

# Ad Hoc DOE-GIS Users Group Newsletter



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## Upcoming Events

- DOE CIO Sponsored User Group meeting at the Information Technology Conference in Denver, CO, March 18-20, 2002. Contact Susan Hargrove, (202) 586-4108
- User Group meeting at the ESRI Conference—Date to be determined.

## Feedback

Your feedback regarding the DOE-GIS user group newsletter and planned user group activities is welcomed and would be greatly appreciated. Please send comments to:

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*Biscuit Basin near Fire Hole River in Yellowstone National Park (Courtesy of Randy Lee, INEEL)*

## DOE GIS Users Meet in Panel Session at the TIE Workshop

By **Jim Bollinger**

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GIS users from across the DOE complex recently met at the Technical Information Exchange Workshop (TIE) to present papers and participate in an all-day user group meeting. This year's TIE Workshop was hosted by Sandia National Laboratory in beautiful Albuquerque, NM and included numerous panel sessions dedicated to environmental management and long term stewardship. TIE was established to



*Octopus Spring in Yellowstone National Park (Courtesy of Randy Lee, INEEL).*

highlight advanced environmental technologies and to encourage their broad dissemination and use throughout the Department of Energy, the Environmental Protection Agency, and the Department of Defense. The ad hoc DOE GIS User Group meets in conjunction with TIE in November of each year.

The panel session and full-day User Group meeting at TIE were outstanding and it was great seeing everyone from around the complex. This particular edition of the GIS User Group newsletter is dedicated to reporting the results of the conference beginning with the GIS panel session that was held on Tuesday, November 13, 2001. Meeting minutes from the User Group meeting, held on Thursday, November 15, are also provided at the end of this newsletter.

The panel session, which featured six very informative GIS papers, was entitled “The Expanding Role of Geographic Information Systems” and

was chaired by Denise Bleakly of Sandia. The following is a summary of the panel discussion and papers.

A revolution in software and hardware developments over the past decade has resulted in very powerful geographic information systems (GIS) applications capable of performing complex spatial analysis operations on typical desktop computers. This revolution has enabled environmental and other non-GIS professionals to make very effective use of this technology to support the spatial analysis needs of their work. The GIS panel session was organized to highlight the important contributions made by GIS professionals and technology to environmental programs across the DOE complex.

The first paper, entitled “Issues for Consideration for Long-Term Spatial Data Archiving,” presented by Denise Bleakly, focused on an extensive study to investigate long-term archival of a GIS database. Several federal agencies,



*Lower Geyser Basin in Yellowstone National Park (Courtesy of Randy Lee, INEEL)*

which handle large quantities of digital spatial data, were surveyed to determine current data archival practices. These agencies in general use the Federal Geographic Data Committee (FGDC) metadata standard for information distribution and data indexing and the Spatial Data Transfer Standard (SDTS) for data distribution. Wide disparities exist between federal agencies regarding resources dedicated to handling the complex issue of long-term archival. Some of the complexities include stability and availability of storage media, hardware and software technological obsolescence, data refreshing and migration, long term costs, and the daunting task of extracting “information” from the archived data at some future time. No single solution exists for long-term data archival, however, the SDTS and FGDC standards have provided a starting point for

addressing this complex issue. Many more resources will be required over the near-term to adequately resolve this issue, otherwise, invaluable data that cannot be reproduced or replaced may be soon lost forever.

Dan Collette of MACTEC Environmental Restoration Services at Grand Junction, CO discussed “Putting GIS on the Critical Path.” Dan laid out a historical perspective of the evolution of the GIS program at Grand Junction. As a fledgling organization, the GIS group drifted between several corporate organizations prior to finding a more permanent home within the Environmental Data Services Department. The GIS program at MACTEC migrated through three distinct phases of growth characterized at first by an insecure budget and mission and ending with a strong program, secure budget, well known, and well recognized capabilities. This positive evolution involved in no small part embracing good data management practices to ensure GIS data integrity from data collection, analysis, to final distribution of official record copy data. The next stage of this evolutionary process was comprised of automating the production environment by developing base maps with all available data layers, providing automated software tools for accessing environmental data stored in relational databases, developing standard layouts and symbology, and developing automated tools for loading and tiling georeferenced imagery. Dan concluded with sound advice for building a strong GIS program of striving to be a key contributor to the team, adopting and executing sound data management practices, balancing production and



*Biscuit Basin near Fire Hole River in Yellowstone National Park (Courtesy of Randy Lee, INEEL)*

development activities, and employing technology that has long-term applicability.

