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Informal Report

Minutes of the Coordination Workshop on DOE Nuclear Data Program Services via the Internet

**Held at Lawrence Livermore National Laboratory
August 14-15, 1996**

by

**Donald L. Smith, Secretariat
Argonne National Laboratory**

and

**Charles L. Dunford
Brookhaven National Laboratory**

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Compiled and Edited at Argonne National Laboratory

November 1996

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**National Nuclear Data Center
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MINUTES

Coordination Workshop on *DOE Nuclear Data Program Services via the Internet*

August 14 & 15, 1996
Lawrence Livermore National Laboratory
NARAC, Building 170, Conference Room 1091

Chair: David A. Resler, Secretariat: Donald L. Smith

PURPOSE

The purpose of this workshop was to explore what is currently being done in the area of data dissemination via the Internet. The idea is to better coordinate our future efforts so that we can:

- (1) modernize and standardize interfaces at the data level to improve the interconnectivity between structure and reactions (e.g., better use of WWW interfaces including hyperlinks to remote sites), and
- (2) explore ways the structure and reaction networks might be unified in electronic data dissemination so that Internet users can be provided a modern and coordinated U.S. Nuclear Data Network interface.

PARTICIPANTS

The DOE Division of Nuclear Physics asked LLNL to host a coordination workshop on "DOE Nuclear Data Program Services via the Internet." At their request, an invitation was issued to and participation strictly limited to those individuals listed below. Appendix 1 provides more complete addresses for these participants.

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AGENDA

Wednesday morning (August 14)

08:00 Participants arrive at West Badge Office for LLNL entry badges
 08:30 Opening and General Information (David Resler, Workshop Chair, LLNL)
 08:45 Welcome (Mike Kreisler, N-Division Leader, LLNL)
 09:00 Introductory Comments (John Erskine, DOE)
 09:15 On-line Services from the National Perspective (Charles Dunford, BNL)
 09:35 International Perspective: Nuclear Data Dissemination Plans of the IAEA-sponsored Nuclear Data Networks (Otto Schwerer, IAEA)
 09:45 Open discussions on the general issue of information dissemination
 10:10 Break
 10:30 On-line presentations/demonstrations
 10:30 NNDC Activities (Tom Burrows, BNL)
 10:50 SBIR/NNDC Project (Craig Stone, SJSU)
 11:10 Internet and the INEL (Russ Heath, INEL)
 11:30 Working lunch in the meeting area

Wednesday afternoon/evening (August 14)

12:30 On-line presentations/demonstrations (continued)
 12:30 Nuclear Data Evaluation Project (Mari Cheves, TUNL)
 12:50 T-2 Information Services (Bob MacFarlane, LANL)
 13:10 Nuclear Data System-2000 (David Resler, LLNL)
 13:30 Isotopes Project (Rick Firestone, LBNL)
 13:50 Charge to the Coordination Workshop (Dick Meyer, DOE)
 14:10 Open discussions on current and future directions

- 15:00 Break
- 15:15 Continuation of discussions and identification of areas/issues
- 16:00 Formation of working groups/assignments (one group was formed to address the general issue of coordinating U.S. nuclear data dissemination activities while a second group considered the specific issue of designing a Web site for U.S. nuclear data activities)
- 17:30 Social gathering in West Cafeteria, LLNL
- 18:00 Working dinner in the Jade Room, LLNL

Thursday morning (August 15)

- 09:00 Summary reports of working groups (with outlines of report section provided)
- 10:00 Open discussion of working group activities
- 12:00 Lunch off site

Thursday afternoon (August 15):

- 13:30 Preparation of a report to DOE (DOE required a rough draft of the workshop report and list of conclusions on a floppy disk before adjournment)
- 15:00 Adjournment

