

NUSL Tourism and Visitor Center White Paper - Revision B

National Underground Science Laboratory Visitor Experience Center

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Table of Contents

Table of Contents 2

NUSL Visitor Experience Center: Vision 3

NUSL Visitor Experience Center: Technology 5

NUSL Visitor Experience Center: Exhibits 6

NUSL Visitor Experience Center: Site Tours 7

NUSL Visitor Experience Center: Partnerships and Affiliations 7

NUSL Visitor Experience Center: Visitor Profile 7

NUSL Visitor Experience Center: Black Hills, Badlands and Lakes Tourism 9

NUSL Visitor Experience Center: Cost Data 10

NUSL Visitor Experience Center: Vision

The five-year vision for the National Underground Science Laboratory (NUSL) Visitor Experience Center provides for the initial development of on-site and off-site activities that include science, mining, history, and cultural educational opportunities. The first efforts will be Internet-based to insure that outreach begins as soon as construction and research activities begin at NUSL. On-site experiences will include underground tours, exhibits, a gallery, an artist-in-residence, a gift shop, a restaurant, and a planetarium that may also serve as an auditorium and theatre. Off-site experiences will be provided via the Internet as well as through partnerships with regional entities and attractions. This multi-year vision allows for staged development and funding.

The proposed research at NUSL spans many scientific disciplines (e.g., physics, astronomy, geology, biology, microbiology, chemistry). While these are often viewed as insular, the intersections between them are particularly apparent in underground science. The NUSL Visitor Experience Center will portray the interdisciplinary nature of science and facilitate an understanding of the interconnection between the various fields of science.

To insure a Best-In-Class facility and on-line experience, a thorough review of respected government and non-profit science visitor centers will occur prior to creating a detailed development plan. A brief review of several of these institutions resulted in identifying these requirements and characteristics for a successful visitor center:

- The visitor center needs to be welcoming, attractive, safe, and secure. Visitors need to immediately feel as if their needs will be met and their expectations exceeded. Security and safety procedures need to be well-integrated into the experiences of the visit and not perceived as a burden. Transportation and parking must be efficient and convenient. These considerations are not only important to the first-time visitor but help to insure repeat visits.
- There must be significant community involvement in planning the site and its programs. In the case of NUSL, this means the communities of Lead (the site of the laboratory), nearby Black Hills cities (e.g., Spearfish, Rapid City), and the Lakota (Native Americans indigenous to the Black Hills and surrounding area). The management needs to work with local, regional, and statewide citizens, tourist attractions, corporations, and government agencies to insure an integrated approach to maximizing visits to both the laboratory and its on-line counterpart.
- The scientists and other staff members should be involved with visitors to the laboratory and its on-line sites. This goal should be facilitated through the facility design (e.g., common eating facilities, lobbies) and program design (e.g., speaker bureau, classroom visits, dignitary tours, chat rooms).
- The facility must represent the internationalism of the site and its researchers. Displays (e.g., international flags), menus, translations (on-site and on-line), the art gallery, and exhibits (e.g., a historical timeline that includes both science and other worldwide events) will contribute to advancing the international perspective.

