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ATE - A National Collaboration to Strengthen the Advanced Environmental Technology Education Programs at Tribal Colleges
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A National Collaboration to Strengthen the Advanced Environmental Technology Education Programs at Tribal Colleges

Project Mission

Strengthen environmental science and technology programs at Tribal Colleges consistent with the unique needs and traditions of these communities.

Introduction/Background: Indian reservations are home to some of the most polluted and environmentally degraded sites in the country. Reservations contain a disproportionate share of superfund sites, Brownfield's designated areas, and toxic military sites. These sites are the legacy of misguided activities by non-Native American firms and government agencies. People living on reservations have some of the highest incidence of environmentally-related health problems. These reservations also remain the most geographically, economically, and educationally isolated areas in the nation, and because of a lack of resources, are least able to cope with the complex environmental challenge that they face. There are 557 federally recognized Tribes controlling 55 million acres of land. The current Native American population of 2.3 million is expected to exceed 4.6 million by 2050. There are 34 Tribal Colleges located on reservations throughout the United States. Many of these Tribal Colleges are seeking to develop, expand, and/or upgrade their environmental technology education programs.
Based upon a history of collaborative activities, as well as the input from Tribal educators at a planning meeting in August 2005, the Tribal Colleges have requested that the Partnership for Environmental Technology Education (PETE) and the Advanced Technology Environmental Education Center (ATEEC) work

"Man did not weave the web of life; he is merely a strand in it. Whatever he does to the web he does to himself."

By Ted Perry Inspired by Chief Seathle

with them as facilitators to strengthen environmental science and technology programs at their colleges.

This project will strengthen STEM education at Tribal Colleges while acknowledging there is a critical cultural component to the study of environmental science by Native Americans. In Native American communities, the importance of humankind's relationship to the environment and respect for their land has been recognized for centuries and is deeply connected to Native American culture and history. Members of Native communities view life as a whole emphasizing the interconnections that exist among all things (Crazy Bull, 1997). This cultural concept has been translated into an interdisciplinary curricular emphasis (Pease-Windy Boy, 1995: Schmitz, 1992) that is now viewed as an asset for students grappling with the highly complex problems of today's rapidly changing world. Community lies at the heart of traditional Native education. Therefore, as educators look to make strategic moves both addressing power imbalances and consistent with an ethic of care, their focus will move to the formation of linkage with tribal communities. These linkages will involve reciprocal relationships whereby universities become partners with tribal communities in building continuous progress curricula (Stiggins, 1997). These curricula will grow out of dialogue among the various stakeholders—students, families, tribal educators, tribal leaders, business people, and postsecondary educators—and will bring Native voices to the forefront in defining educational needs, in developing educational models for meeting these needs, and in evaluating the eventual outcomes of these efforts. (Inglebret & Pavel, 2000) This project will seek to promote and acknowledge that history and motivate Native American students to develop an interest in environmental science and to choose environmental careers.

Results From Prior NSF Support: The Partnership for Environmental Technology Education (PETE) was awarded a one-year NSF planning grant in July 2005 (DUE: 0501699) entitled, "Planning Grant Submission to Establish a National Collaboration to Strengthen the Environmental Technology Education Programs at Native American Community Colleges." The focus of this planning grant was to bring together Tribal College educators to identify the unmet environmental education needs at Tribal Colleges. The specific requests of the Tribal College educators are the foundation for this application. The funded amount for this grant was $74,999. The Partnership for Environmental Technology Education (PETE) was also awarded a two-year NSF grant in September 1996 (DUE: 9602365) entitled, "Faculty Associates in Science and Technology (FAST). This was followed by an extension of that grant for a four-year period (DUE: 9950051) ending in April 2003. These two grants totaled $1,200,328. This program placed 170 community college and high school faculty in summer internships with business and industry, national parks, and state and federal government agencies.

Need: There is widespread acknowledgement and understanding of the need to strengthen environmental technology education at Tribal Colleges. Many Tribal governments are striving to identify economic development and employment opportunities for their sovereign lands that are consistent with and supportive of their culture and heritage. The development of high quality, specialized environmental education and technical training programs has been recognized as necessary for economic development.

Many Tribal Colleges have developed environmental science and technology programs. However, as the Tribal Colleges seek to strengthen their environmental programs, there is currently no comprehensive, coordinated, sustainable program to accomplish this or to link the Tribal Colleges to each other or the broader environmental technology education community. Current assistance to Tribal Colleges is provided through the funding of special issue projects such as environmental justice, pollution prevention, and environmental compliance grants that focus on a single problem or activity. This funding by various agencies is provided with little or no coordination.

The needs of the Tribal Colleges have been discussed and identified in many forums. In 1995, a workshop was held at Crownpoint Institute of Technology on the Four Corners Reservation in New Mexico. In attendance were environmental educators, researchers and regulators seeking to develop environmental technology education curriculum for Tribal Colleges. The workshop concluded with a discussion of the critical need to "bring together teachers of Native American Colleges from across the

nation to share ideas." A White House Initiative on Tribal Colleges and Universities and the U.S. EPA have also focused on the needs of Native Americans in the area of capacity building for environmental programs.

