

WoCQI News

Issue 2 February 19, 2001

Keeping you informed on the USGS World Coal Quality Inventory

Introduction

Welcome to WoCQI (World Coal Quality Inventory) News, issue number 2. The WoCQI project is now firmly established and our goal to generate reliable, internally consistent coal quality analyses for all major coal-producing countries is making progress. Note that the newsletter banner indicates project status worldwide.

This newsletter features coal quality results from our cooperative WoCQI study in Turkey with Ertem Tuncali, General Directorate of Mineral Research and Exploration. The coal quality information is linked to sample locations in a GIS, which in the future will include geologic, land use, transportation, industrial and cultural information. The data will eventually be published on the web and accessed through **GEODE (GEO-DATA Explorer; <http://geode.usgs.gov>)** to query, display, and create custom maps. [Contact: Marc Levine (mlevine@usgs.gov)]

Latest developments

At its September meeting in South Africa, the International Committee for Coal Research (ICCR) endorsed the concept of an international coal quality database (WoCQI) and encouraged its members to cooperate with and support this activity. The ICCR requested that we expand the data-gathering effort to include trace element characterization of coal combustion, conversion, and beneficiation products and to publish an overview of coal characterization methods and their application (including quantifying modes of occurrence). We will now seek appropriate samples to develop a broader, more comprehensive database of coal and coal byproduct information.

A fact sheet describing the World Coal Quality Inventory (USGS Fact Sheet FS-155-00) will be available in March. If you are interested in obtaining copies, contact Bob Finkelman at rpf@usgs.gov.

Featured Country: TURKEY

Characterization of Turkish Coals: An example of international cooperation to develop a World Coal Quality Inventory (WoCQI).

By Ertem Tuncali¹, Curtis A. Palmer², and Robert B. Finkelman²

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The Turkish economy is growing rapidly and electrical energy demand is increasing approximately eight percent per year. The annual coal production of Turkey in 2000 reached 67.3 million short tons (61.7 million metric tonnes) in state-run mines plus 5.6 million short tons (5.1 million metric tonnes) produced by the private sector. The U.S. Geological Survey (USGS) and the General Directorate of Mineral Research and Exploration in Turkey (Maden Tetkek ve Arama Genel Müdürlüğü, MTA) are working together to provide a more complete understanding of the chemical properties of coals from major Turkish coal-producing areas. Results of this collaboration are being presented in a paper at the 26th International Conference on Coal Utilization and Fuel Systems [March 5-8, 2001] in Clearwater, Florida and are briefly summarized here.

Tertiary-age deposits suitable for coal formation cover approximately 110,000 km² in Turkey. Geological mapping and drilling to date shows that the extent of the coal-bearing formations is 1473.9 km². MTA estimated the amount of proved recoverable reserves to be 3.9 billion short tons (3.5 billion metric tonnes) in 43 coal fields for which feasibility studies were completed; 68.5 percent of these reserves are suitable for open-pit mining. Most of the Turkish coals are low rank and can be compared and contrasted with low-rank coals found in the Gulf Coast and the Fort Union regions of the U.S.

One sample was collected from most working mines (for a total of 144 samples) to provide a broad regional overview of coals currently being mined in Turkey (figure 1). Generally, partings thicker than 50 cm were excluded in sample collection. A single sample cannot represent a coalfield, thus Figure 1 groups individual samples into nine coal regions, which can at the minimum illustrate national variability. This preliminary study can be used as a basis for further detailed studies in individual coal fields.

