



Tribal LifeLine™ Project

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Who is The LifeLine Group?

The LifeLine Group is a non-profit 501(c)3 organization who creates and distributes state-of-the-art exposure and risk assessment software and related materials. It has produced software now being used by the Office of Pesticide Programs, the Food and Drug Administration, Health Canada, state regulators and many academic, research and industrial groups¹ and which has undergone extensive review by experts including EPA's Science Advisory Panel². The LifeLine Group copyrights its software and documentation and maintains ownership and version control for all of its programs. All software, including that developed under this contract, is made publicly available, without charge. Because of its non-profit status, software assets of The LifeLine Group do not accrue to the financial benefit of any subcontractor, employee or director of the LifeLine Group. The software is fully transparent and all code is available for examination by any interested party. The LifeLine Group has maintained a leadership role in making such software relevant, transparent, available, and technically excellent.

What is the LifeLine™ Software?

LifeLine™ software is designed to estimate exposures and risks from one or more chemicals reaching individuals in selected populations via their diet, water supply, pets or from their use of consumer products. The exposures can be accrued over a period ranging from one day to a lifetime. The first versions of the software, supported by a cooperative agreement with Hampshire Research Institute, EPA and the U.S. Department of Agriculture (USDA), was revolutionary in its technical approach and its philosophy that software should be fully "transparent", leaving data

¹ LifeLine Aggregate and Cumulative Exposure and Risk Assessment Software, version 2.0 available via www.thelifelinegroup.org

² Proceedings of the EPA Science Advisory Panel <http://www.epa.gov/scipoly/sap/>

sources, assumptions, and other inputs to the software accessible to the user. Subsequent versions have extended the capabilities, making it possible to modify the software for application to unique population groups and add exposure scenarios relevant to how people interact with multiple sources of chemicals in their environment. The software concentrates on accurately modeling people and how they interact with their environment. This dictates their opportunities for exposures as they go through life. The software user brings information about those chemicals and together with the model information, exposure and risk can be approximated. Profiles of exposure can be viewed as a function of the population as a whole, individuals within the population, as a function of source or route of exposure and by various population subgroups (age, ethnicity, gender, season, etc.) The software uses probabilistic approaches, thus minimizing the over-or under-estimation inherent with deterministic approaches. The flexible and fast (Windows based) operating platform permits use of large databases for accurate modeling of demographic, physical, environmental and activity characteristics of individuals in the population or sub-population of interest. Data from many sources is used to quantitatively describe modeled individuals, in terms of physical characteristics, living environments, mobility probabilities, eating habits, and other daily activities. The new Tribal LifeLine™ Software (Versions 1.0A and 1.0B) expands the capacity of the original LifeLine™ Software series³ beyond the original “general public” exposure to pesticides to consider exposure from all chemicals in the unique living environments, lifestyles and diets possible in tribal communities. All software and related documentation are publicly available via The LifeLine Group website www.thelifelinegroup.org.

What is the Tribal LifeLine™ Project?

Prior to 2004, the basic risk assessment tools used by EPA assessed exposure and risk only for the general commercial U.S. population but not for persons living unique lifestyles. In 2002, US EPA responded to the need to expand that capability to consider Native Americans living on reservations and practicing traditional Native American lifestyles. The LifeLine Group was contracted to produce amendments to the basic LifeLine™ Software that would represent exposure scenarios for two types of Native American communities and explore the options and approaches for complete representation of the Native American communities. The contract provided for a pilot project so that the technical approaches for such modifications could be explored as well as determine the probable availability of necessary data and issues related to data access. The new LifeLine™ Tribal Exposure/Risk Assessment Software Versions are the first to use information that represents the living scenarios of the people living traditional lifestyles. Traditional diets based on hunted meats and gathered vegetables, seasonal changes of lodging, use of sweat lodges

