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ABSTRACT

One of a series of units designed to acquaint secondary school students with business issues, this packet focuses on the complex and controversial topic of energy technology. In a 5-day simulation, students play the roles of energy commission members, and business, local, and public interest group witnesses who must determine whether to build a nuclear power plant in the desert, surrounding a growing urban area. By gathering and analyzing information on nuclear power, providing and weighing testimony, and considering the options and consequences of various types of energy generation, students not only gain knowledge about this timely issue, but also have the opportunity to examine their own values and attitudes, and practice decision-making skills. Teacher and student materials are provided in two separate sections. The teacher's guide contains an overview, objectives, preparation instructions, a background reading of the actual case on which this simulation is based, and student handouts for the simulation. Also provided are five lesson plans detailing the introduction, instructions, procedure, and debriefing for the simulation. Student materials consist of a reading which introduces the problem, a reading which describes the workings of a nuclear power plant, introductory discussion questions, a fact sheet and vote sheet for use during the simulation, and a decision-making guide. (LP)

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INSTRUCTOR'S GUIDE

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**THE DESOLATE DESERT
CONTROVERSY:**

SHOULD PRESTO POWER COMPANY BUILD A NUCLEAR POWER PLANT?

Author: Philip H. ...
A Business-Community Lesson Plan

**Constitutional Rights Foundation
1510 Cotner Avenue
Los Angeles, Calif. 90025**

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INTRODUCTION

The Business-in-the-Classroom program is a joint project of the Constitutional Rights Foundation and leaders of California business and industry. The major goal of the program is to improve young people's understanding of the competing values and interests that are a part of business decision-making today.

The program is unique in its focus on the business person, not as an instrument of abstract economic principles, but as a decision-maker who must deal with the trade-offs inherent in competing human, ethical, legal, and economic considerations. The student is placed in an active role as the decision-maker, faced with a problem that requires action. The student considers various solutions and analyzes possible consequences for individuals, for the company, and for society.

Business-in-the-Classroom materials have been designed in accordance with the following goals and objectives of the California Education Code for students in grades seven through twelve.

Goal I. Interdisciplinary Concepts

1. Students will evaluate how well contemporary institutions are meeting needs and hypothesize about ways in which these needs may be met in the future.
2. Students will identify various ways in which conflicts are managed and resolved.
3. Students will be able to identify various institutions and explain how they are supposed to function so that fair distribution of resources, fair procedures for making decisions, and fair corrections of wrongs or injuries can be promoted.
4. Students will compute the social cost of using human and physical resources in various ways and make choices about the allocation of capital mineral wealth.
5. Students will be able to determine some attributes of ownership of property, considering such factors and values as scarcity, security, fairness, privacy, freedom, conflict, law, and human dignity.

Goal II. Skills

Students will examine, propose, and evaluate solutions to problems in terms of consequences. They will develop alternatives for possible solutions and predict the consequences of their suggestions.

Goal III. Diversity: Similarities and Differences

Students will demonstrate an understanding of the wide diversity of occupational choices available to them, the ways in which individuals make these choices, and the necessity that occupational choices not be limited because of racial, sexual, or ethnic stereotypes.

Goal IV. Social Values

1. Students will explore and examine their own value positions to foresee probable consequences of acting upon such positions.
2. Students will develop an awareness of their responsibility for understanding and attempting to solve current social problems.

Goal V. Social Participation

Students will discuss controversial public issues, acknowledge the opinions of others, demonstrate rationality and objectivity, and work cooperatively in small heterogeneous and homogeneous groups.

INSTRUCTOR'S GUIDE: DESOLATE DESERT

The simulation is based on a proposal by the San Diego Gas and Electric Company to build a nuclear power plant in Blythe, California and the hearings of the Energy Commission of California. Several aspects of the factual situation have been changed in order to simplify the number of issues under consideration in the Sundesert case.

This simulation is designed with three major objectives in mind.

(1) Knowledge. Through active participation in the Energy Commission Hearing, the students will have an opportunity to acquire knowledge about the complex subject of energy generation and its impact on the environment. The competing interests of consumer demand for power, environmental protection, and the uncertainty of future technological breakthroughs are dramatized in this simulation.

(2) Attitudes. Students will have an opportunity to examine their own attitudes and values with regard to energy development. When the choice is a series of undesirable options, given the present state of technology, which risk is the best one to take? The options that arise from this Desolate Desert simulation include the building of a nuclear power plant, building a fossil-fuel plant, taking no action and hoping for technological breakthroughs that allow newer and safer methods such as wind, ocean, or solar power to develop.

(3) Decision-making skills. Use of the simulation will also familiarize students with the regulatory process as a tool for decision-making and provide students an opportunity to practice research and decision-making skills. Gathering factual information from many different sources and perspectives, understanding the value questions and moral issues involved, identifying the options available in this case, and considering possible consequences of a decision are important skills for all members of our society. In this simulation the decision-making skills are directed toward a controversial public issue: How can we meet energy needs with as little harmful impact on the environment as possible?

Time Requirements of Desolate Desert Lesson Plan

The simulation is designed for at least five consecutive class periods of approximately one hour in length.

- Day One: Discussion of introductory case.
Roles assigned.
Simulation described.
- Day Two: Research for background material on the energy issue.*
- Day Three: Hearing begins.
Supporting witnesses testify.
Opposition begins testimony.
- Day Four: Hearing continues.
Opposition finishes testimony.
Commissioners meet and vote.
- Day Five: Head commissioner explains decision.
Instructor debriefs the simulation.

*If possible, one day for library research and a second day of preparation in the classroom during which students can work together and obtain help from the teacher, is recommended.

Use of a Resource Person in the Classroom

There are two parts of this unit that can be enriched by inviting a resource person to participate in the discussion. The Constitutional Rights Foundation has a list of business people familiar with this simulation and interested in being resource people. Call Phyllis Maxey at CRF, 930-1510, if interested.