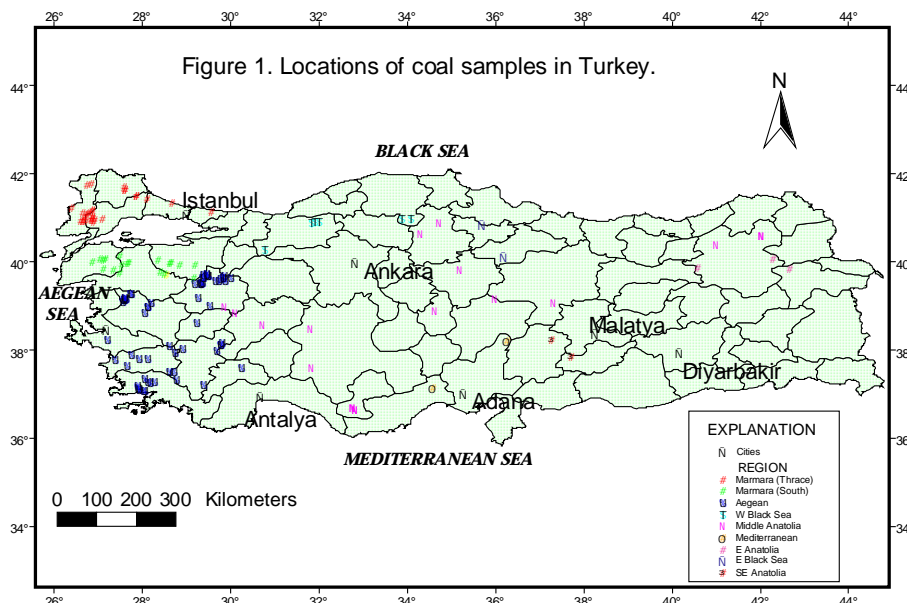


Table 1 shows statistics by region for six selected trace elements on a dry basis. Ash yield, determined by USGS methods, is also presented in Table 1. In general, Turkish regional averages for most of the major-, minor- and trace-elements analyzed are similar to average values of U.S. low-rank coals. One example is mercury, for which Turkish regional means range from 0.079 to 0.15 parts per million (ppm; [dry, whole-coal basis]) and U.S. means are 0.13 and 0.22 ppm for the Gulf Coast and Fort Union regions respectively.

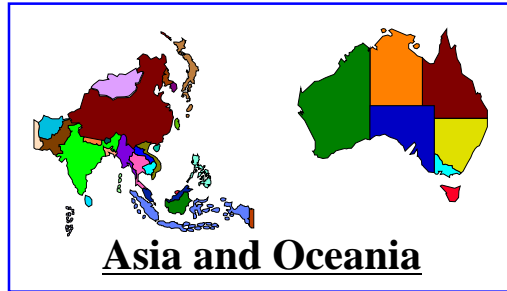
Table 1. Statistics for concentrations of selected trace elements in Turkey by region (dry, whole-coal basis) and U.S. regional values. Percent ash yield determined by the USGS (air-dried basis). [ppm = parts per million, ND = not determined]

	As ppm	B ppm	Cr ppm	Sb ppm	U ppm	Ni ppm	Ash (525 °C)
Marmara Region (including Thrace Basin)							
Average	28	174	48	0.81	2.38	59	22.5
Std. Deviation	34	101	24	0.35	1.42	29	7.3
Maximum	154	439	85	1.43	6.55	110	36.7
Sample Count	28	28	28	22	28	28	28
Marmara Region (Southern part)							
Average	67	341	66	1.4	6.9	198	28.3
Std. Deviation	90	260	87	1.1	4.6	342	12.0
Maximum	346	763	288	4.1	19	1027	50.3
Sample Count	20	20	20	16	20	20	20
Aegean Region							
Average	81	275	116	4.8	21	226	29.4
Std. Deviation	132	256	111	7.8	20	333	13.2
Maximum	686	1308	586	42	132	1681	69.4
Sample Count	64	64	64	60	64	64	64
Western Black Sea Region							
Average	109	271	52	1.5	4.1	201	24.7
Std. Deviation	89	141	47	1.3	3.2	154	16.1
Maximum	228	544	124	3.4	9.5	483	54.1
Sample Count	6	6	6	6	6	6	6
Central Anatolian Region							
Average	71	117	33	1.4	14	78	24.5
Std. Deviation	131	98	16	1.4	12	71	12.4
Maximum	509	435	62	4.4	37	255	51.6
Sample Count	14	14	14	14	14	14	14
Mediterranean Region							
Average	197	132	63	2.5	22	80	40.9
Std. Deviation	1.1	89	17	0.4	1.9	6.6	10.6
Maximum	197	195	75	2.7	24	84	48.4
Sample Count	2	2	2	2	2	2	2
East Anatolian Region							
Average	60	265	38	1.3	3.8	91	33.5
Std. Deviation	63	271	34	0.9	6.0	82	14.5
Maximum	173	806	105	2.7	15.9	231	61.5
Sample Count	6	6	6	6	6	6	6
Eastern Black Sea Region							
Average	3.8	198	81	0.25	1.8	178	33.4
Std. Deviation	0.5	17	85	0.16	1.8	199	2.3
Maximum	4.1	210	141	0.36	3.0	319	35.0
Sample Count	2	2	2	2	2	2	2
Southeast Anatolian Region							
Average	40	45	302	0.81	17.9	60	36.2
Std. Deviation	ND	ND	ND	ND	ND	ND	ND
Maximum	40	45	302	0.81	17.9	60	36.2
Sample Count	1	1	1	1	1	1	1
Gulf Coast Region (Bragg and others, 1997)							
Average	4.3	115	14	0.87	2.3	10	18.4
Maximum	22	440	46	2.8	17	77	33.0
Fort Union Region (Bragg and others, 1997)							
Average	8.4	130	6.8	0.58	1.5	4	12.0
Maximum	63	600	64	7.3	13	84	32.1