- A modern digital planetarium and large-format film projection technology increases both the attendance and revenue to sites. The planetarium will provide a compelling way to explain cutting-edge research (e.g., nuclear physics, dark matter, cosmology) and Native American star knowledge and culture within the same presentation. The theatre will bring in visitors that would not normally stop at a planetarium or a laboratory. Relevant large-format films already exist (e.g., Cosmic Voyage, Solar Max, and Journey into Amazing Caves). The planetarium and theatre provides an enjoyable respite from traveling and walking and will increase the time visitors will spend at the Visitor Center.
- Visual and performing arts provide opportunities for communicating the excitement of science and the nature of the universe to a broad audience. The visitor center should include a gallery for permanent (e.g., large sculpture, mural) and transient art exhibitions (e.g., regional, national, and Lakota artists). A residency program where artists work within the center and create work inspired by current research may help to make abstract principles more tangible. Performing arts events (e.g., music, theatre, readings) should be sponsored either on-site or within the community. These activities not only help to integrate the local citizens with the laboratory, but also support the creativity and morale of the short-term and long-term researchers.
- The design of the facility must reflect the regional environment and heritage. The Black Hills are unique in their beauty and geological history, and the surface architecture should be synergistic with its immediate surroundings. The indigenous Lakota peoples have a cultural and artistic history that extends centuries before Europeans settled in the area and their influence should be reflected in the design.
- Expanding the outreach program to include mobile capabilities (NUSL-on-Wheels) will greatly increase the number of students and citizens served directly. Many science centers double the number of participants this way (half served on-site and half served in their community). This outreach component will include portable exhibits that can be set up for a few days in a school gym or community center, in-class programs and workshops for teachers, and participatory programs for school assemblies.
- Accessibility considerations for both the on-site and on-line facilities must be an integral component of early design efforts. All individuals benefit from physical and virtual sites that pursue excellence in accommodating under-served and specially-abled visitors.
- There must be a closed-loop communication process with visitors to both the on-site and Internet-based visitor centers to solicit suggestions, measure satisfaction, and identify needed improvements. These communications should be regularly reviewed and action taken when needed. To insure a closed-loop process, the input, survey results, and actions taken are communicated back to visitors (e.g., in the printed and on-line newsletter). A similar process should be implemented for the scientists and other staff.

NUSL Visitor Experience Center: Technology

The availability and affordability of today's technology provides an unprecedented opportunity to create a Visitor Experience Center which is Internet-based. The use of the Internet and websites is not an afterthought or addition to the Visitor Experience Center, rather it is the foundation through which all on-site and off-site visitor experiences are created, driven, and managed. All visitor and staff transactions, information presentations, videoconferencing, virtual tours, and accesses to research data are included in the Internet-based solution called the NUSL Visitor Experience Center.

Effective use of the Internet insures that a higher percentage of the population, local and national, has access to the technology, science, archives, links, lab research, and experimental results associated with the Underground Laboratory. Varying security levels and modes of data protection are integrated into infrastructure to insure that initial and potential security requirements are accommodated. The economics and practicality of this model is already proven: several companies have Internet-driven business models in which the entire demand/supply chain is managed through electronic transactions.

The Visitor Experience Center will take advantage of the Dakota Digital Network, a high-speed data and videoconferencing network that interconnects all South Dakota public schools, to reach local, regional, and tribal school districts. Additionally, access to fiber optic cable exists in many nearby cities allowing for the opportunity to transmit data and presentations (e.g., seminars) over the Internet to interested citizens. These networks will also be used to communicate with the state's colleges and universities, particularly those in the eastern portion of South Dakota.

NUSL Visitor Experience Center: Exhibits

Exhibits that optimize the educational and entertainment opportunities associated with science, mining, history, and regional culture will be designed, created, and evolved. To the greatest extent possible, actual components will make up the displays (i.e., replicas, photographs, and simulations will be minimized). The exhibit creators will collaborate with experts in information presentation, learning styles, knowledge retention, ergonomics, and other relevant fields to insure that there is a wide-range of age-appropriate displays. There will be a focus on attracting and entertaining the science-naïve visitor (e.g., K-12 students) while providing sufficient detail for the science-literate and even the advanced student of science.

There will be exhibits for traditional scientific disciplines (e.g., physics, astrophysics, astronomy, geology, biology, chemistry,) as well as inter-disciplinary science exhibits (e.g., materials science, geobiology, cosmology) related to the research at NUSL. Some exhibits will be relatively permanent while others will evolve as research at the laboratory begins and completes. Some exhibits will emphasize the relevancy of scientific research and its results to the day-to-day life of ordinary people (e.g., microwave ovens, calculators, cell phones). Others will show the impact that understanding subatomic physics has had on their lives (e.g., imaging technology for medical diagnoses, accelerator technology for medical and materials applications). Others will explain the difference between research styles (e.g., basic, applied) and the time it takes to result in cost-effective applications (short-term vs. long-term research).