- Day One: Business person introduces the simulation by discussing opening case (pages 1-2 of Student Materials), and provides information on energy alternatives and/or utilities.
- Day Five: Business person debriefs the simulation, using discussion questions in Instructor's Guide, page 6.

INSTRUCTIONS

Prep: Before the lesson begins:

1. Duplicate the following:
 - a. Class sets of Student Materials:
The Desolate Desert Controversy.

- b. Two or more copies of the Commissioners' role description. There is a page with several commissioners' roles repeated that you may copy as many times as necessary. Cut up individually.
- c. Duplicate two copies of witnesses' roles. Cut up individually.
2. Arrange for a resource person to visit class on first or last day of simulation.
3. Notify the librarian of this activity and necessary research materials.

Day 1: Before the hearing begins: Case Study and Map

1. The Energy Commission Hearing should be preceded by the introductory case study, "The Desolate Desert Controversy". Duplicate a copy of the case and map for each student. You may want to make a transparency of the map of Futuro.

Have students read the Case Study on page 1. Discuss the case and questions (pages 1-3). The primary purpose of the introductory case is to familiarize students with the fictionalized state, cities and towns, the natural environment, and the proposed site of the nuclear power plant. An additional objective is to present students with the people and places who will be affected by the plant and to raise the question as to the appropriate group who should have the power to make a decision about Desolate Desert.

2. Explain to the class that one of the ways of deciding whether or not the power plant should be built is through hearings of a state regulatory commission. The company as well as members of the public who support or oppose Desolate Desert then have an opportunity to testify. Commissioners are appointed by the governor of the state.

Distribute class materials for the simulation. Have students look at the diagram of the Energy Commission Hearing.

Explain that for the next few days, the class will be working on arguments for and against building the Desolate Desert Nuclear Power Plant. Some students will be witnesses. Others will be commissioners.

Ask students to describe how a nuclear power plant works. Use references in the Student Materials p.5 or audio-visual aids to help illustrate this process.

3. Assign roles for the Energy Commission hearing.

If class size permits, assign two students to each witness role. Both can do the research, testify, and thus help each other. This dual assignment also helps in classes where attendance is a problem.

There are role descriptions for 12 witnesses, the head commissioner, additional commissioners, and the clerk. After the representative of the power company presents their proposal, witnesses supporting the project will testify, followed by witnesses opposed to Desolate Desert.

LIST OF WITNESSES:

1. Presto Power Company representative
2. Geologist
3. Nuclear Power Commission, Washington D.C., Professor Humho
4. Representative of the Destiny City Council
5. AM Industries
6. Mayor of Crystal City
7. Prof. of Nuclear Engineering
8. Futuro Farm Bureau
9. Sierra Club
10. Representative of Indian Legal Services
11. Property Owners Assoc., Sandy Springs
12. Friends of the Earth

The most difficult roles in the simulation are the Presto representative, Professor Humho, the Professor of nuclear engineering, and the geologist. These roles require the most understanding of the technical aspects of the energy issue. A role requiring leadership and organizational ability is the Head Commissioner's discussion following the testimony.

The commissioners vary in number depending on the number of students in your class. Try to appoint an uneven number of commissioners so that they can make a decision by majority rule.

All students should complete the Decision-Making Guide during the testimony.

Day 2

Witnesses prepare roles: One day is devoted to background reading to expand on the information provided on their role cards. Students should be referred to such resources as FACTS ON FILE, the Reader's Guide to Periodical Literature, and audio-visual aids. Alert the librarian in advance so that materials can be selected on nuclear power and other energy alternatives by the library staff to help your students.

Commissioners' Meeting: Commissioners will have a meeting led by the teacher or head commissioner to review the case and the format of the hearing. Be sure that each commissioner understands his or her responsibility for completing the Benefits and Costs Decision-Making Guide.

Before the hearings, each commissioner should submit a one-page preliminary essay stating the benefits and costs of building a nuclear power plant in Futuro. These can be compared with their final essays that will be written after the hearings.

Clerk: The clerk should examine the diagram and discuss with the teacher the appropriate way to set up the room for the first day of the hearing. The clerk is also responsible for making ID cards for each witness. These cards (Indian, Commissioner, Mayor, etc.) will be placed in front of the witnesses on the day the hearings begin. They should be easy to read from across the room.

Optional: If time permits, Day 3 can be used for research and to work on testimony in class, sharing information among students. The hearing would then begin on Day 4.

Day 3

The Hearing Begins

1. The Clerk sets up the room according to the diagram, and places an ID card on each of the participants' desks.
2. When students have taken the correct seats, the Head Commissioner calls the meeting to order and explains the rules of the hearing.
3. Testimony begins with the first witness, the Presto Power Company representative. Witness rises and addresses the Commissioners. After witness is finished speaking, the Commissioners and the members of the opposing side may ask questions. Questions may be answered by the witness or anyone on his or her side.
4. Continue calling those witnesses supporting the nuclear power plant until all have been called. Then call the opposition.
5. No more than 10 minutes for the statement and questions and answers of each witness.

Day 4

The Hearing Continues/Commissioners Decide

1. The opponents of the Desolate Desert Plant will be completing their testimony today.
2. After all witnesses have testified, the Commissioners form a small group in the middle of the classroom. The Head Commissioner leads a discussion of what action they want to take. All other students listen to the Commissioners and save their comments for later. Commissioners vote by secret ballot. Save results until the next class.

3. If resource person is joining the class tomorrow, assign a student to meet him or her in the school office and bring the visitor to the classroom.

Day 5 Debriefing

1. Have the Head Commissioner present the decision of the Energy Commission, and explain how the commissioners voted.
2. Introduce the resource person, writing his/her name and organization on the board.
3. The teacher or resource person will lead the discussion of questions suggested on this page, "Debriefing the Game". The actual Sundesert case should be discussed at this time. See article on page 8 of the Instructor's Guide.

