameras, and space technology proof-of-concept hardware. Background information on stratospheric ballooning is available at <https://www.overlookhorizon.com/>. All flight phases are led by students under the guidance of an adult Team Mentor.

The NEBP goals are 1) enable inclusive STEM education for participating students, 2) advance learners' understanding of the process of science, and 3) create, enhance, and sustain networks and partnerships.

Nationwide Eclipse Ballooning Project - Eclipse Paths



Annular Eclipse: October 14, 2023

Time of peak obscuration at location ● : 16:32:49 UTC

Total Eclipse: April 8, 2024

Time of eclipse totality at location ● : 19:00:15 UTC

In addition to the hands-on STEM skills gained through preparation for and flying of balloons during each eclipse, all NEBP participants will enhance their 21st century STEM skillset through educational activities to promote teamwork, communication, scientific data acquisition and analysis, science research, and diverse cultural perspectives in science and engineering.

More detailed information about NEBP, including project objectives, track-specific expectations, planned educational activities, photos of balloon flights, funding, timelines, and training workshops is available on the project website, <https://eclipse.montana.edu>. We highly recommend that the website is reviewed in parallel with this solicitation, as it contains more detailed project information. Note that the website will be continually updated as more information becomes available.

BALLOONING TEAMS

The NEBP will provide equipment and support to help create 70-85 student teams across the U.S. Each team must be led by an adult Team Mentor who is authorized to submit proposals on behalf of their institution. Multiple institutions may partner to form one team; each institution partner should have an adult mentor. We recommend teams of six to fifteen students, keeping in mind that all students must be supported to participate fully. Team Mentors should consider

that attrition may occur due to students' varying graduation dates and life events. Each prospective ballooning team will choose **one** NEBP track.

Either:

ATMOSPHERIC SCIENCE track – The Atmospheric Science track teams will conduct cutting-edge research using radiosondes to collect atmospheric data and ground-based weather stations to collect meteorological surface data along the eclipse paths, and use those observations to examine the atmospheric effects of the eclipses. A radiosonde is a small, expendable weather instrument carried by a weather balloon to



measure atmospheric parameters from the surface to the stratosphere. NEBP Atmospheric Science participants will make frequent observations by launching radiosondes every 30-60 minutes on weather balloons to 100,000 - 110,000 feet from 24 hours before to several hours after each eclipse event. In addition, teams will collect high-temporal resolution surface data, including solar irradiance, pressure, temperature, humidity, and winds. This experiment design will provide surface, lower, and middle atmospheric (stratospheric) weather condition observations with enough spatial and temporal sampling to contrast the meteorological differences before, during, and after the eclipse. All flight phases will be carried out by students, including radiosonde initialization, balloon fill, launch, real-time data quality checks, and preliminary data analysis in the field.

OR the

ENGINEERING track - The Engineering track teams will focus on first-hand experiences with designing and constructing stratospheric ballooning systems. They will fly a single, larger balloon platform capable of lifting 12 pounds of student-designed and -built payloads to 80,000 – 100,000 feet, streaming live video and collecting critical data along the way. Typical engineering platform experiments include atmospheric measurements,



photography, cosmic radiation measurements, and space technology proof-of-concept hardware. The teams will generate real-time video that will be streamed to the planned NASA eclipse website, make high-resolution GPS measurements to complement the Atmospheric Science radiosonde data, and potentially include their own individually-designed experiments.

A NEBP ballooning team must include:

- One (or more) lead institutions, which can be any type of higher education institution or high school, if all of the participants are at least 16 years of age. High school groups must either be experienced with ballooning or be partnered with a college team. The minimum age requirement is due to safety considerations and is non-negotiable.
- One (or more) Adult Team Mentors, who must be affiliated with the lead institution(s).
- Six to fifteen committed students who will participate from February 2023 through May 2024, though students who participate in data analysis should consider participating at least through the 2024 summer.
- A signed assurance form that signifies the team agrees to all the team responsibilities listed on pages 7-8.

NEBP is coordinated in partnership with the NASA’s 52 Space Grant Consortia (one in each state, plus D.C. and Puerto Rico). We recommend that each proposing institution notify the state’s Consortium and ask what support the Consortium may be able to offer. Contact information for each Consortium is available at:

https://www.nasa.gov/stem/spacegrant/home/Space_Grant_Consortium_Websites.html.