In 2001, PETE was asked to take a leadership role in identifying and meeting the environmental training needs of the Tribal Colleges. As part of this effort PETE facilitated a workshop entitled, "All Tribal College Environmental Program Capacity Building" that was held at Highline Community College, Des Moines, Washington. The workshop was attended by representatives of 16 Tribal Colleges, government officials, and other environmental educators. The workshop identified specific needs of Tribal Colleges and made recommendations on how these needs could be addressed. The needs included:

- Help with developing programs
- Getting information and networking
- Forming a clearinghouse for sharing information
- Starting a Tribal College environmental program
- Obtaining good faculty training
- Working with Tribal governments
- Connecting science classes to Native American students
- Accessing resources of PETE and ATEEC
- Finding out what has worked other places (Best Practices), and
- Recruiting and retaining students

> Increased participation in environmental education and research by members of minority groups is imperative to achieving and shaping current and future environmental research and education.
>
> *Complex Environmental Systems: A Ten-Year Outlook for the National Science Foundation*

Recommendations of the participants included:

- Utilizing a third party such as PETE to facilitate a capacity bidding initiative
- Creating an annual summer Fellows program for Tribal College faculty
- Adopting ATEEC's *Best Practices* manual to meet the needs of Tribal Colleges
- Developing a system for technical assistance and
- Ensuring sustainability of the key components of the capacity building efforts

Since this workshop, PETE has been working with a group of interested Tribal College faculty to design a STEM proposal to strengthen their environmental education programs. As a follow-up to the workshop and in preparation for this proposal, Tribal Colleges were surveyed in summer 2004 regarding environmental programming at their colleges. (See Supplemental Documentation #3.) The results of this survey served to confirm earlier findings. The needs expressed by the respondents included developing case studies specifically focused on environmental issues faced by Native American communities, faculty training, networking with other environmental programs, strengthening 2+2 programs, creating field experiences relative to Native American issues and ensuring input from the Native American community. All respondents expressed support for a Tribal College Fellows program and the development of an Environmental Education Best Practices Manual for Tribal Colleges.

PETE has also worked with the Tribal Colleges and indirectly, Tribal Governments, through coordinating the development of Tribal Pollution Prevention brochures written by Tribal College faculty highlighting special projects of Tribes and Tribal Colleges, writing articles for U.S. EPA *Tribal News* publication, and coordinating Tribal College sessions at the National Tribal Environmental Management Conference through contracts with U.S. EPA's Office of Pollution Prevention and Toxics.

Most recently, in August 2005, PETE met with Tribal College educators to validate the needs of Tribal Colleges related to environmental programming. (See Supplemental Documentation #4.) The

educators stressed the unique challenges of their Native American students as well as their students' sincere commitment to protect Tribal lands. For example, a majority of the Tribal College students are female with a matriarchal tradition of strong connections to their families and land, and do not want to leave the reservation. This results in a need for education to obtain jobs within a radius of approximately 100 miles of their homes. The educators also stressed the need to integrate treaty issues and rights into the curricula. Most science departments at the Colleges are small and lack technical expertise and equipment. Tribal educators identified the most immediate needs as technical assistance and professional development.

Professional Development Needs	Technical Assistance Needs
• *Best Practices* manual with specific Tribal College case studies • Fellows Institute • Targeted content areas of focus: Year 1 – Water Quality Production of educational modules to use in classroom Field experiences • Basic equipment/software/courseware/labs • Project mini-grants	• Project website/project listserv • Tribal College environmental program inventory • Labor market assessments within 100 mile radius • DACUM services(job/task analyses) • Recruitment/retention strategies • Articulation agreement templates • Project mini-grants

Tribal College educators requested PETE and ATEEC provide these services and this application has been prepared in response to the needs identified.

The Partners:

Tribal Colleges – Currently, 34 Tribal Colleges are located in 13 states of the U.S. (MI, WI, MN, KS, ND, SD, MT, NM, AZ, CA, NE, WA, and WY) with Montana having the greatest number seven. Although many common issues face Tribal Colleges, no centralized program exists to provide comprehensive programming to develop strong and sustainable environmental technology programs. A Tribal College workshop, facilitated by PETE, was held in November 2001 in an attempt to establish a comprehensive capacity building program. Sixteen Tribal Colleges had representatives at this workshop where they identified emerging environmental issues, needs for environmental technology education and the barriers and opportunities facing environmental programs at Tribal Colleges. With this workshop as its foundation, a group of interested Tribal faculty initiated efforts to work with PETE and ATEEC to design and submit to NSF a proposal to strengthen environmental education. Many of these colleges have participated in PETE and ATEEC projects funded by the U.S. Department of Energy, Environmental Protection Agency, and National Science Foundation. Gale Harms, Tribal College Consultant (formerly Environmental Department Chair at Turtle Mountain Community College), Mari Eggers, Instructor at Little Bighorn College and Dick Halvorson, Instructor at Sitting Bull College have stepped forward to help organize, and provide guidance and leadership to this project. Mr. Harms, Ms. Eggers and Dr. Halvorson will serve as project Co-PIs and as Co-chairs of the Tribal College Project Steering Committee.