James Kuiper of Argonne National Laboratory East (ANL-E) discussed the topic of “GIS for Environmental and Waste Management Activities at Argonne National Laboratory.” In 1995, ANL-E began development of a GIS that has now become a key resource for environmental and waste management activities. The ANL-E GIS program supports environmental characterization and monitoring, wetland mitigation, and cultural resource compliance activities from planning stages to completion. The GIS also is used by operational divisions for master planning, infrastructure siting, emergency response, and public outreach. The ANL-E GIS now includes

a database that exists as a repository of diverse spatial information.

Technical activities include database development, spatial analysis and modeling, visualization, and cartography. Portions of the GIS are available on the ANL-E intranet by using both an internally developed JAVA applet and a commercial web GIS package. The success of the system so far is largely due to inter-organizational collaboration at a “grassroots” level rather than a formal mandate. The synergy of bringing together information from many sources and organizations has also been instrumental. Current and future expected activities include a long-term stewardship initiative, 3-D visualization of proposed actions, and broader implementation of a web GIS.

Randy Lee, of the Idaho National Engineering and Environmental Laboratory (INEEL) presented “Cataloging and Mapping Extreme Microorganisms in Yellowstone National Park: Internet-Based Interactive Microbial Database and Map Server.” Randy introduced his presentation with some very beautiful and scenic photographs of geysers, fumaroles, fountain paint pots, hot springs, and wildlife scenery from Yellowstone National Park. Several of the photographs from Randy’s presentation are featured in this article. One of the most striking and beautiful aspects of many of the hydrothermal features are the brilliant colors. These colors are indicative of a rich microbiological diversity existing in these extreme thermal environments that are an important strategic resource in fundamental scientific research. The INEEL is one of several federal organizations involved in fundamental research to investigate the biodiversity, biogeochemical processes, and indicators of ecosystem health of the Yellowstone thermal features. This scientific study involved cataloging a myriad of bioorganisms located across the park.

Organizing all of the data collected and transforming the data into useful and accessible information turned out to be a very challenging part of this overall investigation. The research data was organized to provide both GIS access to the spatial data and tabular access to data such as microorganisms at a particular geographic location. The web-enabled GIS application provided interactive mapping of features such as topography, thermal features, hydrography, lakes and streams, and



*Lower Geyser Basin in Yellowstone National Park (Courtesy of Randy Lee, INEEL)*

geochemical/biogeochemical data. In addition, data input and survey forms were automated so that researchers could input data directly into the database and perform direct queries of existing data. Future plans include linking maps to phylogenetic tree data, including in situ data logging capability, and incorporating remote sensing, satellite imagery, and spectral data.

Paul Rich presented a discussion concerning the “Post-Wildfire Geospatial Information Management at Los Alamos National Laboratory (LANL).” An immense amount of data is being generated in the aftermath of the May 2000 Cerro Grande Fire that burned a major area surrounding LANL and the surrounding town of Los Alamos, NM. Spatially referenced data includes fire effects on soils, water, vegetation, structures, and property. The Cerro Grande Rehabilitation Project (CGRP) GIS has been developed as a central repository for fire-related geospatial data. These data are available to LANL and external users via a simple web interface. For security and access control, data are stored on servers in an

## DOE GIS Users Group Teleconferences

### Update from Paul Rich

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The Office of the DOE Chief Information Officer (CIO), in partnership with the Emergency Communications Network, holds regular video teleconferences (VTCs), typically on the last Thursday of each month. Note that the DOE GIS Users Group is distinct from the Ad Hoc DOE GIS Users Group.

4th GIS Users Group VTC: Thursday, November 29, 2001 at 2:00 pm (EST). The agenda included changes in personnel, (i.e., Kurt Mickus replaced Larry Gresham), establishment of the GIS Core Group, highlights from the 11/15/01 Ad Hoc GIS Users Group meeting in Albuquerque, remarks from the Acting CIO, discussion of GIS for Homeland Security, and comments from the sites.

5th GIS Users Group VTC: Thursday, January 31, 2002, 2:30-4:30 pm (EST). The agenda included a summary of the 1/31/02 FGDC committee meeting; discussion of a proposal by Al Guber (RSL) for DOE site-wide GIS data licenses; summary of progress on a bulk purchase agreement with ESRI; a presentation concerning the "Geospatial One Stop Project"; and comments from the sites.

The next GIS Users Group VTC is scheduled for Thursday, April 25, 2002. Contact the nearest Emergency Communications Network (ECN) Emergency Operations Center (EOC) Manager(s) to coordinate participation in VTCs. For more information contact Kevin Moore (202-586-2184, [moorek@oem.doe.gov](mailto:moorek@oem.doe.gov)).

internal laboratory computer net (data storage capacity 2.3 terabytes), and on an external, public access net. The intent is to provide a LANL resource for consolidating important fire-related data, to inform the public, to assist scientists and emergency managers in assessing long-term environmental effects, and to be prepared for future emergencies.