SUMMARY

This workshop was convened to explore what is currently being done in the area of data dissemination via the Internet and to examine ways that future activities in this area within the U.S. nuclear data programs can be better coordinated. Overview talks on the current status, from both the national and international perspectives, were provided. Following these, there were presentations on specific activities in the area of Internet data dissemination which are taking place at seven different institutions. Institutions represented at this meeting were asked to provide written summaries of their programs before the meeting (see Appendix 2 for a list of titles). The talks included actual demonstrations of the electronic methodologies which are under development at these laboratories, and they highlighted the richness and creativity of these programs. This information proved to be very useful in the ensuing general discussions. The main issues that were addressed at this meeting were: i) how to adapt to rapid evolution of data management and dissemination technologies, ii) how to provide outside users with some sense of unity in the U.S. nuclear data program and to develop consistent, user-friendly ways to access data without discouraging individual initiatives and the richness which comes from diversity, iii) how to maintain quality control over the information and services provided, iv) how to progress in a era of very restrictive budgets, v) how to effectively merge the nuclear structure and nuclear reaction data dissemination activities while at the same time recognizing and respecting their inherent differences, vi) how to organize the stewardship of nuclear data and the processes of nuclear data dissemination in an efficient, technically advanced and yet cost effective manner, and vii) how the data processing tasks should be allocated between server and client computers. Two working groups were formed during this workshop, one dealing with broader organizational issues and one looking at the specific issue of designing a U.S. nuclear data Web site,

respectively (see Appendices 3 and 4 for the working group summaries). This meeting led to the genesis of a broad plan, with an associated organizational structure, that is intended to address this issue over the long term. Some concrete steps have been taken rather quickly following this meeting, including the selection of individuals to serve in responsible positions in the new organization and the development of a draft version of the new nuclear data program Web site:

<http://www.tunl.duke.edu/~nucldata/usndp.html>

NARRATIVE

The meeting was called to order by David Resler, Chairman, who briefly discussed the logistics for this meeting. The participants were then officially welcomed to LLNL by Mike Kreisler (Division Leader, N-Division, LLNL). His opening remarks outlined the contemporary mission for LLNL, with emphasis on the importance of nuclear data to a major concern, namely, developing technology for the stewardship of an aging stockpile of nuclear weapons. Other applications calling for nuclear data include the accelerator production of tritium and medical diagnostics and radiotherapy. Great emphasis is being placed on modeling, and the new codes are quite sophisticated in their requirements for nuclear data. In response to a comment from the audience concerning the obvious decline of funding for new measurements, Kreisler observed that DOE is obviously under tremendous pressure to reduce the overall budget. While ER support for nuclear data work has declined, there is strong evidence that DP recognizes the importance of this information to its mission and is showing some willingness to provide support. Up to now, the resources of the LLNL data group have been directed mainly toward the provision of information for in-house programs at LLNL, but it appears that major portions of its data base will be made available to the outside world by FY98.

John Erskine (DOE-ER/NP) commented on his own experiences in developing a Web site for DOE-ER/NP. He then stressed the need for the nuclear data community to provide a valued service to the public as justification for its existence. DOE-ER/NP needs a strong reason to support nuclear data activities in order to defend its budget for this work in a highly competitive environment. Nuclear data should be provided in a convenient, user-friendly manner, suitably packaged for a wide range of applications and for basic science. The problem is that the technology for compiling and disseminating such information is constantly changing. It is hard to keep up with all of this when manpower resources are so limited.

Charles Dunford (BNL-NNDC) give a brief national overview of the issues underlying the need for convening the present workshop. Although the present meeting deals with data dissemination, he reminded the audience that the issue of support for data production (measurements, modeling and evaluations) ought not be forgotten. The goal of a dissemination infrastructure should be to provide the best quality information (the "truth" to the best of our knowledge). This raises the important issue of quality control, an issue which is compounded by the ease with which information can be transported electronically around the globe, repackaged and posted on the WWW. The difficulties associated with keeping the data files current in view of the manpower limitations was stressed. It is

clear that funding for the generation and dissemination of nuclear data is unlikely to increase. Certainly ER cannot be relied upon to bear the entire burden of funding this work so other applications areas such as DP and Criticality Safety must contribute if they have specific data needs. He suggested that the time had come to unify the nuclear data activities in the U.S. by breaking down some of the barriers between the structure data and reaction data communities which had developed during the past several decades.

