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17th ANNUAL MEETING September 24-27, 1980
Mobile, Alabama

"WASTE DISPOSAL - APPROACHING NATIONAL CRISIS?"

This was the timely theme of the program at our national meeting of the Institute in Lafayette, Louisiana held September 19-22, 1979. The speakers were experts in the field of hazardous waste, and the message was clear: Geologists can and should have a tremendous impact on solving the problems of hazardous waste disposal. They should get with it, because decisions are now being made almost exclusively in the political and social realm. Hazardous waste needs an even-handed approach, scientifically looking at the worst problems first.

H. W. Coulter, Assistant Director U. S. G. S., told the audience that the "Clean Water Act" changed the location of contaminants from streams to localized burial sites -- which is adversely affecting ground water. He noted that streams can be flushed almost instantly, the rate being measured in feet per second. Ground water movement is usually measured in feet per year and contamination may be forever. Non-nuclear waste is really the big problem, and it is contributed to by every city, county and state in the U. S. There are estimated to be 20,000 land fills in the U. S. which have been established with no regard to future contamination of the ground water.

Dr. Joseph D. Martinez, environmental specialist with LSU, placed the problem in perspective. Based on a population of 200 million, he stated that agricultural waste accounts for 10,000 kg/person/year. Municipal waste accounts for 1,300 kg; industrial waste contributes 1,100 kg; non-radioactive 50 kg; and low-level radioactive less than 0.1 kg/person/year. The public interest in nuclear waste is in the short-term, whereas the scientific interest should be in the long-term. He stated that we can reduce the 150,000 year long-term problem to 700 years short-term by reprocessing alone. (President Carter will not allow reprocessing of spent fuel because some plutonium is generated in the process). Martinez noted that \$35 million has been spent on nuclear waste disposal, which may in itself kill nuclear power. No such comparable amount has been spent on chemical wastes. He concludes that nuclear disposal is no big problem and is solvable, and that we should get on with it.

Dr. Linn Draper of Gulf States Utilities Company speaking on nuclear high-level waste disposal, stated that the military produces the largest amount of such material and that it is stored as a liquid at three loca-

tions in the U. S. He noted that reprocessing would reduce uranium mining by 40 percent and reduce waste by 35 percent. After reprocessing, spent fuel cools in six months and offers great ease in transportation. Actually, cesium and strontium constitute most of the end product of reprocessing, and these have a half life of 30 years. The other elements have a long life, but constitute only a minute amount of the total. The problem reduces itself to the disposal of a relatively small volume of highly radioactive material. We have been studying various methods of disposal for the past 15 years, including the following repositories: salt mines, bed rock caverns, tectonic plates, polar caps, the sun, and transmutations in fusion reactors. Draper says that waste disposal is a relatively straightforward problem, but politically, it is something else. Coulter pointed out the advantage of surface storage of nuclear waste for 50-75 years to allow for dissipation of heat, which would also give us time to find a possible use for the spent fuel.

Mr. Jim Hutchinson, dynamic director of the Louisiana waste disposal problem, told how the State has solved all of its hazardous waste problems (with the exception of sewage contamination in streams). The Governor gave Mr. Hutchinson full authority as a businessman to formulate a plan that would rid the State of Louisiana of hazardous waste dumps, chemical ponds from industry, etc., set up industry monitoring schedules which would prevent ground water contamination, and still encourage industry to locate in Louisiana with a specific set of guidelines and requirements that would allow them to operate profitably within a clean environment. He sought their input and cooperation in solving the problem. He alone would make the final decisions, so there would be no obstructionism or walking out if they wanted their ideas to be considered. The project was completed in six months, and believed to be a model for the nation. It is expected that it will take the EPA three years to give formal approval for the plan, but it is already underway in the State of Louisiana.

No state is without its waste disposal problems. Perhaps the AIPG could define and give direction to the problem in the U. S.

