GEOTHERMAL EDUCATION OFFICE

FINAL REPORT

Contract No. DE-FG36-94GO10012, A008
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MAINTENANCE OF COMMUNICATIONS SYSTEMS

The Geothermal Education Office has established and maintains the following means of student, teacher and public access to information and materials about geothermal energy:

Toll free number: 1-800-866-4GEO
Website: <http://geothermal.marin.org>
Email: geo@marin.org

GEO's website has become the primary internet resource for educational information about geothermal energy for students.

DISSEMINATION OF MATERIALS IN RESPONSE TO REQUESTS

GEO mails (and sometimes faxes) materials about geothermal energy published by GEO and others. During the term of this contract GEO has distributed about 50,000 individual brochures, posters, website bookmarks, curricula, comic books, booklets, videos and slide sets about geothermal energy in response to about 6,000 requests.

GEO has authored and published the following materials during the term of this contract:

Geothermal Energy Fact Sheet, article about geothermal energy, in website.

Introduction to Geothermal Energy Slide Set.* Set of 122 slides for classroom, community and business presentations about geothermal energy, covering geology, exploration, electricity production, direct uses, heat pumps and energy issues. Slide list enclosed.*

*Hot Web Sites Bookmarks**

Geothermal Energy: A Renewable Option. 27 min. Video, 6th Grade through General Adult Audiences, with Washington State Energy Office*

A Global View of Geothermal Energy.* Map with country by country geothermal statistics, with Alfred Truesdell

Geothermal Energy. Article for Microsoft Encarta CD-ROM Encyclopedia 2000. Reprint.*

Geothermal Resources Worldwide. Comic book style primer. Geology/technology of geothermal resources, all ages, edited and reprinted from publication of Susan Hodgson, California Division of Oil, Gas and Geothermal Resources*

Geothermal Education Office Geothermal Energy Website: <http://geothermal.marin.org>

Geothermal Energy Poster, with GRC*

Geothermal Energy. Curriculum. Lesson Plants and Student Activities, 88 pages, grades 4-8*

Steam Press, Newsletter format articles about geothermal energy and energy issues*

Curricular Supplement to Geothermal Energy Video, grades 6 - 12, in publication

Project WET Supplemental Activity Guide. Geothermal Curriculum materials (w/ The Watercourse, Council for Environmental Education, University of Montana and Idaho Water Resources and Research Institute, University of Idaho). In publication

* Copy Enclosed

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DISCLAIMER

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Materials by Others, Distributed by GEO:

*Tapping the Earth's Natural Heat.** Geologically-oriented w/ maps, graphs, photos. USGS Circular #1125, reprinted by GEO, USGS and the Naval Air Weapons Testing Center, China Lake, California. Reprinting initiated by GEO.

*Direct Use of Geothermal Resources.** Brochure. By Geo-Heat Center, Oregon Institute of Technology w/ NREL

*Geothermal Energy,** colorful red glossy brochure published by the Energy and Geoscience Institute, University of Utah

Plate Tectonics, CD-ROM published by Tasa Graphics

PRO-ACTIVE OUTREACH AND COLLABORATIVE EDUCATIONAL ACTIVITIES

In addition to responding to requests for information and materials, GEO has pro-actively sought opportunities to disseminate information by staffing booths at science, energy and environmental fairs and teacher conferences and by hosting an annual Teacher Workshop on Geothermal Energy. To stretch educational dollars and ensure the appropriate inclusion of geothermal energy in educational efforts by others, GEO collaborated on the following educational projects:

- Provided Western Area Power Authority (WAPA) a draft Renewable Energy curriculum for 5th graders, based on material from the Geothermal Curriculum produced by GEO, and the GEO video Script.
- Licensed use of footage from GEO video to four educational organizations for production of educational videos about renewable energy
- GRC Annual Meetings: staffed booths, provided materials, showed videos, hosted workshops
- Nevada Energy Fair, with GRC: Provided materials, staffed booth
- Hemispheric Energy Ministers Conference, New Orleans: provided copies of Global View Map, with Ormat International
- American Environmental Review (environmental spots on PBS stations): provided video and edited the script, with GRC
- California Science Teachers Association: staffed booth and distributed materials
- Clean Power Day at the Capitol: Sacramento, CA and San Francisco, CA, staffed booths, provided materials, with GRC
- Earth Day Conservation Fair: Sacramento, staffed booth/provided materials, with GRC
- Geysers Pipeline Press Conference: provided speakers, with GRC and Lake County, CA
- Microsoft: wrote geothermal article for Microsoft's Encarta CD-ROM Encyclopedia
- National Aeronautics and Space Administration (NASA) Jason Project, Journey to the Center of the Earth: provided speakers/materials, w/ Sifford Energy Services and EGS, Inc.
- National Energy Education Project (NEED), drafted geothermal writeup and list of facts that should be understood upon high school graduation, with GEA and Unocal Geothermal
- National High School Energy Debate: 1997, provided materials and speaker, w/ Univ. Kansas
- National Renewable Energy Laboratory: reviewed and edited geothermal article, provided slides
- National Science Teachers Assoc. Global Summit: staffed booth/provided materials, w/ GRC
- North American Environmental Educators, San Francisco, CA: staffed booth, provided materials
- Northwest Power and Gas, Portland, OR: provided speaker, w/ Washington State Energy Office
- Oregon Science Teachers Association: Portland, Oregon, provided materials
- Plate Tectonics CD-ROM: supplied introductions to geothermal experts to assist in adding a geothermal chapter to the Tasa Graphics CD-ROM, with Idaho National Engineering and Environmental Laboratory, U.S. Geological Survey, Energy and Geoscience Institute and U.S. DOE Office of Geothermal Technologies
- Project Wet, Council for Environmental Education (nationally lauded program): co-authored and edited geothermal supplement to accompany Project Wet Curriculum, with University of Montana and Idaho Water Resources and Research Institute, U. Idaho

- San Diego Science Teachers Fair: provided materials, w/ Magma Power Co -- now CalEnergy
- The NewsHour with Jim Lehrer (PBS): provided video and materials used in a story on electricity deregulation seen on more than 250 public television stations across the country
- Wheelabrator Energy Resource Fair, Anderson, CA: staffed booth/provided materials, with Calpine Corporation
- World Renewable Energy Conference, Denver, CO: gave talk on energy education, provided materials to conference attendees
- World Energy Congress, Houston: staffed booth, provided speakers for student workshop, provided materials and video, with US DOE Office of Geothermal Technologies

GEO also participates on several committees and boards to promote understanding of geothermal energy:

- Educational Committee of the California Renewable Energy Marketing Board (coordinates K-12 educational efforts in support of California Energy Commission program for dissemination of public information about renewables under deregulation).
- Geothermal Educational Outreach Committee, whose purpose is to offer assistance and coordinate the public information efforts of entities receiving support from U.S. DOE for geothermal educational purposes.
- Education Committee, International Geothermal Association
- Public Information Committee, Geothermal Resources Council.

RECOGNITION AND AWARDS FOR WORK PERFORMED UNDER THIS CONTRACT

National educational and energy publications that recommend the Geothermal Education Office as a source of information about geothermal energy (partial list):

Resources for Teaching Elementary School Science: 1996: National Academy of Sciences/Smithsonian Institution, National Academy Press

Resources for Teaching Middle School Science: 1998, National Academy of Sciences/Smithsonian Institution, National Academy Press

Energy Education Resources: Annual, Energy Information Administration, US. DOE

National Energy Education Development Project (NEED): since 1989

Directory of Education-Related Information Centers: Annual, (ERIC)

Vertical File Index (Geothermal Resources) -- for Libraries. Annual, H.W. Wilson Company

California Energy Commission, Compendium of Science Resources. Recommendation of geothermal curriculum, 1997

Awards and Honors

- GEO's Executive Director received the Geothermal Resources Council Special Achievement Award in recognition of the Global View Map, a world map with country by country geothermal power and direct use statistics.
- GEO's Geothermal Energy Curriculum is included in the Smithsonian Institution and National Academy of Sciences' *Resources for Teaching Science to Students*

Following are selected comments of those served by the Geothermal Education Office.

"I hope this short note will express my gratitude and admiration for the fine work you're doing . . . most recently brought to mind by the handout packages that you prepared for a briefing, concerning geothermal energy, that I had to give to the CIA. . . . The geothermal video is also an excellent resource . . . we're very fortunate to have it available through your efforts."