Otto Schwerer (IAEA-NDS) provided an international perspective on the issue of nuclear data dissemination. In particular, he discussed the contemporary activities of his organization. There are similarities between the services provided by the IAEA-NDS and the BNL-NNDC, and these organizations work closely together. They share much of the same data and data handling and retrieval programs. Requests for IAEA-NDS data services are far fewer in number than experienced by the NNDC and many of these come from users in developing countries who do not possess sophisticated computer resources. They may require information in printed form or on tape, and the capability to provide data services at a low-tech level must be maintained - at least for the near term. The NDS also maintains a repository of hard copies of old reports that could be of value to users. Still, the IAEA-NDS is working to gradually evolve toward an on-line and/or WWW mode of providing information to its customers. It has acquired its own Web server to bypass the bureaucratic red tape normally associated with the IAEA. Schwerer stressed the need for traceability (pedigree) of the data provided since it should be treated on the same level as information acquired from formal publications. The absence of a consensus on standards for documentation was duly noted. There was considerable discussion on this issue following his presentation.

During the discussion period following these presentations, several issues were raised. One concerned the difficulty of maintaining quality control in the decentralized environment of the Web. In particular, anyone can acquire data, repackage it with or without "value added" and market it. Errors may be introduced even if the original data were error free. The NNDC has had personal experience with this, and the potential for acquiring a "bad name" from the unauthorized use of data attributed to a particular source is very real. It was generally agreed that this was one reason why the present workshop was organized, namely, to deal with such issues and to insure that the DOE nuclear data site build a reputation for being the "best" place to "shop" for nuclear data. This discussion period also addressed the problem of support for nuclear data activities. It was agreed that ER cannot be expected to bear all the costs of maintaining a U.S. nuclear data infrastructure. It should be recognized that there are many "new" users of nuclear data and the marketing of services to these customers should be a priority for the nuclear data community.

LLNL set up computer resources in the meeting room so that various cyber-presentations could be staged during this workshop. The purpose was to demonstrate some of the existing capabilities for data retrieval, manipulation and dissemination that have already been developed within the U.S. nuclear data community, as a prelude to later discussions on how to integrate them into an effective U.S. nuclear data service to the user communities. It appears that there are two aspects to the stewardship of nuclear data. One is to maintain the data base and update it as new information becomes available. The other is to provide "value added" services which make it easy for the user to

access, transfer, interpret and utilize this information. The presentations described below, and the discussions which occurred during and following the individual talks, addressed all these issues.

Tom Burrows (BNL-NNDC) emphasized the dramatic growth in demand for services from the NNDC during the last decade. The bulk of the information transfer currently is via on-line interaction through Telnet and FTP, but a Web site has been established and considerable information is now available there. It is likely that within the next year or so most of the data and information at NNDC will be accessible through the WWW. One of the major difficulties is choosing formats. Presently most of the information is provided through text files or Postscript files but other approaches are being considered. This comment generated a lot of discussion from the audience concerning various preferences for data transfer formats (Postscript, GIF, PDF, etc.). It is clear that the nuclear data community has to work within the limitations of Internet technology, more specifically, the capabilities of browsers such as Netscape, and that these are in a state of constant evolution. Tom also demonstrated the WWW interface that is presently being developed at BNL for the Nuclear Science References (NSR).

Craig Stone (SJSU) provided an outline of ongoing work at his institution, which is aimed toward developing new methods of accessing and visualizing nuclear data. The MacNuclide package for McIntosh and PC-Windows'95 platforms will be released within the next few months by John Wiley & Sons. Work on the development of local client software and a registry system for the "master" data base is being carried with Bob Sutton, at Scientific Digital Visions, Inc., under the auspices of an SBIR grant. This project also involves an active collaboration with BNL-NNDC. Comments from the audience pointed out that the work at SJSU appears to be directed mainly toward structure data. Could this be expanded to encompass reaction data? There was further discussions about the differences between structure and reaction data and the historical origins of the split between these two nuclear data areas, partially due to inherent differences in the nature of the information and the way it is used and partially due to the different customer base (structure data mainly for basic research and reaction data mainly for applications).

Russ Heath (INEL) emphasized the long history of the INEL program (over 40 years) and the strong technical capabilities of this activity. The evolution of the gamma-spectrum catalogue program from hard copy to electronic format was described and demonstrated. Progress in the detector technology area was discussed, including the identification of what has improved and what has remained essentially the same. The importance of gamma-ray spectrometry was made by pointing out that there are an estimated 300,000 spectrometers in operation around the world, with 70% of them based on scintillation detectors. The INEL program has generated a huge data base which needs to be maintained (it was estimated that it might cost as much as \$500M to reproduce this information in today's regulatory climate). The current program aims to achieve a careful merging of the broader ENSDF data base with the INEL gamma-spectrum information. Responses to gamma ray sources in different geometries and for different detectors are being modelled by Monte Carlo techniques. A Web site is under development but it is still available only in-house. Capabilities of this system were demonstrated during this presentation. Heath pointed out that part of the cost for this activity is being supported by a user, namely, DOE-EM. The importance of collaboration with foreign scientists was

also stressed. INEL, with encouragement from EM, is actively involved in tapping the resources of the former Soviet Republics in this area.