The **Partnership for Environmental Technology Education (PETE)** is a non-profit, 501(c)(3) organization established to facilitate, augment, and broker academic, industrial, and governmental partnerships to: 1) provide leadership in environmental education and training through community and technical college partnerships with business, industry, government, and other educational providers; 2) meet the educational and environmental training needs of the nation; 3) promote environmental technology transfer; 4) foster the participation of underrepresented minorities, Native Americans, and women in environmental fields; and 5) enhance U.S. economic development and international

competitiveness. The PETE Network consists of six independent regional partnership offices, serving all 50 states, Puerto Rico, and the U.S Territories. The PETE college membership represents more than 400 community colleges nationwide that include Tribal Colleges and minority serving colleges. PETE has more than 10 years of experience working with Tribal Colleges on specific environmental impact projects through grants funded by U.S. EPA and U.S. DOE. PETE has had significant experience working on major national and international grants with the Environmental Protection Agency, National Science Foundation, U.S. Department of Energy, U.S. Department of Labor and the U.S. Department of State. (Additional PETE information can be found in Supplemental Documentation #1.) This experience includes several years of projects funded by U.S. Department of Energy and Environmental Protection Agency specifically targeting Tribal Colleges.

The **Advanced Technology Environmental Education Center (ATEEC)** is one of three community college Centers of Excellence funded in the first round of NSF's Advanced Technological Education (ATE) program competition held in 1994. ATEEC's mission is to advance environmental technology education through curriculum development, professional development, and program improvement in the nation's community colleges and secondary schools. The vision of the Center is to create a national network of community colleges, supported through public and private partnerships that prepares and maintains an environmental technology workforce to address industry's needs and to promote the transfer of secondary students to higher education. Since its inception 11 years ago, ATEEC has formed partnerships with organizations including the U.S. Environmental Protection Agency, U.S. Department of Labor, the University of Wisconsin, the National Environmental Training Association/Partnership for Environmental Technology Education/ATEEC (NPA), and the Massachusetts Institute of Technology (MIT) to further advanced environmental technology education.

ATEEC has successfully established itself as a national focal point for the development and improvement of environmental technology education. Among ATEEC activities that have impacted environmental education are the following: 29 issues of *ATEEC News* with a per issue hardcopy readership of 6,500; the ATEEC website averaging 2,234 hits per day; 260 national NSF Fellows who participated in an intensive, two-week learning and sharing experience (a survey of Fellows indicates this experience has impacted the education of 21,640 students); 44 regional instructor conferences held in 27 states with 3,000 participants; publication of seven national reports; production of five videos; two national satellite conferences; publication of two textbooks; and ATEEC responses to specific requests for materials from all 50 states. (Additional ATEEC information in Supplemental Documentation #2 and #5.)

PETE and ATEEC are strategic partners who have successfully collaborated on several national projects to leverage the expertise of each other's organizations to promote community college and secondary school environmental education. PETE/ATEEC will work as facilitators in collaboration with the Tribal Colleges to ensure their many resources are fully available to strengthen the environmental education programs at the participating colleges. This national project takes advantage of the strengths of each of the partners to improve environmental science and technology programs at Tribal Colleges.

Goals, Objectives, and Activities:

Goal 1: Ensure that project activities and outcomes of this STEM project reflect the historic/ cultural beliefs and contributions of Native Americans.

Objective 1: Expand the Tribal College Project Steering Committee

***Discussion*:** A Planning Grant Advisory Group convened in August 2005 to aid in conceptualizing, structuring and completing this application. The committee included: Gale Harms, Tribal College Consultant, North Dakota; Mari Eggers, Little Big Horn College, Montana; Dick Poole, Northwest Indian College, Washington; Gary Halvorson, Sitting Bull College, North Dakota; Kirk Laflin, Partnership for Environmental Technology Education (PETE); Dr. Ellen Kabat Lensch, Advanced Technology Environmental Education Center (ATEEC) and Melonee Docherty, ATEEC. The Tribal College representatives on this committee will, upon initiation of the project, transition to serve on the Project Steering Committee. An additional Tribal faculty member, Zetra Wheeler from Salish Kootenai College

has also agreed to serve on the Project Steering Committee. Other members to be added to the Project Steering Committee include: a Tribal College/Cultural Instructor, a Tribal Elder, a Tribal Government Environmental Officer, American Indian Higher Education Consortium (AIHEC), other ex officio members from governmental agencies (federal and/or state), and the PETE and ATEEC staff. The Tribal College/Cultural Instructor and Tribal Elder will guide the Project Steering Committee in complementing STEM activities/outcomes with historic/cultural beliefs.

The formation of an environmentally knowledgeable and culturally aware Project Steering Committee is critical to the success of this project. This committee is charged with the responsibility to oversee a close working relationship with PETE in order to strengthen the STEM content of environmental technology education at Tribal Colleges. The following project tasks will be addressed:

- Program improvement through technical assistance;
- Faculty development;
- Ensuring implementation of rigorous STEM content that incorporates and builds upon the historic and cultural traditions of the Native American communities; and
- Improved math, science, technical and critical-thinking skills of Native American students while cultivating their unique learning styles.

Incorporation of the Native American perspective in environmental programs is critical to build ownership of these programs, to increase the pride of Native American students in their traditional approach to the environment, and to motivate these students to develop an interest in environmental science and to choose environmental careers.

Objective 2: Ensure on-going project input, involvement and review by Tribal College Project Steering Committee.