DEBRIEFING THE GAME

The debriefing session is of critical importance in any simulation. Students have been exposed to many different viewpoints and many opposing opinions, and now need the opportunity to organize their thoughts and discuss problem areas. The following questions may be used as guidelines for the debriefing:

1. After the Head Commissioner has given the rationale for the Energy Commission's decision, ask the other commissioners if there was any disagreement among them. Is there a minority opinion?
2. Ask a number of students who testified for and against the power plant how they think the case should have been handled. What is the reaction of Professor Humho? The Indian representative? The Mayor of Crystal City? SNP? The Destiny City Council?
3. How do the representatives of the Presto Power Company feel about the Commission decision? You might want to mention that in the situation which was the basis for this case, the San Diego Gas and Electric Company did not receive a favorable judgment, but to prepare for the hearings, the company spent more than \$100 million and obtained 90 different permits and approvals.
4. What were the alternatives facing the commissioners?
5. What are some of the consequences of their decision? (If there are other viewpoints opposing the Commission's decision, you might question the consequences of those positions.)
6. Did the decision-makers take into account any of the following factors? What effect should they have on this decision?

- a. prejudice
 - b. sympathy with one or more parties in the dispute
 - c. the relative needs of the parties in the dispute
 - d. the needs of society
7. What trade-offs must be made in this situation? What do you have to give up in order to achieve a particular goal?
8. Are there certain rules or principles that should guide the Energy Commission in all cases whether the utility's request is to build a nuclear, coal, oil, geothermal, or other generation facility?

The California Energy Commission stated in its 1977 Biennial Report that the following principles were to serve as guidelines for energy decisions: (1) Use a diversity of strategies so that one problem will be balanced by success with others. (2) Choose projects that can be easily modified to increase or decrease supply according to future uncertain demand -- flexibility is important. (3) Stick with what we know rather than rely on totally new technologies. (4) To the extent possible, regulation should be avoided.

Was there anything that occurred in the Hearing that you considered to be unjust or unfair?

10. Do you think a state administrative agency, the Energy Commission, is the best group to make these decisions? What would happen if Presto Power and other utilities made the decisions? If the voters made the decisions? The governor? The federal government?

It is important that the discussion leader of the Debriefing Session refer to actual cases and his/her own experience with these issues. Students are interested in the connection between the fictionalized situation and what has happened in reality.

ACTUAL CASE AND THE CALIFORNIA ENERGY COMMISSION DECISION

THE SUNDESERT CASE

In 1976, The San Diego Gas and Electric Company (SDG&E) filed a notice of intention to build the Sundesert nuclear power plant on a 6,400 acre site near Blythe, California. The first 950 megawatt unit was to begin operation in 1984. SDG&E's partners in this project were the Los Angeles Department of Water and Power, and the cities of Anaheim, Riverside, Burbank, Glendale, and Pasadena.

The Energy Commission held hearings at several locations. The commission staff produced a 20,000 page study that found that geothermal and oil-generated plants were not economically competitive with nuclear power. Coal-fired plants were economically competitive, but air quality standards stood in the way of this type of power plant.

The Energy Commission made two decisions required by state law in regard to the Sundesert proposal. The commission first had to decide if a new power plant was needed; they concluded that only one of the nuclear generating units was needed. The second decision was whether or not there were acceptable alternatives to Sundesert. In February of 1978, the commission issued its second decision: A combination of conservation of energy, the reconstruction of two old oil-fired plants, a coal plant, and geothermal power would be acceptable alternatives to Sundesert. The commission predicted that in 10 to 20 years, new technologies such as solar, wind, and biomass conversion would play an important role.

In addition to the action of the Energy Commission, the state legislature and Public Utilities Commission also had to act in the Sundesert case. State laws prohibited the building of any new nuclear plants until a safe and permanent disposal system for nuclear wastes had been designed. In order for Sundesert to be built, the state would have to exempt Sundesert from those laws. An exemption for the nuclear power plant was passed by the California Senate, but blocked in the Assembly. The Public Utilities Commission (PUC) refused to grant the proposed rate increase to finance the plant. The financing proposed by SDG&E would require SDG&E customers to pay for the nuclear plant for ten years during its construction phase and before the plant produced power for those customers. The PUC rejected this type of financing and recommended that SDG&E not tie all of its financial resources to nuclear power.

In May, 1978, the Board of Directors of SDG&E voted to suspend all work on the Sundesert nuclear project. The utility company spent five years on the Sundesert proposal, the environmental impact reports, the hearings, and claimed to have filed a stack of application papers 36 feet high with the various government regulatory agencies. The cost of the Sundesert proposal was \$100 million, including \$2.5 million in legal fees. The company needed 90 different permits or approvals from various regulatory bodies before the plant could be licensed. The main regulatory bodies involved in this case were: the federal Nuclear Power Commission, the state Energy Commission, and the state Public Utilities Commission.

BIBLIOGRAPHY on the Sundesert case

AB 1852 Summary Report: Alternatives to a Sundesert Nuclear Plant,
California Energy Resources Conservation and Development Commission,
January 12, 1978, 77-NL-1.

California Energy Trends and Choices: 1977 Biennial Report of the
State Energy Commission, Energy Resources Conservation and
Development Commission, 1111 Howe Avenue, Sacramento, CA 95825.

Preliminary Report on the San Diego Gas and Electric Company's
Notice of Intention to Seek Certification for the Sundesert
Nuclear Project, 76-NOI-2, State of California Energy Resources
Conservation and Development Commission, April 14, 1977.

Final Report, Ibid., November, 1977.

Minority Report by Commissioner Alan Pasternak, 77-NL-1,
Energy Resources Conservation and Development Commission,
February, 1978.

Student Written Evaluations

Write an essay describing the Desolate Desert case. What are the issues? Summarize the arguments of both sides and explain your position in this controversy. What important facts and values did you consider in arriving at your decision?