Mari Cheves (TUNL) described the activities at her institute. It is a program which originated many years ago with the work of Fay Ajzenberg-Selove on the compilation of structure data for light nuclei and there is the capability of providing the same information in a variety of formats for different users. This activity complements the activities at LBNL, but the approach is somewhat different because of historical reasons. Originally, the work of Ajzenberg-Selove was published as special editions of the journal *Nuclear Physics*. The volume of information is very large. A Web site has been established for this on-going activity (which moved to TUNL several years ago when Ajzenberg-Selove retired from her data evaluation work). The journal information has been put on line in original form and there is an effort to transfer as much information as possible directly to the ENSDF format. To do this completely would be a big job but it is part of the long-range plan.

Bob McFarlane (LANL) described the T-2 Web site maintained by his group. The emphasis is on reaction data, reflecting the traditional interests of his organization, but the content is not limited entirely to this material. The objective is to offer the information in an easily retrievable format as well as to provide a data "viewer" capability that enables the user to generate plots which can be retrieved in GIF or Postscript format. Attention is also being given to collecting data for newer special applications such as Astrophysics and RIB Physics, in response to the changing priorities of DOE-ER/NP. A lot of work has gone into giving this Web site a "comfortable feel" for the user. Careful statistics are kept on the use of this resource, and it was pointed out that the site is frequently "visited", especially by users in Europe. Two difficulties in maintaining this site were mentioned. One was the difficulty in keeping it current, given the limited manpower. Another was that of trying to achieve a balance between the use of server resources to pre-process the information to convenient form versus reliance on client computer resources. The changing nature of Internet interfaces (e.g., via browsers such as Netscape) complicates the process.

David Resler (LLNL) described the resources of the LLNL nuclear data group. This group has been in the business of providing nuclear data, largely, but not limited to, cross section information, to DOE-DP users. Information is frequently provided to general users upon special request, but there is presently only internal on-line access to this data base. This group has extensive computer resources based on Sun workstation and the X-Windows operating system, and over years it has developed valuable software resources for retrieval and processing of information (plots, etc.). Resler and White pointed out that the graphics capabilities of the X-Windows software are much more advanced than what is available through WWW interfaces (such as Netscape) or in the PC environments. LLNL has been developing the NDS-2000 package for the processing and delivery of nuclear data to users, and (as pointed out above by Mike Kreisler) it is intended that the capabilities of this software will be made available to users on the WWW during the next couple of years. The main issue to be faced is how to avoid excessively compromising the advanced capabilities of the X-Windows Workstation environment in adapting this service to the WWW. Some comments were received from the audience which again circulated around the issue of the extent to which data processing should be handled by the server versus processing by client software.

Rick Firestone (LBNL) described the activities of his group, and provided a demonstration of the capabilities of the VuENSDF software which has been developed at this institution. Completion of the *Table of the Isotopes, 8th Edition* was noted. Although this work is available in a two-volume hard copy version, a CD-ROM containing all the material is also provided, thereby reflecting a growing trend away from conventional publication toward electronic dissemination. LBNL has a Web site and the software needed to use the VuENSDF package can be downloaded directly by accessing this site. Differences between the approach taken at BNL-NNDC and LBNL were noted, given that they access a common data base, namely, ENSDF. The object of the LBNL project is to provide as much "value added" service as possible to the user, since the same ENSDF data base is available from a number of sources. The hallmark of the VuENSDF system is interactive capability, namely, the ability to "answer questions" on-line. VuENSDF is designed to work as an application program imbedded within the Netscape browser environment. It was noted that more than one professional FTE of effort (not to mention experience derived from many years of work in this field) went into development of the present version of VuENSDF. The discussion which followed Firestone's presentation dealt largely with the issue of differences between the nature of structure and reaction nuclear data and how to develop a more consistent way for treating them both, as seen by an "outside" user. There was also lively conversation on how to avoid duplicated effort, on how funding should be allocated, on the use of temporary versus permanent staff personnel, and on the concept of what a "data center" really means in the context of the WWW. DOE-ER wishes to see the NNDC as the "location" that users turn to when they want nuclear data, i.e., the entry point into the system. However, the very nature of the WWW emphasizes de-centralization and this creates a dilemma. A lot of energy and creativity has already been devoted to generating "value added" capabilities at the various institutions represented at the present meeting. No one wants to sacrifice their independent identities entirely in the name of representing the U.S. nuclear data service as a single entity, namely, one embodied in the NNDC. Yet, all the participants acknowledged the importance of projecting a more unified image to the user communities than now exists, and of providing some mechanism for quality control. A lot more thought will be needed to resolve these conflicting interests. It was generally agreed that an important first step was taken at the present meeting, namely, that of bringing the principle parties together for constructive discussions on the pertinent issues.