REFERENCE

Bragg, L.J., Oman, J.K., Tewalt, S.J., Oman, C.L., Rega, N.H., Washington, P.M. and Finkelman, R.B., 1997. U.S. Geological Survey Coal Quality (COALQUAL) Database: Version 2.0 CD-ROM.

Country Status



Australia - Discussions on collaboration have been conducted with CSIRO Exploration and Mining. A coal sample from the Collinsville power plant, North Queensland, Australia, has been analyzed for proximate and ultimate, calorific value, forms of sulfur and free swelling index. [Contact: Susan Tewalt (stewalt@usgs.gov)]

Bangladesh — See WoCQI News, issue no. 1. [Contact: Bob Milici (rmilici@usgs.gov)]

Burma - No attempt yet to obtain samples.

P. R. China - Zheng Baoshan and colleagues at the Institute of Geochemistry have collected several hundred coal samples to be shipped to the USGS soon. Additional samples have been obtained from various sources in China. Work is slowly progressing on GIS layers. [Contact: Bob Finkelman (rpf@usgs.gov)]

India - An agreement with the Central Fuels Research Institute and the Geological Survey of India (GSI) is being reviewed by the U.S. State Department. GIS layers (draft form) have been completed of coal field boundaries, political boundaries, drainage, etc. [Contacts: Peter Warwick (pwarwick@usgs.gov) & Bob Milici (rmilici@usgs.gov)] Eight samples from one lignite mine in western India have been collected and a report is in progress. [Contact: John SanFilipo (jsan@usgs.gov)]

Indonesia - Yo Sumartojo, a USGS contractor, delivered two papers at the first Southeast Asia Coal conference held in Bandung, Indonesia, June 2000. This conference was organized by Dr. Hadiyanto of the Indonesian Directorate of Mineral Resources in Indonesia and Dr. Tim Moore of CRL Energy Ltd. in Christchurch, New Zealand. About 300 attendees heard 55 papers, mostly about Indonesian coal, which were presented during the two-day session.

The Coal Geology Section of the Indonesian Directorate of Mineral Resources is very receptive to initiating collaborative research activities for the WoCQI project. Samples from eight Indonesian coal basins were sent to the USGS for analysis. Further research activities will be discussed after the analytical results are completed. [Contact: Bob Finkelman (rpf@usgs.gov)]

Japan - Analysis of the two Japanese coal samples provided by Japan Coal Corporation (JCOAL) has been completed. [Contact: Bob Finkelman (rpf@usgs.gov)]

South Korea - Analysis of the 11 coal samples provided by the Korea Institute of Geology, Mining & Materials from operating mines has been completed. A detailed map of Korea geology was provided showing the locations of the coal mines. [Contact: Bob Finkelman (rpf@usgs.gov)]

Malaysia — No attempt yet to obtain samples.

Mongolia - No response after initial contact. [Contact: Bob Finkelman (rbf@usgs.gov)]

Nepal - No attempt yet to obtain samples.

New Zealand – CRL Inc. has provided 10 samples for which analysis has been completed. Tim Moore at CRL will provide eight additional samples. [Contact: Bob Finkelman (rbf@usgs.gov)]

Pakistan - Progress is being made on the GIS-based summary report that will be available on CD-ROM and also posted on the USGS Web page. Compilation of previously unpublished analytical results is ongoing as GIS covers are being reviewed. [Contact: John SanFilipo (jsan@usgs.gov)]



Austria - Contacted, no response. [Contact: Ron Affolter (raffolter@usgs.gov)]

Belgium – No attempt yet to obtain samples.