³ LifeLine™ Aggregate and Cumulative Exposure and Risk Assessment Software Version 2.0 considers exposure to the general commercial public and some subgroups from one or more pesticide products used in agriculture and residential settings. Substantial upgrades on the “general population” versions will be available in August and again in autumn of this year.

and other unique exposure scenarios are now part of the risk assessment model. That project has led to the development of the LifeLine™ Tribal Aggregate and Cumulative Exposure/Risk Assessment Software Version A.1.0 and Version B.1.0. These represent the Subarctic Freshwater Perimeter Biogeographical Area (BGA) (modeled on Alaska's Nivalena Tribal Villages) and the Northern Plains BGA (modeled on Montana's Blackfoot Tribe), respectively.

What is the Status of the Pilot?

The pilot project is in its final phase and the pilot software and documentation is being prepared for release. A report on the pilot project will be provided to EPA which details the "lessons learned" and advises on the approaches for future work. The pilot was successful in many ways. A pilot version of exposure and risk assessment software has been created that considers two different tribal community types and new exposure opportunity scenarios. Many other new exposure opportunity scenarios have been discovered within these communities as well as for other tribal communities. Many sources of data about the people, their diets, housing and activities exist but need to be gathered and applied to the software—just as such information had to be gathered and applied to the risk assessment tools for the general public. Efficient and culturally appropriate methods for this are being forged using tribal representatives and EPA staff.

Data about diets and food storage, preparation and sources have been discovered. Application of these data to the pilot version of the software has been temporarily offset until clear authority to use the data is acquired. That task is ongoing and success will result in the dietary profiling for the entire Alaskan tribal communities, not just for the Nivalena tribal consortium. Information about important cultural activities, such as use of sweat lodges, have been used in modifications to the exposure profile software. Other unique exposure opportunities via medicinal products, religious ceremonies, craft production, and outdoor activities have been identified though not incorporated into the first pilot version of the software.

New programming has been accomplished which reflects the reality of tribal lifestyles—part traditional diets, lodging and activities—part commercial foods, housing and daily activities. This "cultural blending" capability allows the assessor to designate the percent of the community, by age group, that practices traditional or commercial diets. The new programming accommodates modifications in exposure parameters dictated by health-compromised activity scenarios in communities with high rates of diabetes and asthma or other medical problems. The new programming allows the assessor to include information about the environmental contamination in the main community setting as well as the living sites during seasonal migration—traditional practices by some tribes to temporarily relocate for fishing or hunting or religious activities.

By-products of this project are relevant to the general public as well. These are available to be applied to the LifeLine™ Software for the general public. They include:

- Consideration of contaminants in indoor and ambient outdoor air,

- Health/recreational activities similar to the sweat lodge scenario in the tribal community (sauna's and health club baths),
- Blended diets for intermittent dietary changes related to special diets (Atkins, low carb, vegetarians, or other ethnic diets), where the special diet is elected only for some proportion of the meals or during special holiday seasons.
- Seasonal changes in residence, such as for vacations
- Changes to consider health-restricted activities for some percentage of an age group within a community,
- Integration of unique special events into daily activity patterns by age/gender/ethnic groups.

The software will be presented to the tribes and general public in October at a series of special classes and briefings for the tribal groups being coordinated by EPA. The beta versions will continue to be refined for improvements in the interface and operational functions. Technical manuals and Case Study examples will be made available with the software.

How is OPPTS Working with the Tribes, Tribal Organizations, and Other Groups in this Effort?

OPPTS had a kick-off briefing at the National Tribal Conference on Environmental Management in Reno (2002), and has briefed the Tribal Science Council, Tribal Pesticide Program Council, the United South and Eastern Tribes (USET), and the Alaskan Native Health Board, among others. Although the Tribal Operations Committee (TOC) has not been briefed, most members of the TOC are aware of the initiative. TOC member Gerald Wagner's tribe (Blackfeet) was one of the pilot tribes, and TOC Chairman, Calvin Murphy, was briefed at USET. We continue to work with the tribes and tribal organizations as we proceed with this project.