Steve Rush from Fluor Hanford described the formation of the Hanford Site Spatial Data Council (SSDC) and the management of spatial information at Hanford in a presentation entitled "Improving Access to Hanford Geospatial Information." Hanford has been generating and managing spatial data for over 50 years to support several diverse functions. Unfortunately, the data has been managed by many different stewards who have worked for different contractors with no consistent guidance for data format, metadata, or data accuracy. The SDDC therefore was formed in 1989 to coordinate data activities, set standards for all aspects of data generation at Hanford, implement a data repository with a catalog, and assure availability of spatial data to all involved parties. The SDDC adopted the FGDC framework to improve data sharing and create a widely available source of basic geographic data. Under the direction of the SDDC, all prime Hanford contractors are utilizing the Spatial Metadata Management System (SMMS) along with GeoConnect to serve spatial data coverages and related metadata on the Hanford intranet. The oversight of the SSDC at Hanford has resulted in higher confidence in spatial data accuracy, increased data sharing, especially between contractors, and a reduction in overall costs.

Please feel free to contact any of the aforementioned presenters if you are facing technical problems similar to those discussed. We all gain when we share information. Also, make sure to mark your calendars for the next User Group meeting, which is being sponsored by the DOE office of the Chief Information Officer and will be held in conjunction with the DOE Annual Information Technology Conference (AITC) in Denver, CO from March 18-20, 2002. The User Group will have an all-day meeting on March 20 from 8:30 to 3 PM. For more information on the AITC and User Group Meeting, contact Susan Hargrove at (202) 586-4108 or see the AITC website at <http://cio.doe.gov/aitc/index.html>.

An informal User Group meeting also is being planned for the ESRI User Conference in July. I will let you know when the time, date, and other details are nailed down.

## **Applying GIS to Long-Term Stewardship (LTS) Activities**

**By John Stewart**  
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EM-51 has prepared a white paper entitled... "The Use of Geospatial Referencing for Programmatic LTS Information," to analyze the need for and the benefits of geospatial referencing LTS activities. The white paper identifies initial programmatic needs for geospatially referencing LTS data and the issues that need to be investigated further before identifying

and implementing appropriate referencing tools or systems. The paper also presents a discussion of the issues and challenges associated with developing and implementing systems for geospatial referencing LTS information, provides recommendations for implementation, and includes a summary of "lessons learned" from Grand Junction Office's experience with LTS information.

An Appendix to this paper presents an overview of the GIS status of DOE sites and capability of other relevant organizations for geospatially referencing programmatic LTS data, including what information and existing architectures are available and their ability to compile and integrate available information.

Some of the salient benefits of using geospatially-referenced data for LTS from the white paper are as follows:

- Visualizing and displaying data spatially speeds the comprehension and facilitates communication and helps allow efficient use of the same data for decision-makers both at Headquarters and in the Field.
- Stakeholders can better understand the status of cleanup activities and the relationship between the status of residual hazards and how the site is managed.
- Congressional inquiries about the impact and success of LTS activities at specific sites or Congressional districts can be answered more quickly and clearly through a GIS display of LTS data.

- Geospatially referencing monitoring wells and disposal cells are critical for locating these facilities in the future in order to maintain a viable LTS program.

If you would like a copy of the white paper or if you have any questions, please contact John Stewart, EM-51 at (301) 903-7137 or [john.stewart@em.doe.gov](mailto:john.stewart@em.doe.gov).

## Meeting Minutes from the Ad Hoc DOE Geographic Information Systems (GIS) Users Group Meeting

By **Jim Bollinger**

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The ad hoc DOE GIS Users Group met in conjunction with the TIE workshop and conducted its full-day meeting on Thursday, November 16, 2001. Formed in 2000, the group met for the first time at the ESRI International User Conference in July 2000. The Users Group was created to promote the informal interchange of information and ideas between GIS users across the DOE complex pertaining primarily to environmental management and long term stewardship issues. The ad hoc Users Group was co-chaired in 2000-2001 by Denise Bleakly (Sandia National Laboratory (SNL)) and Jim Bollinger (Savannah River Technology Center/Savannah River Site). For 2002-2003, the Users Group will be co-chaired by Denise Bleakly and Paul Rich (Los Alamos National Laboratory) and Jim Bollinger will serve as the secretary. The ad hoc Users Group meets twice per

year—an informal meeting at the ESRI Users Conference in San Diego and a day long meeting associated with the DOE-sponsored Technical Information Exchange Workshop (TIE). The following is a summary of the discussion held on November 15, 2001.