France - Contacted, no response. [Contact: Ron Affolter (raffolter@usgs.gov)]

Germany - Samples expected this year from the Bundesanstalt for the Geowissenschaften und Rohstoffe. [Contact: Ron Affolter (raffolter@usgs.gov)]

Greece - See WoCQI News, issue no. 1. [Contact: Ron Affolter (raffolter@usgs.gov)]

Philippines - Two coal samples from the Philippine Department of Energy, Coal and Nuclear Minerals Division have been received and submitted for analysis. [Contact: Bob Finkelman (rbf@usgs.gov)]

Taiwan - Analysis of the 4 coal samples from operating mines (collected by Louis Tsai, National Central University) has been completed. [Contacts: Bob Finkelman (rbf@usgs.gov)]

Thailand - Initial contact made. [Contact: Bob Finkelman (rbf@usgs.gov)]

Viet-nam - Initial interest expressed, no recent response received. [Contact: Curtis Palmer (cpalmer@usgs.gov)]

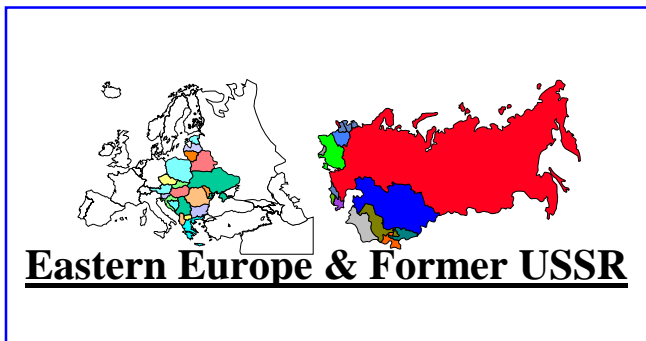
Italy - Contacted, no response. [Contact: Harvey Belkin (hbelkin@usgs.gov)]

Norway – There is an agreement with Alv Ohrheim, who will provide samples of coal from Spitsbergen. [Contact: Ron Affolter (raffolter@usgs.gov)]

Spain - No attempt yet to obtain samples.

Turkey - Analyses of all delivered samples have been completed and sample locations verified in a GIS coverage. See the feature article in this newsletter for more information. [Contact: Curtis Palmer (cpalmer@usgs.gov)]

United Kingdom - No attempt yet to obtain samples.



Albania - No attempt yet to obtain samples.

Armenia — See WoCQI News, issue 1. [Contact: Brenda Pierce (bpierce@usgs.gov)]

Bosnia - No attempt yet to obtain samples.

Bulgaria — See WoCQI News, issue 1. [Contact: Mick Brownfield (mbrownfield@usgs.gov)]

Czech Republic - A proposal from Zednik Klika of Technical University in Ostrava has been accepted that would provide coal samples from the Czech and Slovakia Republics and Austria. [Contact: Ron Affolter (raffolter@usgs.gov)]

Hungary - Analyses of 39 bench and face channel samples from five mines, representing a wide range of rank and ages of the coals, were completed in 2000. Many of the data were presented in a paper, “Quality of Selected Coals of Hungary,” given by Edwin Landis at the 25th International Technical Conference on Coal Utilization and Fuel Systems, and published in the proceedings volume of that conference. Two additional publications are in preparation; one concentrating on Ultimate and Proximate analyses and the other on the trace and minor elements. As a result of conducting the coal quality studies, researchers realized that there is a potential for coal bed methane resources in Hungary and are proceeding with additional investigations of that possibility. [Contact: Hal Gluskoter (halg@usgs.gov)]

Kazakhstan - No attempt yet to obtain samples.

Kyrgyzstan - See WoCQI News, issue 1. [Contact: Hal Gluskoter (halg@usgs.gov)]

Macedonia - No attempt yet to obtain samples.

Poland - Discussions with the Polish Institute of Geology are still on hold. [Contact: Bob Finkelman (rpf@usgs.gov)]

Romania - See WoCQI News, issue 1. [Contact: Bob Finkelman (rpf@usgs.gov)]

Russia - Samples from all the major coal deposits in the Kuzbas Basin were collected in cooperation with the Kemerovo Scientific Center of the Siberian Branch of the Russian Academy of Sciences and have been submitted for analysis. The USGS has a Memorandum of Understanding (MOU) with the Russian Academy of Sciences and is currently planning future work. A MOU is being developed with the Moscow State Mining University. Brenda Pierce met with a delegation from the Russian Ministry of Natural Resources, who is interested in contributing to the planned FSU GIS. [Contact: Brenda Pierce (bpierce@usgs.gov)].