John Finger, Sandia National Laboratories

"My class is studying energy, and I was assigned geothermal energy for my project. . . . I love this website. It's not boring like other educational ones."

Sara Miller, 6th Grade, Holbrook Middle School, Maine

"Yesterday, I had the pleasure of viewing your fine geothermal video. It totally blew me away. An order of magnitude better than anything else on the subject, and just the right tone for educating folks about the benefits of clean green geothermal energy. Great Piano too. My congratulations."

Jeff Hulen, Energy and Geoscience Inst., U. Utah

Statement of Work

Geothermal Education Office

1. SCOPE AND OBJECTIVES

The objective of this effort is to develop, publish and distribute educational information on geothermal energy.

2. BACKGROUND

The Geothermal Education Office is an educational non-profit organization. It's targeted group are teachers and students in kindergarten through 12th grade.

3. TASKS

The following tasks are considered to be representative of the work that will be done through this grant. Many of the tasks are ongoing or level of effort and do not necessarily have a milestone completion date.

3.1 Provide "hotlines" to give teachers, students and others easy access to information about geothermal energy, provided both by the Geothermal Education Office and by referral to other appropriate individuals and organizations.

- Maintain "800 number.
- Respond to mail/telephone requests for info. [*approx. 2000/yr*]
- Maintain homepage on the *World Wide Web*, with links to other important geothermal and renewable energy education organizations.

3.2 Encourage student interest in geothermal energy.

- Write articles for student periodicals.
- Coordinate booths/demos at science and environmental fairs.
- Arrange for exciting classroom speakers
- Provide age-appropriate materials on geothermal energy.

3.3 Encourage teachers interest in geothermal information.

- Distribute free information to schools and at teacher conferences.
- Do pro-active mailings to educators.
- Encourage continued interest by sending updated materials to teachers who requested/received information about geothermal energy prior to 1994 [*approximately 2500*].
- Participate in science/social studies association conferences.
- Organize Teacher workshops with presenters from the geothermal industry.
- Publish articles in Science, Social Studies and Environmental Education periodicals.
- Participate in teacher/administrator curriculum fairs.

- 3.4 Develop and publish geothermal curriculum.
- Fact sheet and brochures.
 - Introductory video tape "An Underground Adventure" (Consider update).
 - Refine concept/proposal for CD-ROM interactive video.
 - Develop model to demonstrate use of geothermal energy for use by industry speakers as well as teachers.
 - Posters.
 - Lesson plans/activities for all grades *fi.e., grades 4-8 and 10-12*.
 - High school level video, 27 min. 40 sec. (to conform with time requirements for PBS broadcasts).
 - Guide sheets (for each grade level) - for teachers and industry speakers; includes activities and list of power plants available as field trip resources. To accompany teacher information packets sent in response to hotline and to publish in GRC Bulletin for industry.
- 3.5 Coordinate upgrade of existing information about geothermal energy published in textbooks and encyclopedias, and in environmental and energy curricula.
- Textbooks: work with Science and Social Studies Framework committees in Sacramento, CA; write letters to publishers.
 - Encyclopedias: coordinate with Geothermal Resources Council.
 - Other energy and environmental curricula.
- 3.6 Expand Geothermal Education Office's library to make videos and written resources more easily accessible to teachers and students.
- 3.7 Encourage school administrators to initiate and support inclusion of geothermal energy in their schools' energy curricula, and in social studies as well as in science.
- Participating in conferences for school administrators
 - Publish brochure/newsletter articles for school administrators
 - Publish brochure for distribution to school administrators.
- 3.8 Encourage/coordinate geothermal industry members to participate in school classroom activities, teacher workshops conferences and science fairs, and to initiate speaking opportunities.
- Provide industry members with suggestions and "tools" (see 3.4).
 - Give flaks at industry conferences and meetings and publish suggestions in industry publications with accompanying articles encouraging industry involvement in the classroom and community events.
- 3.9 Coordinate and keep updated industry "response" letters which can be sent in a timely fashion by the Geothermal Education Office to newspapers, periodicals or other publications who have omitted or misinformed the public about geothermal energy.
- 3.10 Coordinate communication among the Geothermal Education Office and industry, utilities, government agencies, environmental groups an other energy education groups. Publish articles in appropriate industry periodicals; participate in relevant conferences.