FOLLOW-UP ACTIVITIES

- * You may want to start a bulletin board or scrap book that contains clippings of energy alternatives. One nuclear expert has compared this time to the beginnings of the airplane -- all kinds of techniques are being designed and tested and some of the experiments may seem crazy, but who knows the future?
- * Students may ask some other resource people to visit the class. These people might include individuals who are environmentalists, activists in anti-nuclear groups, political figures, people who work for regulatory commissions, journalists who have researched this issue, economists, nuclear engineers, farmers, etc. If it is inconvenient for the resource person to come to the school, perhaps a team of students could conduct an interview of the person at his/her place of business, and report back to the class.
- * Students may research the case on which this simulation was based -- the Sundesert proposal by San Diego Gas and Electric. They can refer to: The AB 1852 Summary Report: Alternatives to a Sundesert Nuclear Plant, California Energy Resources Conservation and Development Commission, January 12, 1978, 77-NL-1; California Energy Trends and Choices: 1977 Biennial Report of the State Energy Commission, Energy Resources Conservation and Development Commission, 1111 Howe Avenue, Sacramento, CA 95825; The Preliminary Report on the San Diego Gas and Electric Company's Notice of Intention to Seek Certification for the Sundesert Nuclear Project, 76-NOI-2, State of California Energy Resources Conservation and Development Commission, April 14, 1977, Final Report, November, 1977; Minority Report by Commissioner Alan Pasternak, 77-NL-1, Energy Resources Conservation and Development Commission, February, 1978.

DESOLATE DESERT

LIST OF WITNESSES
FOR
HEAD COMMISSIONER AND TEACHER

Witnesses to be called:

1. Presto Power Company representative _____
2. Geologist _____
3. Nuclear Power Commission, Washington D.C.,
Professor Humho _____
4. Representative of the Destiny City Council _____
5. AM Industries _____
6. Mayor of Crystal City _____
7. Prof. of Nuclear Engineering _____
8. Futuro Farm Bureau _____
9. Sierra Club _____
10. Representative of Indian Legal Services _____
11. Property Owners' Assoc., Sandy Springs _____
12. Friends of the Earth _____

Commissioners

You will be listening to all of the testimony about the construction of the Desolate Desert Nuclear Power Plant. There is a strong need for additional electric power to the Crystal City area, but also strong concerns about nuclear power plants and high-power transmission lines. Before the hearing, your job is to learn about the costs and benefits of nuclear power and explain them in a short essay. During the hearing, listen and ask questions, take any notes you wish, and reach a decision: Should the Desolate Desert Nuclear Power Plant be constructed? Use the Decision-Making Guide to help organize the information presented by witnesses. After listening to all of the testimony, you will have time to meet together and make a decision. If you can't agree, the majority rules. The dissenters may wish to present a minority opinion to the class.

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HEAD COMMISSIONER

You have an important leadership role in this Energy Commission Hearing. You need to have a brief meeting with your commissioners before the day of the hearing to review the facts of the case, the map, the information on how a nuclear power plant works, and the responsibility of the Commission. Before the hearing, all commissioners will write a short essay based on their library research on the costs and benefits of nuclear power.

On the day of the hearing, call the meeting to order after all witnesses and commissioners have taken their seats. Announce the rules of the hearing:

1. Pro-Desolate Desert witnesses will testify first.
2. Each witness has no more than 10 minutes to speak and answer questions.
3. The witness, when called, will stand up and face the commissioners and make a statement.
4. The commissioners and the opposition side may then ask questions.
5. The witness and anyone on his/her side may answer these questions.

Be sure that your commissioners have the Decision-Making Guide in front of them so that they can take notes on the arguments and list the costs and benefits of building a nuclear power plant. Call the witnesses in the order listed, 1 through 12.

When all testimony is completed, the witnesses will silently watch the commissioners' discussion of what should be done. Ask each commissioner for his/her opinion. Your options are:

- Accept the Desolate Desert proposal and issue Presto Power a license to begin construction of Desolate Desert Nuclear Power Plant.
- Reject the Desolate Desert proposal. Take action in the form of a recommendation to the state legislature that the Air Quality Standards be changed to allow more pollution from coal. Presto Power can then submit a proposal to build a coal-fired plant.
- Reject the Desolate Desert proposal. Encourage conservation and refrain from building any new power plants,

After discussing the case, use a secret ballot for the commissioners to vote. Do not give out the results until the next day. Then you will announce your decision and explain the Commission's reasons for its action.

PRESTO POWER COMPANY REPRESENTATIVE

You will be the first witness in favor of the Desolate Desert plant. First explain the need for more power and then explain Presto Power's Desolate Desert proposal. You may want to review the Fact Sheet (page 6) and the diagram of a nuclear reactor (page 4).

Presto Power Company is responsible for providing electricity to meet the needs of industry and the general public. There is not enough power to meet future demand, and if the oil supply is cut off, there will be no power at all for the state of Futuro. The oil supply comes from other countries who have raised their prices 15% this year. The oil supply is decreasing along with natural gas supplies. The old coal-fired plants have become expensive to operate because of the laws on air quality standards. There are certain "exotic" sources of power -- solar, geothermal, wind, and ocean -- but at this time they are not cost competitive and cannot produce enough power for large-scale needs. Hydroelectric is out of the question because there are no sites to build dams in Futuro.

The best choice is nuclear power and the best place to build it is out in the desert where the chance of earthquakes is the smallest. You want to build two nuclear generating units at Desolate Desert; each will have an output of 950 megawatts. The cost estimate for construction is \$1.5 billion. The Drano River will provide the necessary cooling water. (Refer to diagram of the reactor).

Your argument is that nuclear power is the best choice for the consumer. In 1976, the Atomic Industrial Forum found that 1 kilowatt-hour generated by nuclear energy cost 1.5¢ to produce that year. Coal cost 1.8¢ BEFORE the new pollution equipment was required. Oil cost 3.5¢ per kilowatt hour. Nuclear is the cheapest and the way of the future.

The construction of Desolate Desert will provide jobs for 4,000 people and electric power to the whole state, no matter what happens to our oil supply.