***Discussion*:** The Project Steering Committee will meet twice a year during the course of this project, either in person or through electronic means. The Co-Directors for the project, Gale Harms, Tribal College Consultant; Mari Eggers, Instructor at Little Big Horn College and Gary Halvorson, Instructor at Sitting Bull College will serve as Co-chairs of the Project Steering Committee and will provide project liaison to the Project Implementation Team. The Project Implementation Team will seek guidance and assistance from the Project Steering Committee on an on-going basis throughout the project. The Project Steering Committee will help guide and evaluate the project to ensure that the science components of environmental programs are strengthened and that the proposed activities are appropriate to the Tribal College setting. Some Project Steering Committee members will also serve as mentors and provide technical assistance to other Tribal Colleges.

Goal 2: Ensure Tribal Colleges have ready access to a full range of technical assistance to strengthen their environmental science and technology programs.

Objective 1: Provide on-site, one-on-one technical assistance to colleges.

***Discussion*:** The Tribal College educators who convened in August 2005 stressed the critical need for technical assistance at the Tribal Colleges. The educators requested that three Tribal Colleges per year be targeted. Technical assistance would include utilization of the *Best Practices* Manual and would result in the development of specific case studies which would be shared at the Fellows Institute. It was recommended that the first year's selection of colleges to receive technical assistance include:

- A college interested in launching a new or expanding single course offering into a certificate/degree program.
- A college with a current associate's degree program.
- A college with a transfer program to a four-year institution and/or currently offers a four-year baccalaureate program.

Participants also recommended that specified foci of technical assistance include: job market/labor market assessments conducted within a 100 miles radius of campus (most students do not want to relocate off of the Reservation); DACUM ("Developing A Curriculum") services; train-the-trainer services; assistance in

forming local advisory committees; Retention/recruitment strategies; mini-grants to "kick start" program improvement projects and templates for articulation with high schools and four-year colleges. Technical assistance and program follow-up will be offered to a minimum of nine Tribal Colleges. In order to facilitate this activity, the Project Implementation Team will: 1) identify and distribute a menu of technical assistance topics in support of environmental technology education; 2) develop a request for service process that will include college endorsement of the request; 3) identify a broad range of environmental education consultants/experts from both Native American and non-Native American communities to provide technical assistance as requested by Tribal Colleges; and 4) ensure a system to evaluate the quality of technical assistance provided and to measure the outcomes from the technical assistance.

Personnel from throughout the country will be identified to provide one-on-one technical assistance. Priority will be given to utilize Native American community members, where possible, to provide the technical assistance. Technical assistance may be provided by PETE/ATEEC staff, experienced instructors, various specialists, and other professionals. These may include people with expertise in areas such as the following: curriculum development to strengthen the underlying science and math elements of the program; conducting local needs assessments; utilizing the DACUM process; job development and training; student recruitment techniques; employer recruitment/job placement; establishing and maintaining stakeholder partnerships; sources of financial support; networking with colleagues; working with elders in the community; sustaining job development/job training programs; student tracking; enlisting support of organized labor; employability and life skills; incorporating issues of environmental justice; lessons learned from existing programs; and emerging technologies.

Active dialogue will be maintained between PETE and the participating colleges throughout the project period to identify needs and encourage the utilization of technical assistance. Results of all technical assistance projects will be shared with the other Tribal Colleges to reduce duplication of effort and "re-inventing the wheel."

Objective 2: Provide electronic and other forms of distance-delivered technical assistance to Tribal Colleges.

***Discussion*:** There will also be an on-line component to the technical assistance provided through this project. A section of the ATEEC website will be dedicated for use by Tribal Colleges. This site will provide information on the Fellows program including a list of participants, project products such as case studies, environmental curriculum, DACUMs, and other information of value to Tribal College faculty. Information will also be provided on the use of ATEEC's Electronic Environmental Resource Library (eERL), an NSF-sponsored national digital library. A project listserv will be established to promote communication, networking and the flow of information between project participants. Other specified deliverables include a Tribal College environmental program inventory and the development of an Environmental Technology Chart that will highlight job categories and functions found with both Tribal and non-Tribal employers. The chart will be customizable for each college and will serve as an aid in program recruitment.

In addition, ATEEC has a wide variety of printed and on-line materials that will be made available to the participating colleges. (A detailed listing of these materials can be found in Supplemental Documentation #5.) PETE and ATEEC will bring their experience, knowledge and contacts in working with hundreds of colleges, the private sector, and other organizations to the technical assistance component of this project. These efforts are designed to assure that the highest quality technical assistance is available to the colleges participating in this project. The project will also enlist the dissemination tools of AIHEC to distribute information as well as serve as a portal to engage larger numbers of Tribal College educators.

Objective 3: Provide mini-grants to the Tribal Colleges who participate by receiving technical assistance.

***Discussion*:** Most of the science departments at Tribal Colleges are small and not well equipped. Application for mini-grants will be available to all Colleges who have received technical assistance, in an amount up to $1,500.00, to assist in the implementation of strengthening STEM curricula in their

programs. Applications for the mini-grants will be available to the Tribal Colleges. The Tribal College Project Steering Committee will review and recommend funding for the projects. Recipients will be required to submit reports as to the impact of the grant on their program.

Goal 3: Develop a Tribal College Environmental Fellows Institute that will serve as a vehicle to strengthen environmental science/technology education at the nation's Tribal Colleges.