William A. Newton CPGS 8

BUSINESS AFFAIRS OF THE INSTITUTE

Annual Meetings:

17th Annual Meeting - Mobile, Alabama
September 24 - 27, 1980
General Chairman: Jack H. Bryan
Headquarters Hotel: Hilton Inn-Mobile

Other Annual Meetings:

18th Annual Meeting - Williamsburg, Virginia
November 5 - 7, 1981
General Chairman: John Kent Kane II
19th Annual Meeting - Pasadena, California
October 13-16, 1982 (NOTE: DATES NOW SET)
General Chairman: Howard T. Anderson

AIPG NATIONAL COMMITTEES

AGI Governing Board Representative
Edward E. Rue

Annual Meetings Committee
A. Wayne Wood, Chairman

Awards Committee
Adolf U. Honkala, Chairman

Consultants Committee
Russell G. Slayback, Chairman

Cooperative Evaluation Committee
Richard M. Winar, Chairman

Employment Survey Committee
Wallace B. Howe, Chairman

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Paul DuMontelle, Chairman

Ethics Committee
Rudolph K. Hoagberg, Chairman

External Appointments Committee
Raymond C. Robeck, Chairman

Headquarters Committee
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Fred L. Stead, Chairman

Legislative & Regulatory Committee
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Professional Employment Standards
Ralph H. Espach, Jr., Chairman

Professional Guides Committee
Daniel N. Miller, Jr., Chairman

Public Affairs Committee
Randall T. Chew, III, Chairman

Registration Alert Committee
William E. Cutcliffe, Chairman

APPLICATIONS RECEIVED

BOWLBY, David C.; J.W. Caylor; F. A. Melton; H.W. Hanke; L.G. Vaughan; H.R. Green
CARLSON, William A.; L.T. Grose; K.F. Reighard; E.C. Pendery; R.T. Zitting; R.C. Barkley
DIONISIO Leonard C., Jr.; H.W. Hanke; H.A. Brown
D.F. Lasseter; L.R. Reichardt; J.P. Rolla
EDWARDS, Louis G.; (No sponsors submitted)
FENSTER, David F.; C.W. Houlik; D. Ballman; P. Conroy; L. Kettren; R. Winar
GIBBS, Gregg Mark; B.G. Hammock; O. Van Eck; D.A. Stephenson; R. Hennings; R.C. Anderson
GILLESPIE, Jack D.; J.R. Brooks; D.G. Ellingwood; J.D. Haun; E. M. Warren; R. J. Weimer
ISPHORDING, Wayne C.; J.H. Bryan; J.F. Riccio; T. Simpson; J. Warman; T. Hughes
JENKINS, Ernest B.; J. Avila; L. R. Ponsetto; P.J. Brown; P. M. Miles; H. M. Morgan
KANTNER, David A.; D. E. Bush; T. A. DeBrosse; J.M. Ewing; M. Durham; S. Flynn
LAMB, George M.; J. H. Bryan; T.J. Joiner, J.C. Warman; T. Hughes; T. Simpson
MILLER, Edward G.; W.W. Hammond; K.J. Koenig; R.W. Maclay; C.C. Mathewson; T. A. Small
SAVAGE Robert J.; H.R. Dixon; V. H. Greenwood; F. Dorheim; W. Sheftick; J. Meyers
SCHWIND, Robert E.; C. Bailey; M. Davis; W. Lyons; D. Little; E. Bruner; A.V. Morris
SELF, Donald M.; T.L. Neathery; P.H. Moser; R. Lipp; G.V. Padgett; C.C. Wielchowsky
WOLFERT, Michael F.; J. Isbister; D.W. Miller; R.L. Stollar; M. McEachern; N. Valkenburg

If any Member has any recommendations, positive or negative regarding the qualifications of any of the above applicants, please mail your comments to General Headquarters within 30 days. Your comments will be held confidential within the Executive Committee and Screening Board of the local Section.

NEW MEMBERS

AUSBURN, Ronald G. #4606; Camillus, NY
BAILEY, Clive R. G. #4605; Naturita, CO
BAUGH, Ronald A. #4607; Casper, WY
BENSON, Anthony L. #4608; Lake Forest, IL
DOWNING, Kenneth G. #4609; Englewood, CO
HADDAD, Richard Y. #4610; Washington, PA
PAGE, Norman J. #4611; Houston, TX
PARRISH, I.S. #4612; Arvada, CO
SMITH, Louis D., Jr. #4613; Bismarck, ND
WIERSUM, Keith A. #4614; Midland, TX

Please take a moment and welcome these new members. If they are in your area, give them a call - if not, drop them a note. This can go a long way in helping to strengthen our Institute.