REPRESENTATIVE OF DESTINY CITY COUNCIL

You report that 90% of the townspeople favor the plant being built in Destiny. The town has been in a bad state -- no jobs, poor schools, and a declining population. The nuclear power plant would be a lifesaver for the town. The young people would not move away after graduation like they have been doing, because there would be lots of jobs and lots of excitement in town. The Presto Power Company has sent very helpful representatives to meet with the Mayor and the City Council to prepare for the anticipated 2,800 construction workers who would be coming to town to build the power plant.

The town is going to need financial support from the state legislature. Roads, sewage systems, schools, the hospital, housing -- all of these are inadequate for a town whose population is going to double in size. The power company, the county and the state of Futuro will be giving financial assistance to Destiny to work on these projects. The only worry that townspeople seem to have is a fear of an election in which half of the voters will be stranger and may only be in town for a couple of years. But in general, you and the City Council are very supportive of the project. It is much better than a coal-fired plant which would ruin the clean desert air.

GEOLOGIST FROM THE UNIVERSITY OF FUTURO

Desolate Desert is the ONLY area in the state that provides a secure location for a nuclear power plant. The Commissioners must be aware of the dangers of an earthquake for a nuclear power plant. There are active faults in many parts of the state, especially around Crystal City. A nuclear plant cannot be located near Crystal City for this reason. The Desolate Desert site is a good one because there is little danger of damage to the plant from erosion, collapsible soils, or floods. But the most important aspect of the Desolate Desert location is that there are no active faults. Geological tests indicate that the earth hasn't moved for the last 35,000 years in that area. The nearest active faults would pose no problem to the power plant because the effects of an earthquake would be very mild. Engineers can design the structure of the nuclear plant to accommodate tremors much greater than would be likely to occur in this area. There is no way to be absolutely sure that an earthquake won't occur, but it looks like one chance in a million.

The suggestion made by some people to build the nuclear power plant in the ocean is not possible. The coast off Futuro has an ocean shelf that drops off very rapidly. It would be much too expensive to try to build a plant in those waters. In addition, the coastal area has active faults and some geologists predict a serious earthquake there within the next few years. Desolate Desert is safe from these earthquake problems. It is an excellent site.

PROFESSOR HUMHO, NUCLEAR POWER COMMISSION, WASHINGTON, D.C.

You are chairperson of the famous WASH 1400 Reactor Safety Study. Your findings: The risk to the public from nuclear accidents is very small. There are two or three independent safety checks on all controls. It is important to remember that no method of generating power is without risk. Coal for example, hurts the public and the workers. The coal-burning plants disperse particles in the air that are harmful when breathed. The poor coal miners either die in mine disasters or die at an earlier age than the rest of us because of black lung disease from inhaling coal dust.

The world is going to go nuclear whether the Sierra Club likes it or not. Uranium and plutonium are efficient fuels. Nuclear power is vital in the immediate future because supplies of fossil fuels are dwindling, and solar technology is expensive and still in the experimental stage. The waste from the plant is to be stored in salt beds in sealed containers 500 meters underground. This is only a temporary arrangement until we can find some way to reuse the waste.

Your only concern about the Desolate Desert proposal is that Presto Power Company recruits well-trained operators for the nuclear reactors. In an emergency, an experienced, knowledgeable, well-trained senior operator is essential. Presto will not be able to use employees trained to run a coal or oil-fired generating plant. They will need a training program and recruit some experienced operators.

AM INDUSTRIES OF CRYSTAL CITY

Unless Desolate Desert is built, providing the area with a safe, reliable and economical source of power, your company and others will leave Crystal City. There is a factory that could be built on the outskirts of Crystal City. The plans are on the drawing board, but the location will not be Crystal City if there is a chance that "brown-outs" and power "black-outs" will frequently happen. Shutting down a plant because of inadequate power, costs AM Industries money and hurts productivity. That factory would provide 1,500 jobs that are important to the city. Other companies are also worried and moving cautiously on plans to expand their operations until there is a more favorable energy picture in Futuro.

The Commission has a responsibility to the people of the state. There must be adequate planning to meet future needs. Desolate Desert Nuclear facilities are the best course of action to meet future demand for electricity.

MAYOR OF CRYSTAL CITY

You are the last "pro" witness. You have the chance to sum up the case and make a final impression on the Commission. The big concern in this case is having enough power to meet present and future demand. Something has to be done to end Crystal City's dependence on oil and natural gas -- both are running out and oil is getting much too expensive.

Unemployment is already high in Crystal City. If there isn't power to run the factories and offices, how are people supposed to work? eat? live? The "bread lines" weren't a very pretty sight in the Great Depression with 30% of our people out of work. Crystal City could have a serious economic depression unless there is more power.

The City Council is considering measures that will conserve energy for the present. We have encouraged people to conserve power through television and radio commercials. More drastic measures may be needed. A device can be placed on water heaters, TVs, air conditioners that will shut them off whenever the demand is greater than the supply of electricity.

Something must be done to increase the power supply to Crystal City. Bad tempers, crime, unemployment, and a lower standard of living will face us if we don't take action now.

PROFESSOR OF NUCLEAR ENGINEERING

There has been strong criticism of the WASH 1400 Reactor Safety Study of Professor Humho. The report gives us a false sense of confidence by using numbers to estimate the chances of both minor and serious nuclear accidents. The plants have not been operating long enough for those predictions to be considered accurate. In addition to plant safety problems, there is the danger of leaks from the storage of radioactive waste. The federal government has not been able to develop an effective way to store these dangerous wastes.

A more serious problem than safety is proliferation. Bombs can be made from the materials available in a nuclear plant. As more and more plants are built, this problem grows to unmanageable proportions. The transportation of nuclear fuel (uranium dioxide pellets) to generating plants represents another area of danger to public health and safety due to accidents or sabotage.

Your advice to the Commission is to move cautiously and not license the construction of any more nuclear plants. When we know more about safety, proper storage of used fuel, radioactive clothing and equipment, and the effects of low-level radiation on human health, we can better decide about the nuclear risk.