The USGS and the Vernadsky State Geological Museum are jointly developing an ArcView GIS database for Russia and the FSU. The Russians have completed phase 2 of the project and have forwarded a draft of phase 3 to the USGS for evaluation. Some major changes to the coal databases and document files have been made, plus minor updates to the coal basin map and detailed geologic maps of the major coal basins. Metadata documents meeting USGS standards have also been created. The CD-ROM is now being constructed, with a preliminary ArcView project hopefully ready by the end of February. Negotiations with the Russians for developing a power plant coverage have begun. [Contact: Mick Brownfield (mbrownfield@usgs.gov)]

Serbia — See WoCQI News, issue 1.

Slovakia - See Czech Republic.

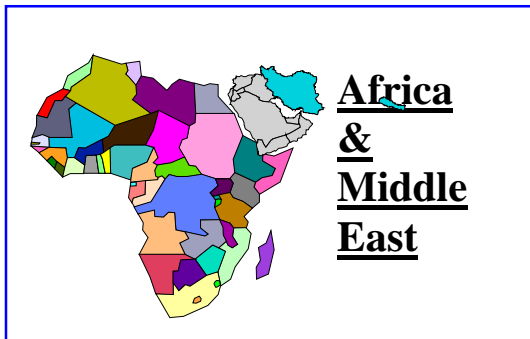
Slovenia - No attempt yet to obtain samples.

Tajikistan - Mike Gaffen, consultant to the USGS, has made contact with the Tajikistan coal sector. [Contact: Brenda Pierce (bpierce@usgs.gov)]

Ukraine - A NATO Collaborative Linkage Grant titled “Geochemistry of metal-enriched coals and coal waste, Donetsk, Ukraine” may possibly fund USGS collaboration with Profs.

Boris Panov and Victor Korchemagin of Donetsk State Technical University. The study would investigate the environmental impact of metal-enriched indigenous coals and associated coal waste, in and around Donetsk, where high levels of mercury and other metals have been linked to coal use. If approved, NATO support will fund two field visits for sampling by the USGS team, and a reciprocal visit to the USGS by the Ukraine participants. Sample analyses will become part of the WoCQI database. [Contact: Allan Kolker (akolker@usgs.gov)]

Uzbekistan - No attempt yet to obtain samples.



Botswana - No attempt yet to obtain samples.

Egypt - Initial interest expressed, no further response. [Contact: Bob Finkelman (rbf@usgs.gov)]

Iran - Bob Finkelman and John SanFilipo met with a visiting scientist from the Geological Survey of Iran and as a result have forwarded a proposal for obtaining and analyzing coal samples, possibly in support of a graduate student thesis. [Contact: John SanFilipo (jsan@usgs.gov)]

Morocco — John Repetski will try to obtain samples during his visit. [Contact: John Repetski (jrepetski@usgs.gov)]

Mozambique — Contacts in South Africa will collect samples. [Contact: Bob Finkelman (rbf@usgs.gov)]

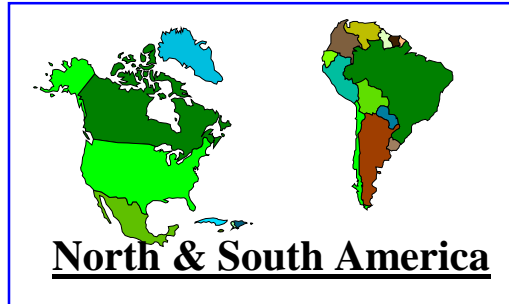
Nigeria - Several contacts have been made. We are waiting for responses. [Contact: Titus Onuoha (tituso@usgs.gov)]

South Africa – Ricky Pinheiro at the South African Bureau of Standards will soon be providing WoCQI with splits of about 250 coal samples including raw coal and preparation plant products. They will be performing proximate analysis, volatile carbon and total sulfur determinations. On selected samples they will conduct petrographic analyses. In addition, they may provide fly ash samples from PF power stations. [Contact: Bob Finkelman (rbf@usgs.gov)]

Swaziland - Contacts in South Africa will collect samples. [Contact: Bob Finkelman (rbf@usgs.gov)]

Tanzania - Several contacts made. Waiting for response. [Contact: Bob Finkelman (rbf@usgs.gov)]