A significant number of interactive exhibits (i.e., hands-on, body-on, mind-on) will be provided. Kiosks and virtual visualization displays can provide a great user experience. The low capital costs associated with these exhibits today (e.g., <\$5K per kiosk) will facilitate bringing in a larger number than is normally seen in institutions. These displays can be used for the transfer of information about general science, science history, ongoing NUSL research, as well as research results from NUSL and other underground laboratories. They can also be used for communicating information about mining, and the region's history and culture.

Hands-on exhibits will be provided for all age groups. The multi-disciplinary nature of the science associated with underground research will be used to create a myriad of hands-on displays for all ages. For example, bubble displays can range from the simple to the complex, hold a fascination for all toddlers and most older children, and afford significant opportunities to provide physics, chemistry, and materials science information at a variety of levels (science-naïve to science-literate).

Wall displays and slant displays will provide sufficient information that an individual or group desiring a quick self-guided tour can capture the key concepts behind the diversity and importance of underground research.

The on-line experience will provide science education that mirrors what is available on-site. The interactive experiences available via kiosk can be provided via the Internet. Exhibits that are no longer available at the laboratory can be accessed through archives on-line. A student research center will provide elementary and post-elementary students with a one-stop shop for finding information about science (i.e., content and links).

NUSL Visitor Experience Center: Site Tours

The NUSL Visitor Experience Center offers both on-site and Internet-based tours. A variety of on-site tours are available for tourists, students and teachers (K-12, undergraduate, graduate, and post-doctoral), corporate citizens, donors, and dignitaries. Visitors can choose between staying in the unescorted areas to view exhibits, galleries, movies and performing arts; taking a shallow underground tour (100-4800 feet); or, going deep underground (7400 feet). All underground tours are offered with a dedicated guide and afford an opportunity to see active experiments and scientists in action.

Remote underground tours will be provided through real-time videoconferencing to classrooms or other connected sites. This expands a successful program already in place in SD that increases the number of students who are able to experience a science center (e.g., USGS EROS).

Visitors on-line can experience an underground virtual tour through a 3-dimensional model of the laboratory. A prototype virtual tour of the existing mine is already available.

NUSL Visitor Experience Center: Partnerships and Affiliations

To create vibrant and dynamic experiences, the NUSL Visitor Experience Center must maintain a high level of cooperation and integration with:

- Other components of NUSL (e.g., K-12 Outreach, Undergrad Outreach, Scientists);
- Regional attractions (e.g., national and state parks);
- Regional museums (e.g., mining, science, and art museums);
- National laboratories (e.g., Fermi, Brookhaven); and,
- International Underground Laboratories (e.g., Gran Sasso, Super-Kamiokande).

NUSL's synergy and integration with the community is equally important. A volunteer advisory board will be created to insure adequate input from local citizens, businesses, and cities.

NUSL Visitor Experience Center: Visitor Profile

It is expected that the majority of visitors to the NUSL Visitor Experience Center will be tourists that are already visiting western South Dakota. At least half of them will be families with children in grades K-12. A small percentage of the visitors (estimated at less than 5%) will be individuals or families who come to the Black Hills primarily to see the National Underground Science Laboratory and its Visitor Experience Center.

Most of the center's visitors will come during the 100-day summer season. These vacations are known to be well-planned and time-limited. Surveys have noted that tourists to western South Dakota establish their itineraries well before arriving and their plans have little room for modifications. This makes it crucial to reach and attract visitors while they are making their vacation plans. More than half of the visitors used the Internet to plan their trip and the percentage increases each year. The NUSL Visitor Experience Center will need to have an effective on-line presence that is well-integrated with the websites that

already serve South Dakota tourists. The center will need to provide on-line reservations for routine tourist visits or ready-made education/vacation packages (e.g., work with the researchers for a day) either by itself or in partnership with travel agencies and/or other area attractions. The South Dakota Department of Tourism has seen a sharp increase in requests for these packages. The center will also partner with regional attractions to insure good visibility to tourists already in the area.