Besides the technical approaches for modeling the tribal communities, other issues have been identified that are important to the overall success of this project and utilization of the software tools as they develop. Those are issues of data access, ownership and representation; training and use of risk assessment tools at the federal and tribal levels; and differences in philosophical approaches for regulatory decision-making.

There is an abundance of data which describe the demographics, activities, environment and diet of the tribal communities. These data must be harvested, reformatted and authenticated to assure they properly represent the communities they purport to describe. Efficient methods to work with the tribes, especially in remote sites, are being developed so information can be identified and gathered and so tribes can benefit from the development of these tools as well.

The best information and the best model development of risk assessment tools are unlikely to address the issue of philosophical approaches for regulatory decision-making, however. The LifeLine™ Software accommodates the philosophy of U.S. Federal legislation wherein regulation is imposed as a function of the degree of “risk” presented by competing scenarios. Risk is defined as a function of chemical exposure and the measurement of adverse biological consequences due to that exposure. This paradigm is fundamentally different than the more holistic “quality of life” philosophy promoted by many of the tribal communities. In that framework, degradation of overall quality of life—at the personal, community and heritage level-- is defined in terms such as health, tradition, language, and community well-being. These are metrics not yet utilized by EPA or other U.S. regulators. The LifeLine™ model in its present form can do little to align these disparate philosophies.

What are the Next Steps for the Tribal LifeLine Project?

The Office of Prevention, Pesticides and Toxic Substances and the Office of Water plan to continue and build on the efforts begun in the pilot project. Building on the experience and products of the pilot project, future work will include inclusion of additional types of tribal communities with different diets and/or housing styles and/or activities that provide different opportunities for exposure to chemicals than already modeled. Work with the tribal communities will expand to improve the quality of information gathered for the model and assure respect for nation-to-nation relationships. The data in the present pilot version of the Tribal LifeLine™ Software will be upgraded with new data and data presently on hold awaiting authorization for use in the tool.

We have learned that there are, indeed, differences in the way people in tribal communities can be exposed to environmental chemicals and there are data so these exposures can be modeled. We have also found that products of the modeling efforts for tribal communities provide improvements for considering the general U.S. population as well. The use of the Tribal LifeLine™ Model will be increasingly useful to examine contaminants in outdoor and indoor air, water and soil; toxic substances in ceremonial, medicinal, building materials and consumer products, as well as those in diets (traditional or commercial foods).

Issues have arisen during the project period that go beyond the scope of this project. For example, data ownership, needs for training and technical support, and philosophical differences regarding regulatory policy have been noted and relayed to other EPA representatives for their attention as appropriate.

Information about and access to the Tribal LifeLine™ Software, as well as all LifeLine™ products, can be found at www.TheLifeLineGroup.org. The project leads and EPA representatives are available to answer questions or assist with any issues relevant to these efforts.

Dr. Christine Chaisson

Paul S. Price, M.S.

Director, The LifeLine Group
4610 Quarter Charge Drive
Annandale, VA 22003
(toll free)1- 877-978-6496
P: 703-978-6496
F: 703 978-6962
CFChaisson@TheLifeLineGroup.org

Director, The LifeLine Group
P: 207 799-3406
Psprice@TheLifeLineGroup.org

Elizabeth Resek
EPA Office of Science Coordination
and Policy (7201M)
Office of Prevention, Pesticides and
Toxic Substances
1200 Pennsylvania Avenue, NW
Washington, DC 20460

P: 202 564-8459
F: 202 564-8452
Resek.Elizabeth@epa.gov

Karen Rudek
EPA Tribal Programs Coordinator
Office of Water (4101M)
1200 Pennsylvania Avenue, NW
Washington, DC 20460

P: 202 564-0472
F: 202 564-0480

Rudek.Karen@epa.gov