AIPG MINERAL RESOURCE POSITION STATEMENT

In the July issue of "The Professional Geologist" appeared the condensed version of the AIPG Mineral Resource Position Statement. Headquarters has available both the full-length version and the condensed version of this statement, and if any AIPG members knows where copies of these statements could be distributed and utilized, please send those names and addresses to AIPG Headquarters, P. O. Box 957, Golden, CO 80401 and copies will be mailed.

Support for the new Dues Support Committee has been high. The Institute appreciates this show of support from the membership. The names of the members of the 1979 Dues Support Committee will be printed in the 1980 Membership Directory which will be printed during February, 1980. The total amount raised from Dues Support as of December 31, 1979 is \$8,500.00

APPOINTMENTS GEOLOGISTS CAN FILL

The AIPG External Appointments Committee is trying to assist Federal and various State officials fill vacancies in their departments. At this time there are the following vacancies:

1. Director - U. S. Bureau of Mines - Presidential Appointment
2. U.S. Bureau of Land Management - Director of Energy and Minerals Division, Washington, DC

AIPG now receives a weekly listing of nearly all Federal vacancies. The above listings are for GS-15 or higher only.

If you are interested in any position or know of other vacancies, please contact Ray Robeck, Chairman of the External Appointments Committee (303) 233-4748.

OTHER VACANCIES

CONSULTING GEOLOGIST - Specialty in exploration for oil and gas in Rocky Mountain area. Must have knowledge of U. S. Government Oil and Gas Lottery procedures. Send resume to Sam Stier, 620 NW 76th Terrace, Plantation, FL 33324 (305) 473-1643. All replies confidential.

GEOHYDROLOGIST - To work with interdisciplinary group investigating Gulf Coast salt domes. Specific tasks will include: electric log correlation; mapping aquifers and groundwater quality variations; designing groundwater investigations to determine local geohydrology of salt domes; supervision of observation well construction; monitoring of observation wells. Advanced degree and/or equivalent experience related to above described duties required. Preference will be given to candidates who have a Ph.D. degree and who have experience and training with hydrochemical studies and hydrodynamic modeling as well as field experience with other standard hydrogeological techniques. Salary commensurate with training and experience. Position available immediately, extending through September 30, 1980 and subject to continuation of contract funds. An equal opportunity employer. Submit resume and 3 references to Dr. J. D. Martinez, Institute for Environmental Studies, 42 Atkinson Hall, LSU, Baton Rouge, LA 70803 (504) 388-8521

The proceedings of the 16th Annual Meeting held in Lafayette, Louisiana will be available for sale in late January. The proceedings are too cumbersome to print in "The Professional Geologist" as in the past. An announcement will be made through "The Professional Geologist" as to how to order the proceedings and the cost.

1980 DUES STATEMENTS

The 1980 Dues Statements were mailed to the membership on November 2, 1979. If you have not received your statement, please call Mrs. Dare at AIPG Headquarters. Please note that on the back of your statement is listed your personal information for the membership directory. The first item in that listing is your computer ID. This is the number that is used to find your information in the computer. Headquarters would appreciate it very much if you would not cross out or mark out that number. It is not your certificate number. Your cooperation will be greatly appreciated.

WESTERN WATER ALERT
Raymond C. Robeck, CPGS 13

A resolution will be introduced at my request in January, 1980 into the Colorado Legislature for the purpose of forming a 10-state legislative committee on water and energy development. The idea is to form a western legislative coalition along with the western governor's coalition to have more effective political clout in Washington, DC.

Geologists in the 10 state area are asked to study the resolution and hopefully influence their state legislature to join the 10 state commission.