TEAM MENTOR BENEFITS

One person will serve as the primary Adult Team Mentor. Students may NOT be primary Team Mentors. Deputy Leads are welcome and encouraged but not required. Well-prepared students can be Deputy Leads. Benefits of being a Team Mentor include:

- Becoming a **leader at one’s home institution and in one’s state** in the field of stratospheric ballooning
- **Curricula, training, and hands-on skills development** that will prepare the Team Mentor to continue supporting students in stratospheric ballooning into the future
- **In-person workshops and virtual training**, as well as support for building the team, project implementation, and collaboration
- Ongoing **professional development** and **technical assistance** from NEBP leadership
- Inclusion in a **national network** of institutions committed to STEM literacy and skills development, scientific discovery, and broadening participation in STEM
- Access to **NASA subject matter experts and national leaders in stratospheric ballooning**
- The **unforgettable experience** of flying balloons and collecting data during a solar eclipse

INSTITUTION BENEFITS

Each institution selected to participate in the NEBP will receive:

- Guided learning for adult mentors and student participants on technical skills related to stratospheric ballooning, as well as complementary skills such as teamwork, science communication, etc.
- **\$13,000-\$28,000** worth of scientific and engineering ballooning supplies and equipment for the institution(s) to use then keep after the project is complete; amount dependent upon the chosen track
- Ongoing support, as part of the NEBP
- Access to the national NEBP leadership team and online resources
- Access to web-based training, curricula, and resources for additional learning

STUDENT BENEFITS

- Learn technical skills and increase understanding of STEM careers
- Learn STEM career skills such as problem solving, teamwork, and knowledge-sharing
- Use cutting-edge technology
- Conduct scientific research
- Be part of a diverse, multi-disciplinary team
- Participate in a nationwide NASA effort
- Have access to NASA subject-matter experts and national leaders in stratospheric ballooning
- Potentially: receive independent study course credit and/or monetary support
- Potentially: be an author on a peer-reviewed scientific journal paper

HOW NEBP WILL SUPPORT TEAMS

- **Leadership and guidance from NEBP at the national and “regional pod” levels**

The leadership team of the NEBP will provide detailed guidance to participating teams for the duration of the project, though the actual execution of team procedures will ultimately be performed by the teams. Guidance will be in the form of videos, online tutorials, and live talks and discussions. Specific, non-detailed examples of guidance provided by NEBP include, but are not limited to, the following.

- **Example Atmospheric Science Track guidance**

(1) Safety and Operations Procedures including:

- a. Distribution of a Standard Operating Procedures (SOP) document guiding team operational procedures related to balloon handling & launches, payload ground station operation, meteorological surface station placement

and operation, equipment and operations checklists, and quality control practices required for success in NEBP.

b. Recommendations for common field safety practices including placement of helium stores, adequate lighting, minimization of trip hazards, established emergency protocols, and NEBP chain-of-command contact information for emergency situations.

(2) How to meet Flight Regulations including:

a. Identification of local and regional air traffic control (ATC) authorities and ATC communication recommendations including balloon launch time, launch location, and estimated burst altitude.

b. Clarification of regulations, requirements, and exemptions outlined by Electronic Code of Federal Regulations (eCFR) Title 14 -> Chapter 1 -> Subchapter F -> Part 101 regarding "free" (non-tethered) balloons.

<https://www.ecfr.gov/current/title-14/chapter-1/subchapter-F/part-101>

(3) Helium acquisition and transportation including:

a. Identification of helium distributors and best practices for purchase and acquisition of helium gas, as well as associated hardware and software including pressure regulators, hosing, balloon fill nozzles, and balloon fill values.

b. Explanation of regulations, requirements, and exemptions outlined by eCFR Title 49 -> Subtitle B -> Chapter 1 -> Subchapter C -> Part 172.1 and eCFR Title 49 -> Subtitle B -> Chapter 1 -> Subchapter C -> Part 173 -> Subpart A 173.6 regarding helium transportation and safety practices.

○ **Example Engineering Track guidance**

(1) Safety and Operations Procedures including:

a. Flight Operation Safety: All Engineering balloon flights must include the provided Iridium tracking and control system, a backup GPS system, and the provided flight-termination system. The NEBP program will provide tracking websites available to safety personal and the FAA for flight monitoring.

<http://eclipse.rci.montana.edu/> and <https://borealis.rci.montana.edu/>

b. Flight Reporting: A Notice to Airmen (NOTAM) must be filed with the Federal Aviation Administration (FAA) Flight Service Station (FSS) at least 24 hours in advance of each balloon flight.

