PROJECT REPORT

Northern Wyoming Community College District / National Science Foundation
2011 Teachers Summer Energy Education Program

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TITLE

Environmental Impact Statement – Research Paper & Powerpoint Presentation on Environmental Issues at Specific Energy Production/Process Sites

SUMMARY

Under Nixon's administration in 1969, National Environmental Policy Act (NEPA) was established as a broad national framework for protecting our environment. NEPA requires federal agencies and others using federal funds or assets to assess the environmental impacts of major federal projects or decisions, such as issuing permits, spending federal money, or affecting federal lands. According to the NEPA action flow-chart, these proposed actions are documented in an Environmental Assessment (EA) or Environmental Impact Statement (EIS).

The main difference between filing an EA or EIS has to do with the degree of environmental impact and the certainty of such impact. EA is filed first, especially if the degree of environmental impact is unknown, which will turn into an EIS when an analysis establishes significant environmental impact by the proposed action. Any proposal that will result in significant environmental impact will require EIS documentation. "Environment" is defined as the natural and physical environment and the relationship of people with that environment, including land, water, air, structures, living organisms, environmental values at the site, and the social, cultural, and economic aspects. An "impact" is a change in consequence that results from the proposed activity. Impacts can be positive or negative or both. An EIS describes impacts, as well as ways to "mitigate" impacts. To "mitigate" means to lessen or remove negative impacts.

In this lesson, students will apply as much of environmental science course (Bio106/Env106) contents in composition of EIS on a current proposed action at a specific site, especially in energy production. Since this course is for non-science majors, greater emphasis is placed on critical thinking and data analysis than on scientific principles. The units covered in this course are earth, air, water, climate, energy, food & agriculture, health & human population, environmental systems, urbanization, waste management, environmental policy and conservation.

Instructor will begin the 10-week course, 2-hour lectures twice and a 2-hour lab per week, with an introduction to NEPA and the description of EIS project during first week, but the paper will be due at the beginning of week 9. This is to allow plenty of time to make as many connections between the course contents and EIS project, a paper that will describe specific impacts on the environment as a result of a proposed energy production, detailed plans to mitigate these impacts, as well as site-reclamation proposal at the completion of energy production. An exceptional paper might also include the non-physical impacts of proposed action, such as social, cultural and economic aspects, but these will not be expected since they are not easy to quantitate.

ENERGY CONTEXT

Warm-up Activity – Refer to the Lesson Intro Presentation for details.

6 groups of students (4 per group) will use the following energy production/process case-study articles in this activity, all provided by McGraw-Hill (publisher of *Principles of Environmental Science: Inquiry & Application, 6th Ed.*)

- *Black Gold from the Caspian* – shortest pipeline route for oil (200 billion barrels, 25% world supply) and gas (9 trillion m^3, world's 4th largest supply) from Caspian, across Iran to Persian Gulf
- *Chernobyl: Could it happen here?* – key events leading to the accident and significant consequences
- *Forestry for the Seventh Generation* – logging history by the Menominee Nation (now Wisconsin & northern Michigan)
- *James Bay: James Bay Hydropower* – details of 3-phase hydropower construction plan by Hydro-Quebec and the environmental impact following the first phase
- *Love Canal: The Forgotten Wastes of Love Canal* – some consequences of aborted industrial development
- *Green Bay, Wisconsin PCB Contamination in the Fox River* – chemical discharge by paper mills, result of carbonless copy paper production

Possible Topic Ideas for EIS Project – Refer to the Lesson Intro Presentation for details.

Even if students are familiar with current environmental issues, the following list can be used extra resource. For those students who look for instructor suggestion, these case study articles can be launching pads for EIS project, all provided by McGraw-Hill (publisher of *Principles of Environmental Science: Inquiry & Application, 6th Ed.*)

- *Chattanooga: A Model Sustainable City*
- *Conflict Diamonds* (Angola)
- *Death in a Mine Pit*
- *Exploiting Oil in ANWR* (Arctic National Wildlife Refuge)
- *Mining a Tropical Paradise*
- *Off-Shore Wind Power*
- *Radioactive Waste Disposal at Yucca Mountain*
- *Southeastern Wisconsin Reformulated Gasoline and the Fight Against Ozone*
- *Should We Revise the 1872 Mining Law?*
- *Sukanatani: A Photovoltaic Village in Java*
- *The Three Gorges Dam* (China)
- *Wind Energy in North Dakota: A Feasible Energy Source*

ANTICIPATED TIME REQUIRED

Project Timeline:

- Introduction of Environmental Impact Statement – Week 1
- Site Selection (blog posting) & Introduction of project rubric – Week 2-5
- Critique of Rough Draft by Writing Center – Week 5-8
- Discussion of Rough Draft with instructor (communication via blog or e-mail) – Week 5-8
- Environment Impact Statement on Selected Site (paper) – due Week 9
- Preparation of powerpoint presentation on EIS and post-presentation survey – Week 9-10
- Powerpoint presentation on selected EIS – Week 10
- Student audience survey after powerpoint presentations – Week 10

INTENDED STUDENT LEVEL

This project presents learning activities and assessment intended for students in grades 11-12 (Science) or non-science-major college students (100-level Environmental Science).