Zambia - Analysis of 5 coal samples obtained from Imasiku Nyambe, University of Zambia has been completed and a report is being prepared. [Contact: Bob Finkelman (rbf@usgs.gov)]



Canada - Data for about 50 samples received from Geological Survey of Canada. Locations for these non-confidential data are now being collected. [Contact: Linda Bragg (lbragg@usgs.gov)]

Greenland - Initial contact made with the Geological Survey of Denmark and Greenland. [Contact: Susan Tewalt (stewart@usgs.gov)]

Mexico - Several contacts made. Waiting for response. Available digital geologic data on coal occurrence and mines has been collected. [Contact: Fiorella Simoni (fsimoni@usgs.gov)]

U.S.A. - Analyses of approximately 15,000 coal samples have been completed. About half of the data may be obtained through the USGS Web page (<http://energy.er.usgs.gov/products/databases/coaqual/intro.html>) or from a published CD-ROM. [Contact: Linda Bragg (lbragg@usgs.gov)]

Argentina - Earl Brooks (USGS contractor) has collected samples from several coal mines. Collection of paper maps for GIS has been started. [Contact: Earl Brooks or Bob Finkelman (rbf@usgs.gov)]

Brazil - Wolfgang Kalkreuth, Universidade Federal do Rio Grande do Sul, provided 39 samples from 3 coal fields (Leao, Candiota, Santa Terezinha). The results of the analyses provided the basis to select 20 samples for low-

Zimbabwe - No attempt yet to obtain samples.

temperature ashing and SEM analysis. [Contact: Jason Willett (jwillett@usgs.gov)]

Chile - Three samples have been received and some analyses have been completed. A GIS file of coal-bearing formations is also almost complete. Other digital GIS data (culture and topography) have been collected. [Contact: Peter Warwick (pwarwick@usgs.gov)]

Colombia - A total of eight samples have been received from InGeoMinas and submitted for analysis; results of two samples have been completed. GIS digitization of the geology is complete and available geologic digital information is being compiled. [Contact: Peter Warwick (pwarwick@usgs.gov)]

Peru - Analysis of six coal samples collected by Earl Brooks (USGS contractor) have been completed. Collection of digital GIS geologic and cultural data is ongoing. [Contact: Earl Brooks or Bob Finkelman (rbf@usgs.gov)]

Venezuela - Compilation of GIS coal occurrence and mines (plus already digital cultural and topographic information) is underway. The National Institute of Geology and Mineralogy has indicated that they will provide samples from every active mine. [Contact: Peter Warwick (pwarwick@usgs.gov)]

We need your help!

Contacts are being sought for the following coal-bearing countries: Burma, Malaysia, Mongolia, Viet-nam, Austria, Belgium, France, Italy, UK, Albania, Bosnia, Kazakhstan, Macedonia,

Slovenia, and Egypt. If you know any individuals who may be interested in collaborating, please email their names to rbf@usgs.gov.



Upcoming Conferences

2001

<u>When</u>	<u>What</u>	<u>Where</u>	<u>Who</u>
June 25-29	9 th Coal Geology Conference	Prague, Czech Republic	oplustil@natur.cuni.cz
Sept. 24-26	WoCQI Conference (USGS)	Reston, VA USA	rbf@usgs.gov
Sept.30-Oct.5	International Conf. On Coal Science	San Francisco, CA USA	lockhart@netl.doe.gov
December 3-7	Pittsburgh International Coal Conf.	Newcastle, Australia	lruppert@usgs.gov

Special Request:

We have been asked to mention a data request for some collaborating coal researchers. Drs. Glenn Stracher of East Georgia College and Tammy Taylor of Los Alamos National Lab are deriving P-T stability diagrams for the condensation of minerals from coal gas. Glenn would appreciate receiving samples of mineral specimens, known to have condensed from the gas, for geochemical analysis and identification by XRD. Photographs of in situ specimens around gas vents, industrial smoke stacks, etc. would be very useful. Contributors will be reimbursed for the cost of postage and photos; contributions will be acknowledged in publications. In addition, Glenn and Tammy welcome inquiries from anyone interested in collaboration and co-publication. Please send, e-mail, phone, or fax all responses to: Glenn B. Stracher, Dept. Science and Mathematics, East Georgia College, 131 College Circle, Swainsboro, Georgia 30401, USA. [Phone: 912-289-2073; Fax: 912-289-2080; E-mail: stracher@ega.peachnet.edu]