(2) How to meet Flight Regulations; same as (2) above.

(3) Helium acquisition and transportation; same as (3) above.

- For 70 total Base Material Support Awardees, **all the necessary ground and balloon-borne equipment and supplies for practice, the 10/14/2023 annular eclipse campaign, and the 4/8/2024 total eclipse campaign, EXCEPT helium.** Among these 70 Awardees, 22 Minority Serving Institution (MSI) and Community College (CC) teams will also receive support for 1) workshop and eclipse travel and 2) practice and eclipse helium.

- **Educational support** for related activities including online asynchronous resources, online synchronous resources, and one required in-person workshop for two team mentors.

INDIVIDUAL TEAM RESPONSIBILITIES

- Ensure team safety, insurance, and liability
- Provide physical space for the team to learn, build, test, and practice – indoor space as well as a spot to conduct local practice flights
- Find and secure specific locations, with necessary permissions, for conducting practice, annular, and total eclipse campaigns; NEBP will assist as much as possible
- Find and secure locations for team lodging for the annular and total eclipse campaigns; we recommend doing this as early as possible
- Secure funding support for travel to campaign sites, helium, student support (many Space Grant Consortia have allocated some funding; check with them; <https://www.nasa.gov/stem/spacegrant/about/index.html>)
- Follow all prescribed safety and operations procedures
- Meet all applicable local, state, and federal flight regulations
- Implement all activities according to the guidelines and instructions
- Recruit and mentor students; all majors are welcome, though mentors should realize the different levels of experience needed for various team roles; the focus of NEBP is on undergraduates though graduate students are also welcome; no student under the age of 16 may participate; a minimum of six and a suggested maximum of 15 students per team
- Commit to building a diverse team and use exemplary practices for diversity, equity, inclusion, and accessibility; examples: <https://www.breakthroughfilms.org/toolkit/> and <https://www.nasa.gov/offices/odeo/special-emphasis-programs>
- Be a good steward of the science and engineering supplies and equipment that are granted to the institution
- Obtain necessary helium and transporting it to the campaign locations; NEBP will provide guidance
- Ensure all participants have access to, and knowledge about, the timing of all offered NEBP training and educational activities
- Participate for the full length of the project; adult Team Mentors and Student Leads: January 2023 through August 2024; other student team members: January 15, 2023 through April 30, 2024 (participating earlier and later is encouraged, but optional)
- Participate in field campaigns for BOTH the October 14, 2023 annular and April 8, 2024 total solar eclipses
- Send one Adult Team Mentor and a second team member – either another adult mentor or a student team lead – to the appropriate in-person regional workshop in

spring 2023. Regional workshop dates and locations will be available on the NEBP website (<https://eclipse.montana.edu>) no later than September 16, 2022

- Train team members in summer 2023 in-person and hands-on
- Participate in each quarterly virtual NEBP meeting
- Submit required reporting, anticipated to be 2-5 pages every six months; templates will be provided
- Invest effort toward moving to a sustained remote sensing program at the home institution – not required to involve stratospheric ballooning but should make use of the NEBP experience (and possibly the NEBP hardware) – could also involve similar vehicles such as remotely-piloted aircraft
- Promptly inform NEBP leaders if full participation is no longer viable and return equipment and supplies

If not selected by NEBP as a team to receive equipment and supplies, teams participating through self-funding must still meet each of the above requirements. NEBP has the ability to include and advise 15 additional teams (beyond the 70 Base Material Support Awardees) that purchase their own equipment.

IMPORTANT DATES

| | |
|-------------------|--|
| October 28, 2022 | Proposals due |
| December 16, 2022 | Team selection notification deadline |
| January 15, 2023 | Learning begins |
| May 2023 | In-person regional pod workshops for mentors |
| Summer 2023 | Hands-on practice |
| October 14, 2023 | Annular eclipse |
| April 8, 2024 | Total eclipse |

PROPOSAL COMPONENTS AND SCORING

Submit all proposal components as a single PDF document.