Peter Ekstrom (Lund University, Sweden) had been involved in a collaboration with LBNL on developing a WWW interface for the NSR data base. He described his work in this area and demonstrated the software. A Web site has been developed for this activity. Ekstrom strongly defended the idea of de-centralization and opposed the idea of a "unified" system "centered" at NNDC, an approach which, he felt, was behind the times and inherently inconsistent with the concept of the WWW. Still, the realities of funding for nuclear data research, and the need for quality control in service to the user communities, dictates that some standards must be set and an attempt be made to coordinate the national effort. Potential users of data who are unfamiliar with the structure of the U.S. nuclear data program need to be led directly to a site which, in some sense, represents the "center" of the U.S. nuclear data resources. They need to be able to find this entry point into the system through Internet search engines such as Alta Vista or Yahoo. The only way this can be done is to engineer the Web dissemination structure so that it will emerge prominently when a potential user seeks information via these commercial search routines. This would be impossible without

cooperation and careful coordination between the individual entities comprising the U.S. nuclear data community. While everyone was sympathetic to Ekstrom's point of view, pragmatism dictates the need for surrendering some independence for the overall common good.

Dick Meyer (DOE-ER) discussed the view from Washington (the prime source of funding for this activity). The realities of the situation are: i) the nuclear data effort must justify itself in a competitive environment by providing a valued product of good quality and making it easily accessible to a wide range of users, ii) the availability of funding is shrinking so unneeded duplication can no longer be tolerated, iii) the nuclear structure and nuclear reaction people have to talk to each other and work as a team in the future, iv) to DOE, NNDC is the recognized "center" for nuclear data activities in the U.S. v) while creativity must be encouraged, and individual programs should be recognized for their accomplishments, independent fiefdoms can no longer be supported, vi) if the stewardship of nuclear data is to be handled effectively, there must be an assignment of responsibilities and clear definition of quality standards. These strong views triggered extensive discussion and evoked strong emotions. Again, the underlying issue was to find a balance between the seemingly conflicting considerations of responsibility and quality control on the one hand and freedom and creativity on the other hand. In spite of the heated nature of these discussions, it became evident that a satisfactory compromise could be found and that it would be for the good of everyone involved, especially the users. It was felt that the details could be ironed out by working groups of knowledgeable (and reasonable) people. It was decided that the remainder of this workshop should be dedicated to setting the mechanisms for accomplishing this goal into motion.

The plethora of issues were thought to fall into two categories. First, those related to general policy matters and the formation of an effective organizational structure for coordinating the U.S. nuclear data dissemination activities. Second, the more specific and technical issue of producing a concept for a unified U.S. nuclear data Web site to which users would be led as an entry point into the system. Two working groups were formed along these lines. The first was led by Charles Dunford and the second by David Resler. It was agreed that Dunford's group would be limited to a few individuals who had experience in dealing with such policy matters. The remainder of the participants at the workshop joined the technical discussions aimed at launching a fledgling Web site for the U.S. nuclear data activity. The reports of these two working groups are attached as Appendices 3 and 4, respectively.

The reports of these working groups were presented in a final plenary session and there was further discussion of the various issues which had been raised during the workshop. During this meeting there was general discussion on the subject of methods to better integrate the activities of the two data networks (structure data and reaction data). A joint meeting of these two networks is planned for the Spring of 1997, and this could be the beginning of some actual integration of their respective activities. In the meantime, it appears likely that there will be continued discussions concerning this important issue of integration.