The Fellows Institutes will be structured around a specific theme. Tribal College educators requested that the theme for the first Institute focus on Water Quality. Specific topics to be addressed under Water Quality include: sampling and collection, wet chemistry, regulations, water rights-tribal treaties, watershed management, and GIS/GPS. The Water Quality theme will be accompanied by examining the *Best Practices* manual and the specific Tribal case studies. As additional Tribal case studies are added, they will be incorporated into the annual Fellows agenda. The Tribal Educators brainstormed other potential thematic/content topics for the second Institute. These included: remote sensing, soil sampling and analysis, bridging environmental regulations and Tribal environmental law, and energy and the environment. Task One (see Objective 2) is to expand the Environmental Education *Best Practices* manual to include case studies specific to Tribal Colleges. Task Two (see Objective 3) is to provide faculty development in STEM areas of highest interest and value to Native American communities. Task Three (see Objective 4) is to conduct field exercises at nearby sites of environmental interest and to develop field-based learning exercises for the participants to take back to their classrooms. Task Four (see Objective 5) is to provide mini-grants to assist the Fellows in implementing the STEM curricula as needed.

Objective 1: Ensure that processes and systems are in place to support an annual, on-going Fellows Institute.

***Discussion*:** An annual Tribal College Environmental Fellows Institute will be established and held in Years 2 and 3 of the grant proposal to perform specific tasks assigned by the Project Implementation Team and to strengthen math, science and technical curriculum in the participating college/high schools' environmental education programs. Nominations for participants will be solicited from the Tribal Colleges for 25 Fellows positions. Four of these instructor positions will be reserved for four-year degree granting institutions and high schools that have ongoing articulation agreements with a Tribal College. Candidates will be selected for participation based upon guidelines and criteria developed by the Tribal College Project Steering Committee.

The Fellows will be hosted for one week each summer by a Tribal College. Sitting Bull College in North Dakota has been selected to host the first Fellows Institute due to its comprehensive water quality laboratory. A solicitation will be held for colleges interested in hosting the next Fellows Institute. Criteria for selection of a site will include availability of housing, classrooms, laboratories, cultural activities, and proximity to environmental sites of interest. Travel logistics and expense will also be considerations in selection of a site. The P.I., Co-P.I.s and ATEEC staff will assist in planning and coordination responsibilities for the Fellows Institutes and will participate in the Institutes.

In addition to active participation in the one-week program, the Fellows commit to: reading selected material as required in preparation for the Institute utilizing an ATEEC developed institutional self-assessment instrument at their college and dissemination of Institute outcomes at regional PETE instructor conferences and at Native American educational conferences such as the annual AIHEC conference

The project will cover travel expenses, room and board, tuition for graduate credit and equipment/software/courseware/labs for each Fellow. The participants will also receive a stipend. The Fellows will evaluate the Institute and a follow-up survey will determine the impact of the Fellows Institute experience upon their teaching.

Objective 2: Expand the Environmental Education *Best Practices* manual by adding specific Tribal College case studies.

***Discussion*:** ATEEC has recently created a manual entitled *Best Practices: A Guidebook for Environmental Technology Credit Programs*. This guidebook has been well accepted and is being used at community colleges throughout the country to assist in developing and strengthening environmental programs. In order to be of maximum value to Tribal Colleges, the manual must identify and address the conditions that pose unique challenges in the Native American communities and must utilize Native American examples and case studies. These case studies will be developed by working closely with specific Tribal Colleges and capturing their needs, accomplishments and lessons learned.

***Best Practices: A Guidebook for Environmental Technology Credit Programs*.**

This manual serves as a reference point for colleges to assess the strengths and challenges of their current environmental technology programs or as a guide in the development of new programs. The *Best Practices* document represents an NSF-sponsored, seven-year endeavor by ATEEC to interview and collect the best practices from successful environmental technology programs across the nation. Its goal is to assist in the development or improvement of existing environmental technology programs. *Best Practices* focuses on the following issues: administrative support; marketing a program; evaluating a program; curriculum and instruction; student services; alliances; learning resources; program assessment; faculty professional development; and equipment, supplies and facilities.

Included in *Best Practices* are checklists and instructional design instruments that can be adapted by participants for use at their colleges. These instruments include a template for conducting a labor market survey and an environmental perception survey. A perception survey is an evaluation instrument designed to acquire data about the health of an existing environmental program. Specific survey instruments are aimed at graduates, employers, advisory committee members, current students, and administrators. Based upon guidance provided by the *Best Practices* manual, the participating college will identify strengths and weaknesses in their programs and will prioritize the areas of greatest concern or need in their programs.

The Fellows participants will address and identify unique conditions that pose a challenge to the success of Native American environmental education programs. Tribal Colleges have suggested that the unique challenges they face may include issues such as: strengthening the science and math foundation of students, conducting needs assessment in a reservation environment, addressing socioeconomic conditions, identifying and incorporating the predominant learning styles of Native American students, and addressing the issue of whether training is designed for employment on or off the Indian lands.

At the first Fellows Institute, participants will review all major elements of the current *Best Practices* manual in particular the case studies which will highlight the unique needs of the Tribal Colleges. Each Fellows participant will develop an Individual Action Plan to implement some portion of the *Best Practices* manual at their college during the upcoming year. Each Fellow will share their action plan with the group. Technical assistance, as described in the following Goal, will be available throughout the year as colleges strive to implement these action plans.