Over 25 GIS professionals from across the DOE complex representing DOE-HQ and most of DOE's production and laboratory facilities engaged in a very informative and wide-ranging discussion. The minutes from the Users Group meeting at TIE are provided below.

Denise Bleakly of Sandia National Laboratory provided an agenda for and chaired the ad hoc DOE GIS User Group meeting. Following opening comments from Denise, Susan Hargrove, a representative from the DOE headquarters office of the Chief Information Officer (CIO), updated the user group on the status of the CIO's involvement in GIS. The CIO's office, in conjunction with the DOE Emergency Communications Network (ECN), is sponsoring a bimonthly videoconference to discuss GIS issues impacting DOE. The CIO is interested in improving access to the most current geospatial data for daily operations, emergency response, planning, and infrastructure maintenance. The next videoconference will be held Thursday, April 25 from 2 to 4 PM EST. The CIO's office also has extended an invitation to all DOE GIS professionals to attend the Annual Information Technology Conference from March 18-20 in Denver, CO. Additional information regarding this meeting and the videoconferences can be obtained from Susan at

[susan.hargrove@hq.doe.gov](mailto:susan.hargrove@hq.doe.gov) or at (202) 586-4108.

Susan reported that David Moorehouse of DOE-HQ continues to attend the Federal Geographic Data Committee (FGDC) Coordination Working Group Meetings on a monthly basis and that the FGDC is taking a new look at the use of spatial data since the 9/11 attacks. Specifically, the FGDC has requested papers regarding homeland security and has placed a guidance document entitled "Homeland Security and Geographic Information Systems" on the FGDC website.

DOE also has joined the Open GIS Consortium (see <http://www.opengis.org>), a non-profit organization whose mission is to deliver spatial processing interface specifications that are openly available for global use.

Randy Lee (INEEL) mentioned that while DOE HQ interest in GIS activities around the complex is very positive, there is essentially no interaction between the GIS group at the INEEL and the local DOE GIS representatives. This issue exists at several other DOE sites as reported by GIS users. In fact, Randy stated that he does not know the name of the GIS counterpart at the DOE Idaho Operations office. Since most contractor funding issues are made at the local DOE operations office, it is critical that we establish contacts with the GIS representatives in these offices and let them know the capabilities and services that exist in the GIS organizations at each DOE site. Randy requested recommendations for making these contacts and forming a liaison with local DOE GIS representatives.

Susan referenced an Office of Management and Budget News Release citing GIS as one of 23 initiatives that will help improve customer service and efficiency. Although DOE-HQ is interested in harnessing the power of GIS technology, GIS currently does not have much visibility at HQ. Howard Landon, the former CIO, suggested to Susan that the User Group develop a joint proposal regarding the effective use of GIS at DOE and present the proposal to the CIO council, which meets once per month. This proposal would need to address GIS interoperability between all DOE sites and HQ.

The User Group addressed the possibility of establishing a bulk purchase agreement (BPA) with ESRI. The BPA would represent an agreement between ESRI and DOE that would provide additional software-related price breaks beyond what we get with the federal pricing structure. Paul Rich (LANL) cautioned that we need to insure that the BPA doesn't lock DOE into something that is less desirable than the federal pricing structure we already have.