For further information, contact Ray Robeck at (303) 233-4748

JOINT RESOLUTION

WHEREAS, the national energy policy of the United States will require extensive development of energy resources in the Western states; and

WHEREAS, such development will require significant quantities of water, which is in short supply in the Western states; and

WHEREAS, the use of water for energy development should preempt neither existing state water law and administration nor current uses of water; and

WHEREAS, the development of water resources is a necessary prerequisite to development of energy resources and accomodation of related growth; and

WHEREAS, the people of the entire United States will benefit from energy production in the West and should share equally in the development costs associated with such production; and

WHEREAS, the Western states face the common task of communicating to the Congress of the United States and the President of the United States the

problems, including development of adequate water resources, which will be encountered in energy development, and because it should be recognized that many of these problems are common to the Western states, and

WHEREAS, effective communication will require that the Western states present a unified voice on the problems associated with energy development in the West; now, therefore,

Be It Resolved by the _____ of the Fifty-second General Assembly of the State of Colorado, the concurring herein:

(1) That the General Assembly hereby invites the state of Alaska, Arizona, Idaho, Montana, New Mexico, Oregon, Utah, Washington, and Wyoming to participate in a joint effort to influence the development of national energy policy and urges, as an initial step towards such a joint effort, the formation of a Western States' Committee on Energy Resource Development comprised of two representatives from each state. The General Assembly urges the legislatures of the aforementioned states to consider a similar resolution to approve formation of the committee. The committee shall be formed upon approval by eight of the states.

(2) That it shall be the purpose of the Western States' Committee on Energy Resource Development to identify issues which are related to energy development and which are of common concern to the member states, to communicate the problems associated with energy development to the Congress of the United States and the President of the United States, and to develop strategies to ensure that energy resources in the member states are developed in an orderly fashion and that water resources which are adequate to support the development of energy resources and related growth are available when needed.

(3) That the General Assembly hereby approves formation of the Western States' Committee on Energy Resource Development. The representatives from the State of Colorado to the Committee shall be the Speaker of the House of Representatives and the President of the Senate, or their respective designees.

(4) That the General Assembly hereby invites the Western States Committee on Energy Resource Development, upon formation, to meet in the State of Colorado.

(5) That the Colorado representatives to the committee shall be considered members of an interim committee of the General Assembly under the provisions of section 2-2-307 (9)(a), Colorado Revised Statutes 1973, and shall be compensated and reimbursed for necessary expenses incurred in accordance therewith. Vouchers covering Colorado's share of the expenses of the committee shall be signed by a Colorado representative to the committee, and warrants shall be drawn by the state controller in payment thereof as provided by law.

(6) That copies of this resolution be sent to the President of the Senate and the Speaker of the House of Representatives of the states of Alaska, Arizona, Idaho, Montana, New Mexico, Oregon, Utah, Washington and Wyoming.

AIPG MINERAL RESOURCE POSITION STATEMENT GAINS SUPPORT

Reprinted from Rock Products

A refreshingly enlightened approach to mineral resource development is contained in a recent position paper from the American Institute of Professional Geologists. Is it too much to hope that such a document might be read by decision-makers, understood, even acted upon?

Is the world running out of materials? "In a real sense, technology creates mineral reserves. Traditionally, valuable ore deposits have been depleted first. Technology, however, has made it possible to recover low quality ores (often left behind in prior mining) and to extract ore from former waste piles . . . How minerals are viewed and handled by society has far more influence on mineral availability than the actual amount in the ground or in the ocean."

Can the damaging conflict between national needs and local desires ever be resolved? "A way must be found to compensate communities from which minerals are produced for our nation proportionately to the value to the nation of the mineral produced. Alternately, compensation might be proportional to the need to construct new infrastructure . . . and/or labor requirements. The public hearing process, often required before mineral deposits can be developed, should be revised so that the long-term interests of the nation are more clearly represented."

Underground mining should be encouraged. "If only 10% more of the production of the U. S. were to be produced from underground, the nation would gain about 1¼ billion cubic feet of 'conservation space' per year. This is roughly equivalent to 125 million square feet of choice industrial space or to additional storage capacity for 296.8 million bbl of oil per year."

Our lack of sound mineral policies has had global effects. "Not generally realized is the U. S. is responsible to a large extent for the continued high energy prices in the world markets. This in turn has had two effects on the less developed nations: (1) it has forced them to burn huge quantities of wood for fuel and (2) it has caused the price of fertilizers to rise by a multiple factor. These two things are largely responsible for the greatest rate of environmental degradation in the history of the world's civilizations . . . it is, perhaps, paradoxical that our recent failure to develop our energy resources has largely been for environmental reasons; thus in many ways our environmental desires have proven to be environmentally destructive on a worldwide basis.