Objective 3: Provide rich faculty development experiences aligned to the needs of Tribal Colleges that will strengthen STEM education in environmental programs.

***Discussion*:** The Tribal College educators at the August 2005 meeting requested that Water Quality be the theme for the first Fellows Institute. Other potential thematic topics for the following year included: remote sensing, soil sampling and analysis, bridging environmental regulations and Tribal environmental law, and energy and the environment. The Project Steering Committee will review, validate and prioritize the thematic topics identified for faculty development. A minimum of 1-l/2 days of the Institute will be spent on this topic. While the thematic topic will vary, each year the sessions will include formal presentations, selected readings, and group exercises. Content experts will be brought in as necessary to address faculty development topics identified for the Institute.

"To support a new generation of environmental professionals, the Advisory Committee recommends major investments in environmental education, training and infrastructure."

Complex Environmental Systems: A Ten-Year Outlook for the National Science Foundation

It is anticipated the Institute will involve both Native and non-Native technical experts and Native Elders. Technical expert presenters to the Fellows Institute may be drawn from business, professional societies, higher education, government agencies, research laboratories, or Native American community organizations with the priority to secure Native American experts. The Project Steering Committee will be charged with suggesting, investigating, and nominating appropriate speakers.

Objective 4: Conduct field exercises at nearby sites of environmental interest and develop field-based learning exercises for use in the classroom.

Discussion: The Fellows Institute will be held at a different site each year. One of the criteria in the site selection process is "proximity to an environmental site of interest." These sites may be a Brownfields designated areas, a toxic military site, a pristine forest/grassland, a site degraded by mining or industrial activity, environmentally historic sites, or other site of environmental interest. As a part of each Fellows Institute, a guided field trip to the site will be arranged. The Fellows will spend approximately 1-l/2 days examining the site and working with the instructional design team to develop field-based learning activities. Following pilot testing in the classroom by the Fellows the modules will be finalized and disseminated to all Tribal Colleges.

Objective 5: Provide mini-grants to the Fellows to allow them to incorporate STEM curricular changes into the classroom.

***Discussion*:** Most of the science departments at Tribal Colleges are small and not well equipped. Application for mini-grants will be available to all Fellows, in an amount up to $1,500.00, to assist in the implementation of strengthening STEM curricula in the classroom. Applications for the mini-grants will be available to all Fellows. The Tribal College Project Steering Committee will review and recommend funding for the projects. Recipients will be required to submit reports as to the impact of the grant on their program.

Project Implementation and Evaluation Table:

Goal 1: Ensure that project activities and outcomes of this STEM project reflect the historic/cultural beliefs and contributions of Native Americans.				
Objectives	**Responsible Party**	**Timeline Project Month**	**Formative/ Process Measures**	**Summative/ Impact Measures**
1. Expand the Tribal College Project Steering Committee	Project P.I. and Co-P.I.s	1-3	Project Steering Committee is expanded and list of members is on file	20% of Tribal Colleges have a representative serving on the Project Steering Committee
2. Ensure on-going project input, involvement and review by Tribal College Project Steering Committee	Project P.I. and Chairs of Project Steering Committee	1-36	Project Steering Committee meets at least twice per year and minutes are placed on file	Annual evaluation by Project Steering Committee confirms their input is being incorporated into the project
Goal 2: Ensure Tribal Colleges have ready access to a full range of technical assistance to strengthen their environmental science/technology programs.				
Objectives	**Responsible Party**	**Timeline Project Month**	**Formative/ Process Measures**	**Summative/ Impact Measures**
1. Provide on-site, one-on-one technical assistance to colleges	Project P.I. and Co-P.I.	1-36	A menu of technical assistance topics and consultants are identified and made available.	A minimum of 9 requests for on-site assistance are fulfilled and colleges complete evaluations on the

				quality and outcomes of the assistance
2. Provide electronic and other forms of distance - delivered technical assistance to Tribal Colleges	Project P.I. and Co-P.I.s	1-36	A section of ATEEC website is dedicated to this purpose and information from eERL and other ATEEC/PETE printed and on-line materials will be made readily available.	A minimum of 50 searches for technical assistance are fulfilled. Colleges evaluate the quality of the available electronic and print materials
3. Provide mini-grants to Tribal Colleges to assist in program improvement or implementation	Project P.I., Project Steering Committee and Tribal Colleges	12-36	Applications are submitted to Project Steering Committee and funding is granted.	Recipients will document impact in writing
Goal 3: Develop a Tribal College Environmental Fellows Institute which will serve as a vehicle to strengthen environmental science/technology education at the nation's Tribal Colleges.				
1. Ensure that processes and systems are in place to support an annual on-going Fellows Institute	Project P.I. and Instructional Designers	20 and 32	Two Fellows Institutes are held	50 Tribal College and high school faculty attend Fellows Institute
2. Expand the *Best Practices* manual to include case studies relevant to Tribal Colleges	Instructional Designers, Steering Committee, Fellows	1-33	*Best Practices* Manual is completed and available in print and election format	75 % of participating Tribal Colleges evaluate the value of the manual as 3 or higher on a 5-point Likert scale
3. Provide rich faculty development experiences aligned to the needs of Tribal Colleges that strengthens STEM education	Project Co-P.I., Steering Committee, Instructional Designers	14-33	The Fellows Institute incorporates a major faculty development component each year	Fellows evaluate the quality of the faculty development experience as a 3 or higher on a 5-point Likert scale
4. Conduct field exercises at nearby sites of environmental interest and develop field-based learning exercises for use in the classroom	Instructional Designers, Host College	20 and 32	Field trip is conducted and field-based learning exercise is developed each year	75 % of participants report they success-fully used the field-based modules. Modules are disseminated
5. Provide mini-grants for faculty to implement enhanced STEM curricula	Project P.I., Project Steering Committee and Fellows	21-36	Applications are submitted to Project Steering Committee and funding is granted.	Recipients will document impact in writing