FUTURO FARM BUREAU

Your organization represents farmers from many of the areas that will be affected by Desolate Desert. Valuable land will be used for the plant as well as the transmission towers and lines. Crop production will have to be reduced by 50% on 7,000 acres of land near Destiny that is owned by Presto Power Company. This land will be taken away from agricultural production, reducing income to the area and jobs for farm workers. Many of the farmers are worried about the water of Drano River -- it is vital to farming in that area and we do not want a contaminated water supply. There have been incidents in which animals and humans have received electric shocks in the vicinity of high voltage transmission lines. The nuclear plant seems like a dangerous and costly way to provide energy, imposed on the people of Destiny who do not need more energy.

INDIAN LEGAL SERVICES

You represent the Santo and Tolo Indian tribes. They are both opposed to Desolate Desert. The construction of the transmission towers will destroy valuable archeological sites. Burial grounds that are sacred to the Tolo Indians will be disturbed by this construction. How would YOU like a family cemetery torn up just to put in a high voltage electric tower? Indian rights to develop the land and control its use will be violated by the large amounts of land that will be taken from us in order to build the towers. 6,000 Indians are very much opposed to this invasion of their land. A coastal site for power-hungry Crystal City is the best choice. A less favorable choice would be to place the transmission lines somewhere else. The worst possible choice would be the present proposal of Presto Power Company.

SIERRA CLUB REPRESENTATIVE(S)

Your organization is absolutely opposed to the Desolate Desert Nuclear Power Plant. Here are some reasons: Danger of sabotage, danger of leaks from the storage of radioactive wastes, terrorism, danger of contamination of the Drano River if any of the rules of plumbing in the reactor should leak, danger of a reactor core melt-down due to human or equipment error. The consequences for people are increased chances of cancer and death.

There is no reason to take such risks. The proposed security system for the nuclear plant has many weak spots. Presto-Power states that they plan to use 12 to 14 guards with semiautomatic weapons who will be on duty at all times. Could those guards outwit a small team of people with detailed knowledge of, and access to, plant equipment? No security system is good enough to protect us from the drastic consequences of the release of radioactive material.

The billions of dollars that will go into the plant could better be used to develop solar energy, geothermal energy, and other options. In the meantime, the people of Futuro are going to have to learn to conserve.

REPRESENTATIVE(S), PROPERTY OWNERS ASSOCIATION OF SANDY SPRINGS

You are absolutely opposed to the transmission lines coming through Sandy Springs. No one wants ugly power lines on or near his property. It will decrease the value of the property. Instead of a view of the beautiful desert and mountains, the view will be of tall towers and wires stretching across the sky. Your recommendation to the Commission is that they scrap the Desolate Desert Project and start telling people in Crystal City to conserve energy. Then maybe we won't need ugly power lines ruining our land. You are aware that the Chamber of Commerce and City Council of Sandy Springs are in favor of bringing more power to the area. But the members of those two groups don't have the transmission towers near their property. We do!

FRIENDS OF THE EARTH

This is a private environmentalist group. Your philosophy is that every life is important -- human, plant, and animal. The desert is not "desolate" but a place teeming with life and very, very fragile. This proposed invasion of this environment by Desolate Desert and high power transmission lines must be stopped. The Bighorn sheep, an endangered species, will have more difficulty surviving when the roads, trucks, buildings, towers, and people move to this remote area.

"Visual pollution" is another problem. The beautiful surrounding mountains and the desert terrain will be permanently changed with the building of Desolate Desert. People need places of beauty, places free of technology, and the area around Destiny should remain that way. Your group recommends conservation and investment in solar energy.

THE DESOLATE DESERT

CONTROVERSY:

SHOULD PRESTO POWER COMPANY BUILD A NUCLEAR POWER PLANT?

Author: Phyllis F. Maxey
A Business-in-the-Classroom Lesson Plan
Constitutional Rights Foundation

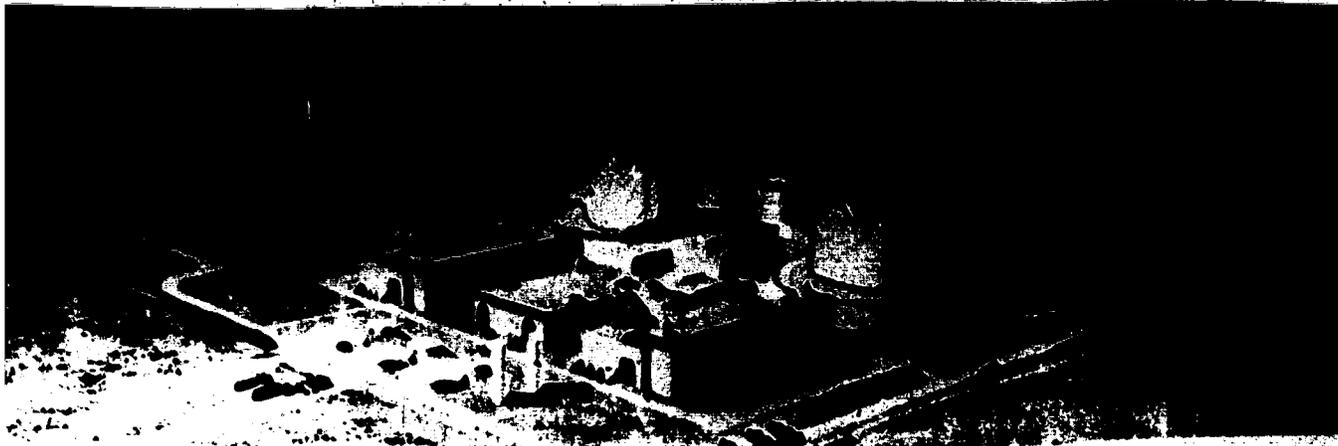
1510 Cotner Avenue, Los Angeles,
California (213) 473-8001

THE DESOLATE DESERT CONTROVERSY

You are Chris Clark, vice-president for product management of the Presto Power Company located in beautiful Crystal City. The city is an attractive area with a growing population due to its desirable climate. Your problem is that by 1990 there will not be enough electricity to serve all of the people who are moving into the area. Heating, lighting, as well as refrigerators, air conditioners, stereos, and all kinds of electric gadgets (maybe even electric cars?) will create a big demand for electric power. Your boss, Max Maximum, wants a report on his desk as soon as possible as to the best way for Presto Power to meet this future demand.