And improving our own environment means more minerals. "Many things which are considered environmentally important, such as removal of sulfur dioxide from stack gases, expansion of solar and wind power, and the collection and treatment of sewage, will require large amounts of mineral materials -- far more than are currently used if these environmental amenities are further implemented. Much of the cost of such environmental benefits is in the cost of minerals and the mineral-derived energy required to produce them."

A MEMBER SPEAKS OUT

Dear Sirs:

I have received a copy of your announcement of the "Conference on Reserve Recognition Accounting for the Petroleum Industry" scheduled to be held at the Whitehall Hotel, Houston, Texas November 1-2, 1979.

While your list of speakers is impressive, it is seriously flawed by the lack of a qualified petroleum geologist.

Exxon, the worlds largest oil and gas company uses geologists exclusively to determine reserves of oil and gas. I know because I worked for Humble Oil and Refining Company in the Reserves and Evaluation Section.

Your use of the "Engineers Role" in estimating or auditing reserves is a serious error. The engineers qualifications end at the "bore hole". His expertise is limited to the saving and handling of oil or gas above ground as it is delivered for sale. To provide reserve data is exclusively the role of the geologist; proven reserves are in the rocks beyond the bore hole below the surface of the ground. Only geologists have the knowledge necessary to predict the magnitude and extent of these reserves.

Accountants and engineers will be on "thin ice" when they "disclose the value of estimated future net revenue" if the proven reserves are provided by anyone other than a qualified geologist.

I am today sending copies of this letter to organizations representing qualified geologists.

Yours very truly,
/s/ Arthur H. Trowbridge

cc: Division of Professional Affairs, AAPG
American Institute of Professional Geologists
Society of Independent Professional Earth Scientists

PROFESSIONAL PARAGRAPHS

Charles J. Mankin, CPGS 1415 and Robert H. Paschall, CPGS 118, have been appointed to the six-man Technical Review Committee on validation of domestic oil and gas reserves estimates. The Committee is advisory to the Energy Information Administration of the U. S. Department of Energy. Good luck!

Earl G. Tarr, CPGS 823 is pleased to announce the opening of an Appalachian Energy Management Division office at 6660 Doubletree Avenue, Ste. 6, Columbus, Ohio. Earl will serve as Manager, Natural Resource Development. Congratulations, Earl!

Ernest E. Wahlstrom, CPGS 69 has published a new book entitled OPTICAL CRYSTALLOGRAPHY, 5th Edition (488 pp., \$22.95). The book offers a modern and comprehensive treatment of the theory and practice of the study of light-transmitting substances under the polarizing microscope.

Thomas A. Simpson, CPGS 884 - It's a pleasure to announce that Tom has been appointed by Governor Fob James as a member of the Alabama Surface Mining Reclamation Commission. Congratulation and best wishes to Commissioner Simpson.

MEMBERS ACTIVITIES

At the Fall Public Meeting of the Interstate Commission on the Potomac River Basin, in Harpers Ferry, West Virginia on November 1-2, 1979, Peter Lessing, CPGS 2496 and Ken Weaver, CPGS 1064 presented substantial parts of the program. The focus of the meeting was on water in the Great (Shenandoah) Valley of Virginia, West Virginia and Maryland, and most attendees were from that part of the Upper Potomac Basin.

In the part of the program dealing with constraints, Pete gave an excellent slide show and discussion of the geology of the Valley, concentrating on its groundwater pollution because of man's inconsideration of the limestone plumbing system. He provided the lead-in for discussions of hydrology by a U. S. G. S. surface water expert, and of soils by a West Virginia University soil scientist.

Following a session on problems, which had a "geologist-planner" and a "hydrogeologist", but lacked a professional geologist, the session on solutions turned to a panel with Ken Weaver as one of the nine panelists (planners, hydrologists, sanitary engineers, etc.) who remarked about what they had heard so far, and responded to questions from the audience. Ken discussed the appropriate roles for the three levels of government -- Federal, State, and Local, and remarked that as the planner must be a translator, it is up to the geologist to provide him with an understanding of the geology; thus the geologist must be a translator, too.