1. Cover page
 - a. Adult Team Mentor name(s), job title(s), and signature(s)
 - b. Institution Name(s)
 - c. Type of Institution(s) – research university, four-year college, Community College, High School, Minority Serving Institution (more than one designation allowable)
 - d. Contact information for each Team Lead (email, phone number, mailing address)

- e. Proposed track: Atmospheric Science or Engineering. A single institution cannot field/lead both, though multi-institutional teams might include participants from a given school in each track.
 - f. Institution Authorized Organizational Representative (AOR) name(s) and signature(s)
2. Mentoring Plan (45% of score)
- a. **Team mentoring approach plan (3 pages max).** The plan should show that the adult Team Mentor is committed to supporting student team members throughout the learning and eclipse campaign process. The plan should give details about how the advisor will attend the pod lead workshop with one other team member (required) and support the students through the various project phases: learning/preparation; eclipse campaigns; data analysis; knowledge sharing; and wrap-up. Plans should include team goals and reference the online training resources provided by NEBP (<https://eclipse.montana.edu>). Creative approaches are welcome. Teams with higher levels of experience should expect to spend time helping teams with less experience learn and prepare. Teams with less experience should expect to spend more time learning and preparing. Include the following elements.
 - i. Is the team: A new team that will need extra guidance? An experienced team that will be able to learn and participate with little assistance? An advanced team that could potentially guide a new team? Briefly describe experience.
 - ii. Is the team willing to be paired with another group, forming a multi-institution team (if not already part of a multi-institution team)?
 - iii. What skills or experiences are sought to be gained?
 - b. **CV for each Adult Team Mentor (2 pages max for each person);** CV for optional Deputy Lead allowed.
3. Resource Statements (20% of score)
- a. **Financial resource statement (1 page max).** Each team needs financial support from the home institution(s), their state's Space Grant Consortium, and/or other sources for team travel to each eclipse and for helium. All equipment and supplies needed for participation, other than helium, will be provided to selected teams. Note that there will be 22 awards made to teams from Minority Serving Institutions and Community Colleges for student travel to each eclipse (\$12k/eclipse) and also for the necessary helium (cost information at <https://eclipse.montana.edu/nebp-funding.html>). Teams that would like to be considered for one of these supplemental awards should use this section of the proposal to describe their needs. Engagement of underrepresented minority

students is particularly encouraged for teams seeking additional funding. Note: NASA considers underrepresented minorities to be African American, Native American, Hispanic/Latino, Native Alaskan, Native Hawaiian, and/or Pacific Islanders, but not Asian.

- b. **Student support statement (1 page max).** The statement should include what participating students will receive (pay, credits, and/or other types of recognition or support) for their time and effort. Support can come from the institution(s) and/or the local Space Grant. It is not a requirement for students to be paid, though it is encouraged, especially in summer 2023. We highly recommend that the proposing institution(s) offers an independent study course in the spring 2023 semester/quarter that participating students can take to learn the essential background information. All material necessary to teach the course will be provided by NEBP. To ensure successful participation, each student needs to commit at least 40 hours of online/remote training and at least 80 hours of in-person, hands-on training time prior to the 10/14/2023 annular eclipse. No student should have to pay to participate - e.g., students should not have to pay their own way to the eclipse campaign sites nor pay to travel to other locations for collaboration. It is okay for students to pay tuition for course credit (if independent study is offered).
 - c. **Physical space(s) statement (1/2 page max).** Describe the institution(s)' physical space(s) for the team to work.
 - d. **Letter of support from institution(s).** Provide a letter of support from each participating institution. The letter should include a statement of general support for the team to participate and should describe any other resource support offered by the institution, such as a dedicated workspace, mentor time/pay, student pay, and/or student course credit. The letter can be from an appropriate department head, dean, provost, or other administrator. Multiple letters are allowed, but not required.
 - e. **Multi-institution collaboration statement (optional, 1 page max).** If a team is made up of students from multiple institutions, describe how the collaboration will work, the benefits of the collaboration, and the support for the students to travel between campuses to work together when needed. Also state if the institutional collaboration is new or has existed before.
4. Diversity, Equity, Inclusion, and Accessibility (DEIA) Plan (20% of score)
- Team recruitment and DEIA plan (1 page max).** The NEBP has a goal of 50% involvement of students who are historically underrepresented or underserved in STEM. NASA defines underrepresented minorities in STEM as: racially or ethnically underrepresented (Hispanics and Latinos, African Americans,

American Indians, Alaska Native, Native Hawaiians and Pacific Islanders). By underserved in STEM, we mean women, persons with disabilities, those who are at Community Colleges, those who are low-income, and/or those who are first-generation college students. We follow the Space Grant aim to include 45% women participants. Additional information and resources are available at: https://www.nasa.gov/centers/hq/library/find/bibliographies/minorities_in_science. Each team should be composed of an appropriate number of students to accomplish team goals (who all have support to travel to each eclipse) and who are excited to fill the necessary roles for the team (role information will be posted on the website, <https://eclipse.montana.edu>). The plan should describe how the mentor(s) will recruit a diverse team of students and how the team will welcome diversity and promote equity, inclusion, and accessibility in their approach.