You look at your options. First there are the old oil-fired plants in Maco built years ago. Then there are Presto's coal-fired power plants, now a major problem to the company because of new air quality controls. Another option available is geothermal - the use of underground steam for electricity; it doesn't pollute, but the equipment to get that steam out of the ground is still in the experimental stage. Nuclear power is an option - the technology exists, the site is available out in Desolate Desert - but there are some strong anti-nuclear groups in the state concerned about safe storage of nuclear waste. Solar energy is a wonderful option, but the solar technology to provide abundant electric power is not available and experts estimate it won't be available until after the year 2000.

You have a report from the financial wizard of the company. He has calculated the cheapest and most efficient power source to meet the 1990 demand: it is the nuclear power plant. He has sent you a map of the site selected by company engineers. It takes 7-10 years to build the nuclear plant so you need to get started soon. In addition to a consideration of a cheap, efficient source of power, what else do you have to worry about? Who will be affected by the Desolate Desert plant?

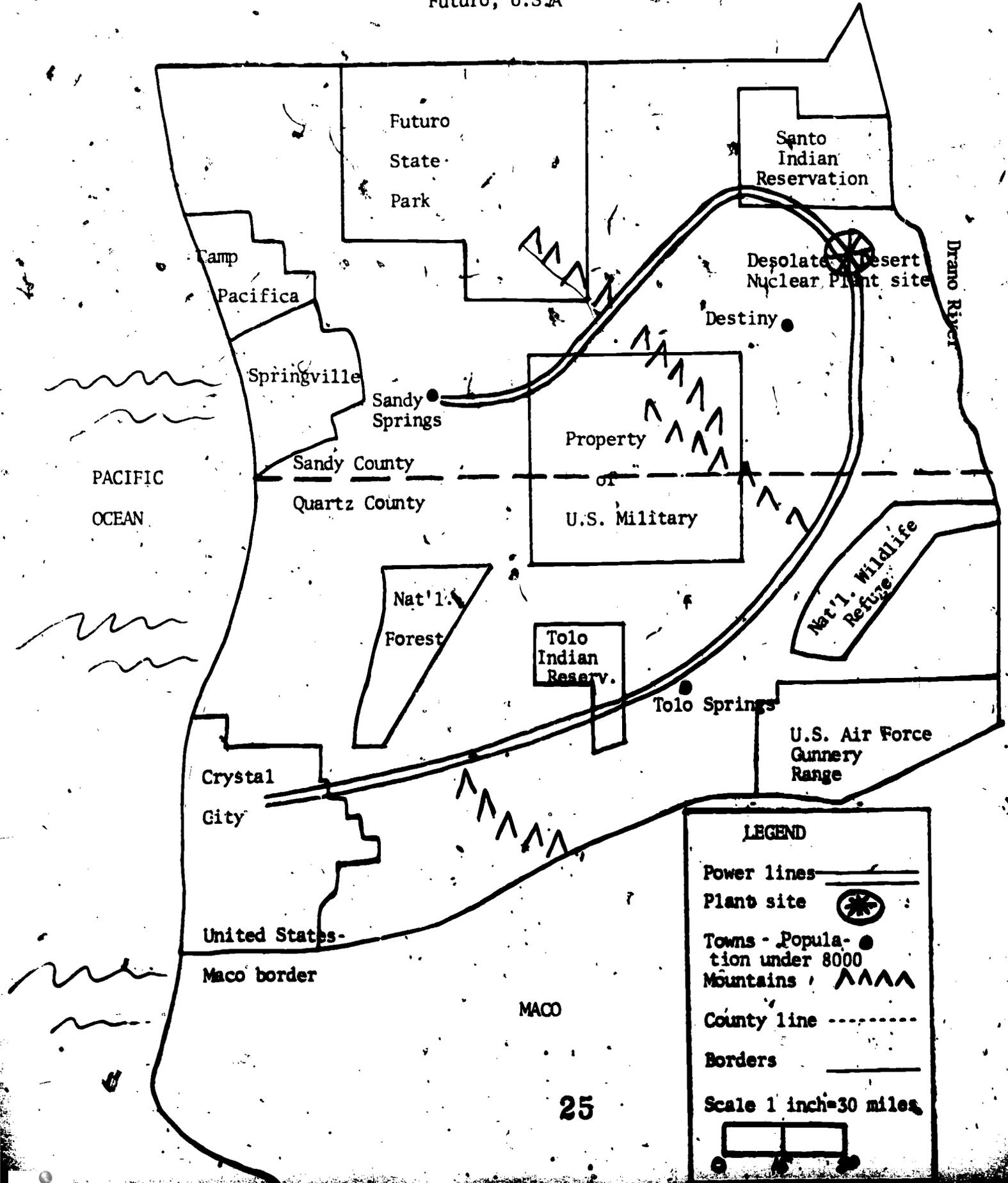


Discussion Questions

1. Study the map of the nuclear power plant site and the legend.
 - A. Where are the power lines?
 - B. What town is nearest to the nuclear plant site?
 - C. How many miles is it from the nuclear plant site to Crystal City?
 - D. What water will the nuclear plant probably use?
2. Who should be consulted before the power plant is constructed?
3. Who has an interest in your decision about how to best provide electricity? Who would be in favor of the Desolate Desert Plant? Who would be opposed? How could you find out more about who is for it and who is against it?
4. What other information do you need in addition to the Efficiency Report which recommends the nuclear power plant? Who else should supply information to help you in your decision?
5. Who do you think should make the final decision about whether or not Desolate Desert nuclear power plant should be constructed?
 - A. Max Maximum
 - B. The Presto Power stockholders
 - C. The people of Crystal City of Andy County or Futuro
 - D. The Futuro Energy Commission members appointed by the governor
 - E. The Futuro State Legislature
 - F. The Federal Government