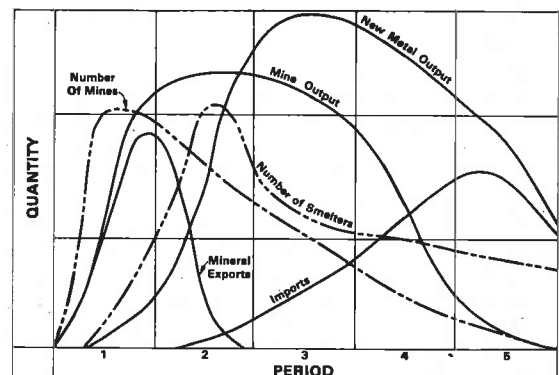
The attendees were treated to stellar performances by both of these AIPG members, who showed that they not only know their subjects, but are able to communicate it to this kind of audience -- an exemplary characteristic.

Allen F. Agnew, CPGS 240

THE GOOD NEWS

Randall T. Chew, III, CPGS 3575
Chairman, AIPG Public Affairs Committee

John Eliot Allen (CPGS 925), a member of the Public Affairs Committee sent me a copy of a diagram prepared by D. Foster Hewett for the AIME Transactions back in 1929, the year I became three years old. Hewett's paper had the title "Cycles in Mineral Production" and the graph, reproduced here, analyzes the normal history of mineral exploitation in a nation as he saw it.



CYCLES IN METAL PRODUCTION (Hewett, 1929)

AIPG WASHINGTON REPORT
Legislative and Regulatory Activity Watch List

Compiled monthly by your Legislative and Regulatory Committee, Larry D. Woodfork, Chairman, Morgantown, WV and AIPG Washington Legislative Counsel, James U. Hamersley, 1800 M Street NW, Ste. 1040, Washington, DC 20036 (202) 223-8200

SENATE AND HOUSE BILLS

| <u>Bill No.</u> | <u>Description</u> | <u>Sponsors</u> | <u>Hearing Schedule</u> | <u>Committee Status</u> | <u>Final Deposition</u> | <u>AIPG Input</u> | <u>AIPG Position</u> |
|-------------------|---|-------------------|--|--|--|--------------------|---|
| HR 3636 | Alaska Lands | Udall (D-AZ) | Completed | Sent to House | Passed House as HR 39 with language of HR 3651 | Previous Testimony | |
| S 9 | Alaska Lands | Jackson (D-WA) | | Reported out HR 39 with amendment in nature of substitute. Language of substitute is similar to S9. | | | |
| S 222 | Alaska Lands | Durkin (D-NH) | | No action by full Committee | | | |
| S 1176 | Alaska Lands Would restrict executive's ability to withdraw lands | Gravel (D-AK) | Completed | | | | |
| S 366 | 1872 Mine Law Revision | Jackson (D-WA) | None | Hearings Possible | | | |
| Bill to be intro. | RARE II Lands (roadless area review evaluation) Numerous bills dealing with individual areas or states | | | House & Senate Committees have scheduled hearings this week on several bills recommending wilderness areas on a state by state basis. House floor action is possible week of Dec. 10 for Colorado bill | Testimony 2-8-79 | | Geological evaluation for future potential required before any land withdrawals. AIPG encourages passage |
| HR 990 | Non-Profit Corporation Tax Reform | Conable (R-NY) | None | Refer to Full Ways & Means Comm. | | | |
| HR 3919 | Windfall Profits | Ullman (D-OR) | Completed. Senate hearings 2-25-79 | Senate debate continues. It now appears unlikely that Senate will comply with Admin. request to strengthen Senate Finance Comm. Bill | | | |
| S 82 | Petroleum Industry Competition Act (Vertical Divestiture) | Bayh (D-IN) | Pending Anti-trust Subcom. No action sch. | Bill not given a chance of passage; Senate hearings | | | AIPG opposes divestiture |
| S. 600 | Antimerger of petroleum companies | Kennedy, (D-MA) | See S 1246 | | | | |
| S 1246 | Petroleum Industry Competition Act | Metzenbaum (D-OH) | Full Comm. Hearings 10/16-19/79 | Precedence given to S 1246 Senate Judiciary Comm. reported out with changes. Slight possibility will be offered as an amendment to HR 3919 | | | AIPG opposes divestiture |
| HR 8 | Prevents 8 major oil companies from obtaining federal coal and uranium leases | Udall (D-AZ) | | Defeated in late June by 6-21 & 7-17-79 no further action anticipated this session. | | | |
| S. 1637 | Onshore Oil & Gas Leasing (Embodies Administrations proposal) | Jackson (D-WA) | Energy Resources Subcommittee 10/12/79 | | | | |
| HR 4373 | Companion to S 902 | Miller (D-CA) | None scheduled | No hearing anticipated until next session Admin. draft bill submitted; no interest shown (House Interior) | | | |
| HR 5236 | Competitive Oil and Gas Leasing | Peyser (D-NY) | Nothing pend. | | | | |
| S 493 | Deep Seabed Mining Act | Melcher | Completed | Reported out of committee pending on legislative calendar; floor action this week | | Previous Testimony | |
| HR 2759 | Deep Seabed Mining Act | Studds (D-MA) | Foreign Affrs. Hearing sched. tent. 12-10 | Reported out Interior Comm 8-2-79; Merchant Marine 8-17-79; Ways & Means 11-2-79 | | | |