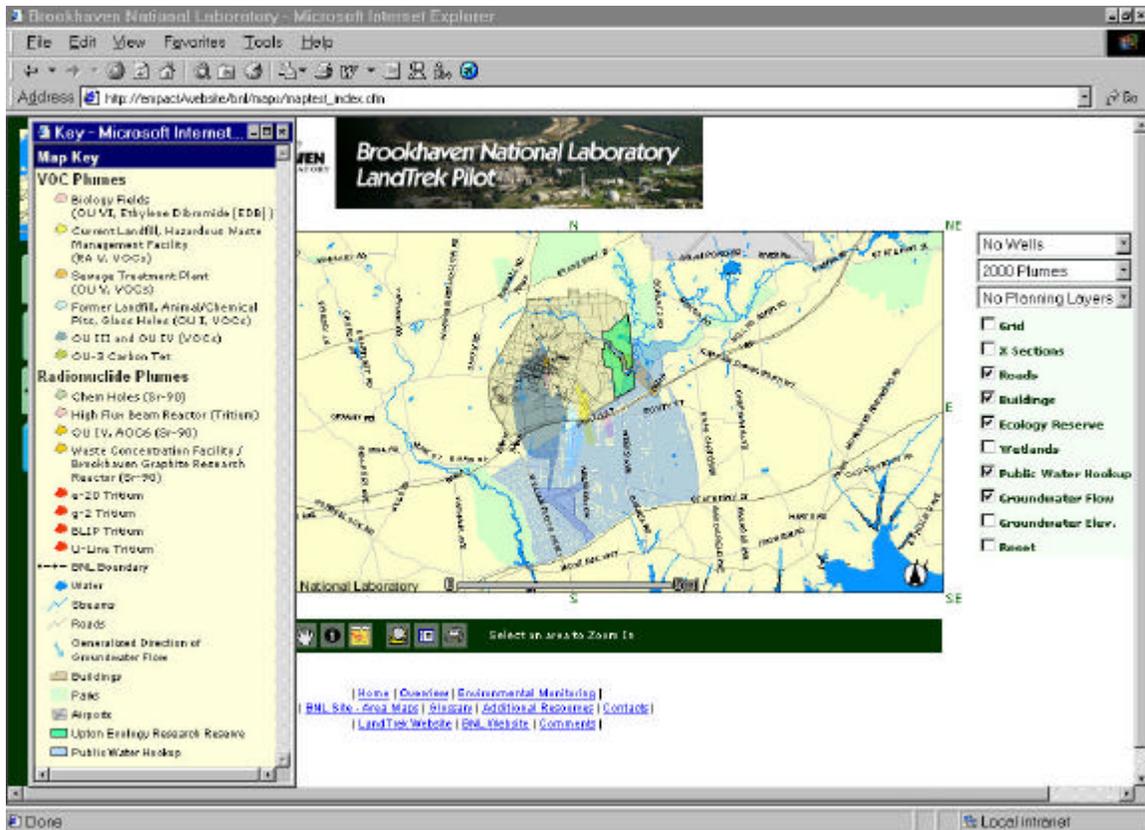
The group discussed site license proposals from Al Guber (RSL-not present at the meeting) for GDT (roads/basemap data), Claritas (Business Point Data), and Pennwell-Mapsearch (Infrastructure data - electric lines, pipelines, etc) that would make this data available to all DOE sites at a greatly reduced cost. These proposals will be reviewed to make sure that they are beneficial to the overall GIS community. Denise Bleakly brought up the point that if a DOE site license is obtained, accessing this data over the internet

would be an issue at SNL due to the firewall. In addition, Denise asked if the data would be available in different formats (Arc coverages, shape files, SDE layers, etc.).

Dan Collette of Grand Junction and Steve Rush of Hanford emphasized the importance of good GIS data management and configuration control policies. Dan and Steve both have experienced frustration with data quality issues involving legacy and current spatial data. Many other attendees echoed these problems. Steve encouraged sites to review their corporate data configuration policies to make sure that these issues are adequately addressed. He is the

geospatial coordinator at Hanford and has had to deal with spatial data configuration control issues spanning several Hanford contractors. Hanford has developed policies and standards for dealing with data configuration control issues and Steve said he would be glad to share this information with other interested parties. Dan added that the state of Utah has set up protocols for handling data among state agencies and that the program they have instituted is an excellent example of good data management handling practices.

Mary Daum of Brookhaven National Laboratory presented an overview of the LandTrek system. LandTrek is a collaborative project between DOE and



*LandTrek Pilot Web Display of Plume Data for Brookhaven National Laboratory (Courtesy of Dr. Mary Daum, BNL)*

the Department of Defense to facilitate federal facility site cleanup, closure, and transfer or reuse. Land Trek is a web-based GIS and data analysis system aimed primarily at community and public outreach. The system, which Mary demonstrated as part of her presentation, includes map displays of landuse and quarterly groundwater contaminant plume data. In addition to the spatial displays, groundwater geochemical data is available in tabular form. Future plans for the LandTrek system include the incorporation of air monitoring, operable unit, surface water, and contaminated soils data. Unfortunately, public access to the Land Trek website was removed after the 9/11 attacks.

At this point, Denise Bleakly asked what impacts the 9/11 attacks have had on GIS programs and data access at other DOE sites. She relayed that all long-term spatial data access to the public has been disabled at SNL, although much of this data is still available on the local county website. Denise voiced concern that removing public access to the SNL data was likely to damage DOE's and the lab's reputation with the public. At Rocky Flats, an agreement with Jefferson County to share spatial data may need to be reviewed and changed due to post-9/11 security issues. Hanford had to pull some spatial data from its external web site and Pantex had to remove some information from local reading rooms—although with understanding and support from the public due to heightened security awareness.

Following discussion of the impact of the 9/11 attacks, the ad hoc DOE GIS Users meeting was adjourned.