Experience, Capabilities, Roles, and Responsibilities of the Principal Investigator and Senior Personnel: There are several individuals whose experience and capabilities are key to the success of this

project. These individuals will provide leadership, support and coordination to ensure the project goals and objectives are met or exceeded.

Kirk Laflin will serve as Project Director. Mr. Laflin is Executive Director of the national Partnership for Environmental Technology Education (PETE). Prior to assuming the position of PETE's Executive Director, Mr. Laflin served as Regional Director of Northeast PETE since its inception in 1993. As the Executive Director, Mr. Laflin is responsible for the management of projects, programs, contacts and grants with the following sponsors: U.S. Environmental Protection Agency, National Science Foundation, Department of Defense, Department of Labor, the U.S. Information Agency and several contracts with other environmental education related organizations. As noted in his resume, Mr. Laflin has numerous professional certifications and has earned awards from a variety of state and national environmental organizations. In recent years, Mr. Laflin has worked closely with representatives of Tribal Colleges and organizations. As Project Director, Mr. Laflin will have overall responsibility to fulfill the programmatic, fiscal and reporting requirements of this project.

Gale Harms will serve as Project Co-Director. Mr. Harms is currently an independent Tribal College Consultant. He most recently served as Director of Environmental Studies and as a faculty member at Turtle Mountain Community College, North Dakota. Mr. Harms' current responsibilities include strengthening the College's curriculum in the area of Environmental Public Health and Energy Technology. Mr. Harms has worked as a Policy Analyst/Environmental Engineer for the state of New Mexico, Air Programs Director for Hercules Aerospace, and as Director of Industrial Hygiene for the state of Wyoming. He has substantial grants management experience having previously served as the director of grants from the Environmental Protection Agency and from the Center for Disease Control.

Mari Eggers will serve as Project Co-Director. Ms. Eggers currently is the biology/environmental science instructor at Little Big Horn College, Crow Agency, Montana. Ms. Eggers has taught biology, ecology, environmental science, forestry, astronomy and human geography. Mari holds a B.A in interdisciplinary studies in Biology and Anthropology, a M.S. in Anthropology, a M.S. in Biological Sciences and is currently pursing her Ph.D. in Science Education. She has a strong background in grants management and implementation.

Gary Halvorson will serve as Project Co-Director. Dr. Halvorson is an instructor at Sitting Bull College in Ft. Yates, North Dakota. He currently teaches mathematics and chemistry. Dr. Halvorson has a strong research background in soil chemistry as well as a strong background in grant management and administration. Gary holds a B.A. in Chemistry and a M.S. and Ph.D. in Soil Chemistry.

As Project Co-Directors, Mr. Harms, Ms. Eggers and Dr. Halvorson will share project leadership responsibilities with Mr. Laflin and will serve as the primary liaison between the Project Steering Committee and the Project Implementation Team.

Management Plan: The Project Director, Kirk Laflin, in consultation with Co-Project Directors, Gale Harms, Mari Eggers and Gary Halvorson will have overall responsibility for the project. PETE will serve as the fiscal agent and assume all related contractual responsibilities. However, the project will be carried out with the close participation and support of the Project Steering Committee and the Project Implementation Team. The management of the project will occur through the following organizational structures:

Project Steering Committee – Will serve a crucial role in this project providing strategic guidance, direction and assistance to all key project activities. This Committee is comprised of 12 members representing Tribal Colleges and Tribal communities. Gale Harms, Mari Eggers and Gary Halvorson Co-Project Directors, will serve as Committee Chairs and primary liaisons between the Project Steering Committee and the Project Implementation Team. Formal, in-person or electronic meetings of the Project Steering Committee will be held at least twice yearly. The Committee will review all written evaluation/ progress reports and will discuss with the Project Implementation Team the status and direction of the project. The Project Steering Committee will provide input for the strategic management of the project and will maintain vigilance over the activities of the project.

Project Implementation Team – Membership of this team will be the core professional project staff. This Team will include the Project Director, Kirk Laflin; Co-Project Directors, Gale Harms, Mari Eggers and Gary Halvorson; and Instructional Designers, Chris Walker and Melonee Docherty. The Project Implementation Team will be chaired by the Project Director and will meet in person or electronically a minimum of every eight weeks. This Team will have primary responsibility to ensure all objectives and activities are carried out in a timely manner and that performance measures are achieved. Individual Team members are responsible to coordinate their activities with the Team and to assist the Project Director in the overall management of the project.

A Project Implementation and Evaluation Table (page 9) has been developed and is in place. This plan provides clear objectives, with a timetable, assigns responsibilities and provides comprehensive project evaluation measures.