The diagram shows five periods.

1. Period of mine development; exploration, discovery of new districts, boom towns, many small mines working, first recognition of large deposits and development of large mines, rapidly increasing metal production.

2. Period of smelter development; few new discoveries, small mines becoming exhausted, increasing output from large mines, many smelters competing for ore.

3. Period of industrial development; decreasing costs, increasing standard of living, rapid accumulation of wealth, expanding internal and external markets, approaching zenith of commercial power.

4. Period of rapid depletion of cheap domestic raw materials; increasing mining costs, more energy required to get same amount of material, potential for bitter commercial struggle with competing raw material sources, some foreign markets lost, some foreign goods appear at home -- first raw materials and agricultural products, then manufactured goods.

5. Period of decreasing internal and external supply; increasing dependence on foreign sources of raw materials with increasing costs, decreasing living standard with attendant social problems and political unrest, tariff, subsidies, cartels, decreasing commercial power. Military pressure may be used to strangle competition or seize control of new raw material sources. Attempt make to acquire cheap foreign sources first through commercial control but later, perhaps, through political control. International friction can result from this attempt.

Allen points out that in 1938, when World War II began in Europe, Rhodesia was in stage 1, Canada was in stage 2, the Soviet Union was near the end of stage 2, the U. S. was nearly through stage 3, Germany was in stage 4, and Great Britain was in stage 5. World War II accelerated passage by the world powers through the various stages. All of the industrial countries of the world are now in some state of Period 5, precipitated by a combination of developmental old age and the over-zealous self-interest of some environmentalist groups.

Hewett did not indicate what happens after Period 5. We can expect the passage of time to remain a continuum at least until advent of the millenium (By Jove -- religion in science!) Something will happen after Period 5. In Hewett's time, probably no developed country had yet gone through all five periods. At least, I can't think of one. Hewett stood at the top of the hill looking down into a vast unknown.

Metal production has gone through only one Hewett cycle since the Industrial Revolution. This suggests that the cycle may not be complete. There will be a "Period 6" -- barring the millenium.

The Industrial Revolution resulted from man's desire for material things, personal conveniences, and healthful living leading to longevity. Man by his nature just does not want to kill his food with a stick, live in mud huts or a teepee, and die at age 35. That this is true is demonstrated by the materialistic desires of "Less Developed" countries (LDC's) and their willingness to literally fight for creature comforts they consider desirable. I am not impressed by radical statements of back-to-nature groups promulgated over TV by a jet-set pasha. In fact, little genuine environmental concern is expressed outside the U. S. and some European countries. There is no 55 mile per hour speed limit in Canada, Mexico or anywhere else that I know of. No anti-nuke demonstrations are held in Nigeria to my knowledge. A Department of Energy

official recently stated that contracts with DOE for uranium enrichment have been cancelled by companies in Germany, the United States, Spain, Iran, Sweden, and Portugal. Several other contracts from the U.S. Israel, and Thailand, were assigned to Korea and Taiwan. With the exception of Thailand and Iran, the countries dropping contracts and, by inference, reducing their nuclear power plan are "developed". Those accepting some of those contracts are LDCs who have the purchasing power to increase their energy use. There are ample signs that LDCs, which are in Periods 1 or 2 of the Metal Production (or Consumption) cycle, are just itching to get on to Period 3. It follows, then, that they will continue to Period 5.

