Revitalizing Legacy Scientific Software: Updating the MILDOS-AREA Software System

MILDOS-AREA software is used by the U.S. Nuclear Regulatory Commission (NRC) to estimate radiological doses and risks from uranium mining licensing activities. This EVS-developed software package was recently updated to reflect changes in four areas: regulations, in-situ leaching (ISL) mining technologies, graphical user interfaces (GUIs), and Internet software distribution technologies. Users can now specify ISL processes through a Windows object-based geographic information system (GIS) interface that incorporates updated dose assessment methodologies. The MILDOS code and documentation are freely distributed through the Internet.
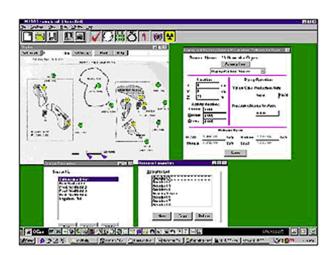
PROBLEM/OPPORTUNITY

Many useful environmental assessment software tools are outdated from a technological standpoint. Such "legacy" tools can be updated by incorporating new data, adding interface "wrappers" and preprocessors, and being made available through the Internet. Thus, without having to be reengineered or revalidated, the software systems will be able to address specific issues, scenarios, and problems more precisely, be accessed and applied by users more easily, and be available to a wider audience. One example of such a tool is the MILDOS-AREA code, developed by EVS for the NRC in estimating radiological doses from uranium mining licensing activities.

APPROACH

EVS has a long background of adding GUIs to legacy FORTRAN codes. Examples are the RESRAD and RISKIND models, which now, like MILDOS, operate in the familiar Windows environment. Two additional graphical features were added to MILDOS: (1) a map-based interactive component for the placement and movement of radiation sources and receptors and (2) windows that show the properties of radiation sources specific to the mining technology being considered. These interfaces are wrappers around the FORTRAN code that allow batch mode processing if desired.

Updated MILDOS software is distributed over the Internet. The information collected during distribution allows news and updates to be broadcast to the user community. The original notification of the availability of the software was done through a posting on the RADSAFE News Group site. EVS

MILDOS employs a graphical user interface and map-based component.

ascertained MILDOS-AREA's input needs with regard to mining technology characteristics, dose assessment methodologies, and other features by visiting an ISL facility and conducting interviews. General radiological dose assessment methodologies were adapted for the specific sequences of processes found at a particular facility.

RESULTS

EVS involved the NRC in reviewing prototypes and drafts. This process led to the timely delivery of the updated software package, including the GUI; updated methodologies and inputs for the specific technology; and web-based, low-maintenance distribution software. EVS also trained the NRC in using the new system.

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FUTURE

Over the years, the MILDOS software has gone through many changes to maintain its applicability and accessibility to practitioners and regulators. It was first developed in 1981 from the Argonne computer program UDAD (Uranium Dispersion and Dosimetry). In 1989, Argonne modified the software to develop a PC version of the MILDOS-AREA code that enhanced the model's ability to compute doses from large area sources. Then in 1997, Argonne further updated the MILDOS-AREA computer code.

The software that was released in late 1998 is currently being distributed and applied in the uranium mining industry. Although many suggestions for the GUI have been made, the current interface still seems to be well received overall.

With rapid changes in information technology, there are many directions to pursue in maintaining the integrity of legacy systems while making them easier to use and providing them with additional functions. One prospect is to allow the code to be run over the World Wide Web; a thin-client applet interface for users could run the code on the server. This encapsulation of the code would also allow parts of the software to be connected in a distributed computing environment. The web-based nature of this environment would permit group discussions and collaborations with regard to applications and data. EVS is also investigating simple video and audio capturing of demonstrations and classes that could then be streamed over the web for just-in-time training.

COMMUNICATION OF RESULTS

A poster on the MILDOS-Area Software Project is being submitted for the 1999 Health Physics Society Meeting. The idea of offering training presentations at mining conferences is being investigated. The main connection to users now is through the MILDOS web site, which is being maintained at Argonne for the NRC. The finalized software and manual are available for downloading. The MILDOS web sites now reside at http://www.nrc.gov/NRC/NMSS/URANIUM/mildos.html and http://www.EVS.anl.gov/mildos.