Evaluation/Impact: Comprehensive evaluation is an integral component of this project. It is critical that valid measures of success be identified and that project impacts be captured and documented. The evaluation plan is formative and summative in design and incorporates an internal and external review. This application outlines the project's three goals and ten objectives. For each project activity the Project Implementation and Evaluation Table identifies the person responsible, the timeline for completion, formative/process measures and summative/impact measures. These evaluation measures will incorporate both qualitative and quantitative data and will include surveys, self-reports and measures of organizational and learning outcomes. An experienced independent evaluator, Dr. Catherine Zeman will have overall responsibility for this function.

The external evaluator will design assessment instruments, compile the required formative and summative data and report on project outcomes. Dr. Zeman, Assistant Professor, University of Northern Iowa, has an extensive environmental education background. She earned a M.S. degree in Environmental Science and a Ph.D. from the University of Iowa with an emphasis in Environmental and Occupational Health. Dr. Zeman is of Native American descent and will bring a familiarity and awareness of environmental education issues facing Native American communities. Dr. Zeman's project management and evaluation experiences include work with the National Institute of Health, the Romanian Public Health Education system, U.S. Department of Education FIPSE environmental learning projects, panelist for NSF Review Board for Graduate Research Fellowship program, Co-P.I. on EPA Pollution Prevention project, and P.I. for Fulbright scholars program in environmental health. Dr. Zeman has written numerous articles, published in refereed journals and has been an invited speaker at numerous regional and national events.

Within each grant year the evaluation process will place emphasis on formative evaluation that will allow for adjustments of objectives and schedules, reallocation of resources and formation of solutions to unanticipated obstacles or problems. Comprehensive summative evaluation will occur at the end of each project year. The analysis strategy will be based on a discrepancy model and will measure the variance between established measures and the actual achievement of those measures. Each year the external evaluator will prepare a Project Evaluation Report to be made available to all partners, the Project Steering Committee and to NSF. This report will detail progress toward achievement of the objectives, positive and negative results from each activity and suggestions to improve project outcomes/impact.

Sustainability: The Tribal Colleges, PETE and ATEEC are committed to maintaining an on-going, mutually beneficial relationship. This project was conceived and designed to ensure that project benefits would be sustained beyond the period of project funding. Elements of the project that will continue following the grant include:

- Continued open dialogue between and among Tribal Colleges, PETE, and ATEEC facilitated through the on-going Tribal website, eERL, and the listserv;
- Provision of technical assistance through the on-going operations of PETE and ATEEC;
- Two field-based learning modules will have been developed and made broadly available;

- The *Best Practices* manual with highlighted Native American case studies will continue to be disseminated and updated as necessary; and
- Tribal Colleges, PETE, ATEEC and AIHEC will explore new and innovative ways to establish mutually beneficial connections.

The resources of this grant are primarily devoted to start-up costs to initiate and develop the major project goals. Once developed, the identified activities will be maintained through established funding mechanisms.

Dissemination: The structure of this project lends itself to efficient and rapid dissemination. Approximately one-fifth of the Tribal Colleges will have representation on the Steering Committee and all 34 Tribal Colleges will be invited to actively participate through the Fellows Institute. The project listserv and Tribal College section of the ATEEC website will facilitate the dissemination of project activities, products, and outcomes.

Additional dissemination will be facilitated by utilizing the existing communications networks of the Tribal Colleges, AIHEC, PETE, and ATEEC. These include: mailings of the *ATEEC News* (circulation of 6,500 copies), ATEEC virtual library website eERL, exhibits by PETE and ATEEC at national conferences, PETE Regional Instructor Conferences where a track will be created for Tribal College representatives, and exhibits and presentations by Tribal Colleges, PETE, and ATEEC at national and Tribal conferences. These mechanisms, as well as other existing communication vehicles, will be utilized to inform environmental educators of the project, to promote the goals of the project, and to market the project products.

Final thought by Makwa Gaa Nii Bawit – Chippewa

Connecting the Circle – "With no beginning and no end, it reflects our connection with everything. All that is with us will always be with us. There is no such place as 'away' and the effort to throw things 'away' has created polluted land, polluted water, and polluted air. The Earth itself is a circle and all that we throw away is here in that circle. The poisons in the circle must be cleaned up, but more importantly, the flow of pollutants into the circle must be controlled. Prevention is the ultimate control. The awareness to see natural systems as circles has guided some of today's tribes to employ technology and timeless environmental values to accomplish good things for all people for all time."

Project Timeline Summary

	Year 1 Quarterly				Year 2 Quarterly				Year 3 Quarterly				Sustainable Activities
	1	2	3	4	1	2	3	4	1	2	3	4	
Steering Committee Meetings	*			*		*		*		*		*	

Fellows Institute ▪ **Fellows selected** ▪ **25 Fellows meet** ▪ **Field-based learning exercises developed** ▪ **STEM based faculty development** ▪ **Provide Mini-grants**							*				*		…….
Technical Assistance ▪ **Provide on-site, one-on-one technical assistance to 9 colleges** ▪ **Provide electronic/distance delivered technical assistance** ▪ **Provide mini-grants**													…….
Tribal College "Best Practice" Manual ▪ **Incorporate Tribal College case studies** ▪ **1st Draft completed** ▪ **Manual is broadly disseminated**													…….