I propose that Hewett's cycle is only a single wave and not yet complete. The developed countries have gone through the wave at varying rates. Allowing for the side effects of the developed countries having used all their readily accessible minerals, plus a considerable amount of the rest of the world's accessible minerals, the LDCs will go through the cycle too. They may go faster because they have us for a guide on how to do it. Period 6 will follow as the night the day and that, surprisingly, is the Good News.

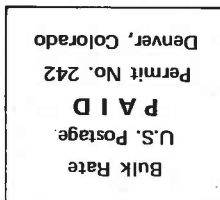
Our Chicken Little environmentalist acquaintances would have us believe that time will stop if we don't move back to the teepee. They seem to forget that time is a continuum and LDCs (with lots of teepee experience in their recent past) will insist on moving up. If we are smart, we will plan to be part of it. Any other thinking is unrealistic - not that we don't see unrealistic thinking everyday at all levels of influence. We can sit around and watch the LDCs sail by or we can join the show and maintain our position. The choice is ours whether to join the party, but there will be a party. That, too, is Good News.

Period 6, I submit, will be an era of less accessible, more expensive raw materials. The expense of raw materials and energy will lead to their conservation, but the world's populace will be willing to pay more to retain or gain material conveniences. Technology will be developed in the areas of scrap recovery and minerals processing to use less energy. Alternate forms of energy will be developed as "conventional" sources are depleted and cost becomes unbearable. Environmental concerns will be important, and there will be much research toward methods to preserve the environment balanced with decreased energy consumption per unit produced and high raw material cost per unit produced. An optimist looking past the Carters, Brezhnev's, Friends of the Earth, and the Sierra Club can see a hint of such happenings now.

The role of environmentalist groups in Period 6 is problematical, but most significant. Their forces are centered in the industrial countries. They provide a conscience for a populace accustomed to Periods 3 through 5. However, related paranoid fringe groups threaten to upset the balance between the industrialized "Period 5" countries and the semi-industrialized "Period 1" LDCs. What these fringe groups view as reactionary conservatism is actually a forward-thinking attempt to maintain economic and cultural balance as the whole world completes Period 5. They forget that all people have the same goals: comfort, full bellies, and health.

To survive Period 6 we must have the cooperation of all people including that paranoid fringe of the environmentalist groups or we must neutralize the fringe so it becomes ineffective. We cannot afford paranoia just because it makes good conversation, or

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self-flagellation because it feels too good to stop. We the people, can neutralize the nuts, not by legislating them out of existence, but by getting our ears on straight and filtering short-term gibberish through the circuit of long-range realities and inevitabilities. "The people" must understand that 1) raw materials and earth-bound energy sources are finite at a given cost level, but not always finite at higher cost levels 2) thus total non-use of raw materials and energy is not required or even desirable but care and technological advances are required, 3) the majority of the world's population will continue to seek and gain material happiness regardless of what we do and we can stay in the mainstream or be shunted aside to stagnate. In short, Period 6 will follow Period 5 and we can't stop it (The Good News - Got that?) Stagnation is not a desirable condition because stagnated cultures always are eliminated. Once most everyone understands this we will be able to get on with the transition and by making strong moves nationally we may be able to maintain or regain our world leadership.

The geologist is one who understands what will happen because he supplies raw materials and energy. He must transfer his knowledge to those about him, an unfamiliar role perhaps, but one he must assume. The role of the geologist should be self-evident to geologists. The science of geology can carry its share of the technological load and, given a self-regulating economy as opposed to artificial regulation by a meddling government, can deliver the goods. When we can no longer deliver, we'll be the first to know. We have a message of "Good News." The sky will not fall at the end of Period 5. Let's say it, get on with the job, and join the party.

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