A goal of the NEBP is that our team leaders and members be as racially and demographically diverse as the communities they serve. How will the Adult Team Mentor(s) recruit and encourage building a team to meet the goals established by this program and by NASA? Once a team is established, what steps will be taken to ensure that each team member receives equitable levels of support, inclusion, and mentoring for the duration of the project?

5. Sustainability (15% of score)

Sustainability plan (1/2 page max). Plans for considering some kind of remote sensing program (making in situ observations via vehicles such as balloons or remotely-piloted aircraft) in the future at the participating institution(s), building on the knowledge and infrastructure gained from NEBP. Could this program lead to a sustainable stratospheric ballooning and/or remote sensing program in the team's state? Does the institution have resources to support this work in the local area after the NEBP ends? If so, how?

6. Team assurances

Print, sign, and scan the **NEBP Team Assurances page**. Then attach it to the proposal so it is included in the single submitted PDF document.

TEAM ASSURANCES

Print, sign, and scan this page. Then attach the scanned page to the proposal so it is included in the single submitted PDF document.

By signing below, the Team Mentor and AOR acknowledge and agree that:

The NEBP leadership and program hold no safety responsibility or liability for activities conducted by individual teams. The Team is responsible for identifying and following all reasonable and necessary safety measures as listed on pages 5-6 of the NEBP Team Proposal solicitation.

Date: _____

Team Mentor Signature: _____

Institution AOR name: _____

AOR Signature: _____

On behalf of (Institution): _____

ADD SUBSEQUENT LINES IF THE TEAM HAS MULTIPLE INSTITUTION PARTNERS

SUBMISSION INSTRUCTIONS

Submit the proposal as a single PDF document to nebp@montana.edu by **October 28, 2022**.

Team selection decisions will be communicated no later than **December 16, 2022**.

QUESTIONS?

Informational webinar

- Proposal overview: Wednesday, April 27th at 3pm EDT, 2pm CDT, 1pm MDT, 12pm PDT, 11am Alaska, 10am Hawaii. At the webinar we will give an overview of the solicitation and describe the required proposal components. There will also be time for questions. Webinar link: <https://montana.webex.com/meet/m23x137>.

Office hours to drop in and ask questions about the project and/or proposal preparation

- Current office hours are listed below. We will add more for September and October at a later time. Existing and new office hours are/will be listed on the NEBP News page <https://eclipse.montana.edu/nebp-news.html>.
 - o General questions (join at <https://montana.webex.com/meet/m23x137>):
 - Tuesday May 3rd, 11am-12pm MT
 - Wednesday May 11th, 3-4pm MT
 - Thursday May 26th, 9-10am MT
 - Tuesday August 2nd, 2-3pm MT
 - Wednesday August 10th, 11am-12pm MT
 - Thursday August 25th, 3-4pm MT
 - o Atmospheric Science (join at <https://umontana.zoom.us/j/9203203043>):
 - Tuesday May 3rd, 1-2pm MT
 - Wednesday May 11th, 10-11am MT
 - Thursday May 26th, 11am-12pm MT
 - Tuesday August 2nd, 11am-12pm MT
 - Wednesday August 10th, 1-2pm MT
 - Thursday August 25th, 1-2pm MT
 - o Engineering (join at <https://montana.webex.com/meet/c89r881>):
 - Tuesday May 3rd, 9-10AM MT
 - Wednesday May 11th, 9-10AM MT
 - Thursday May 26th, 11AM-12PM MT
 - Tuesday August 2nd, 9-10 MT
 - Wednesday August 10th, 10-11AM MT
 - Thursday August 25th, 10-11AM MT

FAQs will be released as needed and posted at <https://eclipse.montana.edu/nebp-news.html>

Send questions to nebp@montana.edu. We are happy to answer questions but would appreciate the review of detailed information available at <https://eclipse.montana.edu> prior to sending inquiries.