The Visitor Experience Center will also work to attract non-traditional visitors. Less than five miles away, the city of Deadwood has a year-round influx of gamers to its renovated casinos. Some of these individuals may be interested in the opportunity to see the end-result of the area's goldrush (i.e., the laboratory). Each August, between 350K and 750K motorcycle enthusiasts come to the Sturgis Bike Rally. Many of these individuals are professionals (e.g., doctors and lawyers) who may welcome the opportunity to explore a nearby scientific facility.

There will be an intensive effort to get K-12, undergraduate, and graduate students into the facility. This will be accomplished in partnership with other NUSL Outreach programs. Although the majority of these programs will be during the traditional school months, there is a demand for educational opportunities outside the school year as well. A special focus will be placed on partnering with the South Dakota tribal schools and colleges to insure that under-represented students have ample opportunity to participate in NUSL Visitor Experience Center programs. Additional partnering opportunities exist with the Space Grant and EPSCoR organizations.

NUSL Visitor Experience Center: Black Hills, Badlands and Lakes Tourism

Tourism is South Dakota's second largest industry (agriculture is the largest). Visitors spent \$351M in the the Black Hills, Badlands, and Lakes region (location of the proposed National Underground Science Laboratory) during 2000 (out of \$624M in the state). Tourism spending in the region has been generally increasing over the last decade. This area offers spectacular topology, geology, and history opportunities with roads winding up and down through beautiful vistas, towns, and National Park Service lands. The most popular attraction is Mt. Rushmore, which averages around 2.5M annual visitors.

The three summer months generate 70% of the tourists. The average tour group contains 3.8 people and is from South Dakota or another Upper Midwestern state. Almost half of these groups include children. The average group spends \$208 per day and has an annual Household Income of \$50K. Their trip to SD represents a return visit for half of the visitors.

Within 60 miles of NUSL, there are more than 25 major attractions, including 1.2 million acres of National Forest Service lands, and several National Parks and Monuments. The city of Deadwood, listed in the National Register of Historic places, is less than five miles away and offers gaming as well as a visit to the famous wild, wild west (e.g., panning for gold, burial sites for Wild Bill Hickok and Calamity Jane). There are major events occurring all through the summer, including the ten-day Sturgis Bike Rally, which draws between 350K and 750K visitors each year. During the winter months, all types of winter sports are available.

Western South Dakota Attraction	Visitors in 2000
Mt. Rushmore	2.5M
Custer National Park	1.7M
Badlands National Park	1.1M
Wind Cave National Park	872K
Sturgis Bike Rally	750K
Reptile Gardens	~250K
Jewel Cave National Monument	129K
Mammoth Site	105K

NUSL Visitor Experience Center: Cost Data

To date, no sizing estimates or architectural drawings have been made. The following table provides data from the Association of Science and Technology Centers (ASCT), a professional association representing more than 300 hands-on science centers across the country. Like the NUSL Visitor Experience Center, these facilities communicate complex scientific concepts in ways children and adults find both educational and entertaining. Although few, if any, of these centers are underground, or focus on underground science, these numbers are the best estimates available today. These costs are within the estimate provided in the original proposal.

Item	10K Visitors/Year	100K Visitors/Year	250K Visitors/Year	500K Visitors/Year
Square Feet of Exhibits (10 sq. ft./visitor)	1000 sq. ft.	10,000 sq. ft.	25,000 sq. ft.	50,000 sq. ft.
Hands-On Exhibit Costs (\$500/sq. ft.)	\$500K	\$5M	\$12.5M	\$25M
Square Feet of Facility (20 sq. ft./visitor)	2000 sq. ft.	20,000 sq. ft.	50,000 sq. ft.	100,000 sq. ft.
Operating Costs (\$13/visit)	\$130K	\$1.3M	\$3.25M	\$6.5M
Promotion/PR Costs (15% of Operating Budget)	\$20K	\$195K	\$485K	\$975K
Employees (FTE during peak season)	3 employees	25 employees	60 employees	125 employees
% of Costs Covered by Admissions	~55%	~55%	~55%	~55%