DESOLATE DESERT NUCLEAR PLANT SITE

Futuro, U.S.A



LEGEND

- Power lines ————
- Plant site 
- Towns - Population under 8000 ●
- Mountains 
- County line - - - - -
- Borders ————
- Scale 1 inch = 30 miles

25

HOW NUCLEAR POWER PLANTS WORK

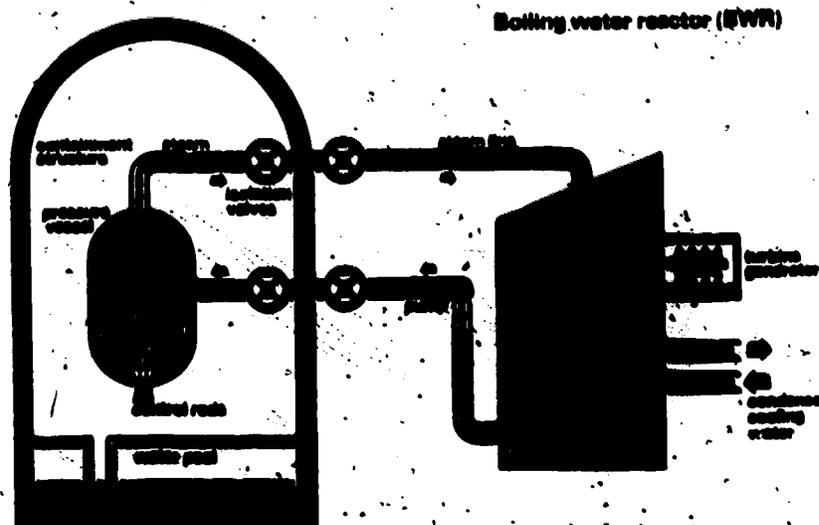
Electricity is produced at all power plants by spinning the shaft of a huge generator, in which coils of wire and magnetic fields interact to create electricity. In most plants - thermal or steam-electric stations - this spinning is done by high-pressure steam "blowing" the propeller-like blades of a turbine connected to the generator shaft.

Heat to boil water into steam at these plants is produced in either of two ways: by burning coal, oil, or gas --- "the fossil fuels" --- in a furnace, or by splitting certain atoms of uranium in a nuclear reactor.

Nothing is burned or exploded in these power reactors. Their fuel consists of many tons of ceramic pellets made from an oxide of uranium. The cylindrical pellets, each about the size of the end of your little finger, are carefully arranged in long, vertical tubes within the reactor.

Inserted throughout the bundles of these fuel tubes are many "control rods." These rods regulate a process that results in atoms invisibly flying apart, or fissioning. As the atomic pieces plow through the fuel pellets, they generate heat by a kind of friction.

The cooling system is the main link in the chain that converts fission energy to electrical energy. In the reactor illustrated below, the water in the reactor boils to steam. The steam is cooled by a separate water system. It condenses and is reused in the reactor to make steam. The pressurized steam causes the turbine to spin which in turn produces electricity.



THE FUTURO ENERGY COMMISSION
HEARINGS

Clerk
Commissioners

<input type="checkbox"/>	<input type="checkbox"/> Mayor of Crystal City	Friends of the Earth	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/> AM Industries	Property Owners' Association	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/> Destiny City Council	Indian Legal Services	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/> Professor Humho	Sierra Club Representative	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/> Geologist	Futuro Farm Bureau	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/> Presto Power Co. Representative	Professor of Nuclear Eng.	<input type="checkbox"/>	

PRO -
DESOLATE
DESERT
NUCLEAR
PLANT

ANTI -
DESOLATE
DESERT
NUCLEAR
PLANT

FACT SHEET

1. Need: There is definitely a need for more electrical energy in Crystal City. Present generating facilities are inadequate for projected future demand. The entire state relies on a dwindling natural gas supply (1 year's supply remaining) and an unreliable and expensive supply of oil. There is coal in Futuro, but the air quality standards established by the legislature would have to be lowered to allow for more air pollution from burning coal.
2. Necessity of planning: Crystal City will need more power within 10 years. A nuclear power plant requires between 7-10 years to construct and bring into full operation; a fossil fuel (oil or coal) plant requires five years from planning to operation.
3. Cost: The cost of construction and operation of a nuclear power plant is less than coal and much less than oil-fired plants. The price of oil has climbed 15% this year. All oil must be imported. At this point, the new generation methods such as solar, wind, and ocean power would cost 10-20 times more than nuclear or coal.
4. Energy Commission: The Futuro Energy Commission must, by law, approve the construction of all power plants. The commissioners are appointed by the governor. They hold public hearings at which representatives of the utility, expert witnesses, and the general public have the opportunity to testify.
5. Government Agencies: The U.S. Military and the Department of Water Resources have given the Commission a written statement - no objection to the building of Desolate Desert.
6. Commissioners' task: The duty of the commissioners is to decide whether or not Presto Power's proposed Desolate Desert Nuclear Power Plant should be built.
7. Witnesses' task: The witnesses in favor of Desolate Desert testify first, followed by the opponents. Role cards will provide the basis for your testimony. Library research can expand that information base.

RESEARCH SUGGESTIONS

You will have time to read about the energy issue to prepare for the Hearing. Here are some suggestions of where to look for additional information.

- Check the front page and Business Section of your newspaper for articles about nuclear or other methods of power generation.
- Use the Reader's Guide in your library to find references to recent articles in magazines and journals about this subject.
- Use the Card Catalogue in your library to find books, films or film-strips on the energy issue.
- Use library reference books such as encyclopedias (recent editions).
- Talk with individuals knowledgeable in this field - economists, engineers, environmentalists, power company representatives, etc.
- Ask your teachers in other classes and use your textbooks in such subjects as science and social studies as additional resources.

DECISION-MAKING GUIDE

Should the Desolate Desert Nuclear Power Plant be constructed?
Write the facts/values/arguments from the Energy Hearings in
the appropriate column.

Yes! Build it! Benefits	No! Never! Costs