ASSUMED PRIOR KNOWLEDGE

This lesson will assume that students have prior knowledge of:

- Critical Thinking
- Competency in online research
- Data analysis & Graphing
- Competency in written communication
- Familiarity with APA & MLA Styles
- Group work etiquette

LEARNING OBJECTIVES

- What is environmental policy and how is it formed?
- What is NEPA and what does it do?
- What is EIS and what are its components?
- What is the purpose of EIS?
- What are current local environmental issues?
- How are the environmental issues affecting or can affect local community?
- What should be included in EIS for the selected issue/site?
- How should EIS be published and evaluated?

MATERIALS

Each student will need:

- Access to lecture notes on Environmental Policy
- Independent internet access
- Digital and written resources on selected environmental issue/site
- An appointment with College Writing Center
- Access to Powerpoint & Excel
- Computer, LCD projector and audio equipment for presentation
- Student audience survey on each EIS project prepared by presenting group.

INTRODUCTION / MOTIVATION FOR STUDENTS

Refer to the Lesson Intro Presentation for details.

- **Warm-up Activity –** After a short lecture on NEPA and EIS, students will verify their understanding on EIS with this activity. Each group of 4 students will review an environmental case-study article and determine the components of EIS. "Environment" and "Impacts" will be relatively easy to find in the article, but students will brainstorm for "Mitigations & Restoration". During each group presentation on their case-study, both the instructor and the student audience will be able to re-direct any misunderstandings, such that all students are better prepared for EIS Project.
- By allowing students to select own project partner and an environmental issue related to a specific energy production/site, this lesson will maximize student engagement and ownership of their learning. Through this research, students will also increase their environmental awareness and knowledge in global sustainability, especially with regard to energy production.

PROCEDURE

Refer to the Anticipated Time Required.

- Students will work in pairs, no more than 3.
- Each group will select a specific environmental issue/site, preferably in energy production.
- Students will conduct independent research on environmental issues of a selected site, outside the classroom.
- Students will include as much of the course material as possible in their paper, since this assignment is the culmination of entire course work. (Refer to the grading rubric.)
- Students will communicate with each other and with the instructor through blog and e-mail.
- Each group will consult the Writing Center with a rough draft, before submitting to instructor for critique on content.
- If needed, instructor will provide constructive critique on each rough draft in timely fashion.
- Each group will submit one paper and prepare one powerpoint presentation to class.
- Students will evaluate their own paper at the time of submission.
- Students will take notes on each EIS during presentation for a grade.

SAFETY ISSUES

This lesson does not involve any safety issues that require instructor's attention. However if a specific EIS presentation includes a demonstration, it is the group's responsibility to consult with instructor and receive an approval ahead.

TROUBLESHOOTING TIPS

- **Students will consult with instructor on environmental issue/site selection, as well as any scientific question, if needed.**
- **Students will refer to the textbook for environmental science content as often as possible.**
- **Students will consult with college writing center for written communication question or concern.**
- **Students will consult APA & MLA styles guideline for proper bibliographic citation, including online sources.**
- **Students will refer to college IT helpdesk for any software and digital technology question or concern.**

ASSESSMENT

- **Students will adhere to the lesson timeline, receiving completion points for each step.**
- **Both the EIS paper and presentation will be graded according to the pre-set rubric.**
- **Student audience survey after EIS presentation will be graded for completion.**

SUGGESTED EXTENSIONS

- **If possible, students could contact the business that they wrote the EIS paper about and share their ideas on environmental concerns.**
- **Students can conduct further research –**
    1. **Compare the contents of their paper to the EIS submitted to NEPA by the business of their choice.**
    2. **Monitor NEPA evaluation of EIS submitted by the business of their choice.**
    3. **Monitor the progress of EIS implementation by the business of their choice.**
    4. **Examine the community's response to EIS implementation by the business of their choice.**
    5. **Compare the environmental policy in different countries.**