Mari Cheves agreed to prepare a draft version of a unified U.S. nuclear data Web site, incorporating ideas which emerged during the working group meeting. This Web site would be

posted on the Internet for consideration by the participants (and others), and it would continue to be developed under the stewardship of a standing working group of specialists in this area. The location of this fledgling Web site is:

<http://www.tunl.duke.edu/~nucldata/usndp.html>

Although this workshop opened up many sensitive issues, the meeting appears to have succeeded very well in establishing a process that promises to lead to their eventual resolution. Due to the fluid nature of Internet technology, this community will have to be very flexible in implementing its policy of providing access to the valuable nuclear data resources of the U.S. (and the rest of the world). It will have to achieve this objective under severe financial constraints and during a time when many of the contemporary workers in this field are approaching the end of their careers and the mantle of responsibility for future stewardship of this resource is necessarily being transferred to a new generation of technical workers. Furthermore, the nature of the user communities will be changing dramatically as many of the established technologies (customers), originally responsible for motivating nuclear data work several decades ago, are declining in their influence and are being supplanted by newer application areas, each with their own unique requirements and challenges.

APPENDIX 1: Participant Addresses

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APPENDIX 2: Titles of Institution Summaries

Summary of the National Nuclear Data Center Internet Services

T.W. Burrows and C.L. Dunford, BNL

Argonne National Laboratory

D.L. Smith, ANL

Internet Activities of the LBNL Isotopes Project

R.B. Firestone, S.Y.F. Chu, H. Nordberg, E. Browne and J.M. Dairiki, LBNL

Summary of Web Activities in T-2

R.E. MacFarlane, LANL

INEL Summary of Activities Related to Nuclear Data on the Internet

R.L. Heath, INEL

Present Activities and Future Plans for Nuclear Data Work on the Internet in the ORNL Physics Division

M. Smith, ORNL

World Wide Web Data Dissemination Activities of the Nuclear Data Evaluation Project

R. Tilley, TUNL

Summary of Network-related Nuclear Data Activities of the LLNL Nuclear Data Group

R.M. White, LLNL

Center for Nuclear Information Technology, San Jose State University

C. Stone, SJSU

Complete texts of these summaries can be found on the WWW at:

<http://www.nndc.bnl.gov/nndc/instsumm/title.html>

APPENDIX 3: Report on meeting of the Working Group on Coordination of U.S. Nuclear Data Dissemination Activities (Chair: Charles Dunford)

The participants in the workshop have recommended that a committee be established to coordinate the information dissemination activities of the U.S. Nuclear Data Program including both the nuclear structure and nuclear reaction data components. This committee will replace existing committees of the Reaction and Structure networks which currently coordinate separately the dissemination of reaction and structure data.

Initially, Robert MacFarlane (LANL) has agreed to chair this committee which will in addition be composed of Thomas Burrows (BNL), Richard Firestone (LBNL) and David Resler (LLNL). By November 1, 1996, this group will submit a mission statement and a plan of action which will maintain the momentum resulting from this meeting over the long term. Among the important tasks for which this new committee will be responsible are the coordination of dissemination software development and the peer review of the development products.

APPENDIX 4: Report on meeting of the Working Group on Design of a Web Site for the U.S. Nuclear Data Program (Chair: David Resler)

The majority of the workshop participants worked to develop the idea for a united home page for the U. S. Nuclear Data Program. Initially, most proposed designs used graphics and image maps for the top level page. These were sketched side-by-side on a white board so that they could be compared and comments made by all. It quickly became apparent two issues were being intertwined. One was the graphical look of the new home page and the other was the layout and structure of links to subsequent Web pages. The Working Group decided that it needed to first concentrate on the logical layout of the information. This made our task much easier. As ideas developed, we used the Web to look at examples of pages developed by workshop participants as well as other Web pages considered to be good examples of structuring access to large bodies of information. By the end of the Working Group session, we had designed, in outline form, a new home page as well as several of the next level pages. Mari Cheves (TUNL) volunteered to make a first pass at turning our ideas into HTML. The WWW address for these new pages is:

<http://www.tunl.duke.edu/~nucldata/usndp.html>

The committee described in Appendix 3 will coordinate further work in this area.