Health Profile Inherent Problems

This document represents excerpts of information supplied to the Missouri Department of Natural Resources via the BASF's Palmyra sites (formally American Cyanamid) health profile submitted to the MDNR, under American Cyanamid correspondence dated October 1, 1990, prepared by Paul Cary, consulting toxicologist. We believe this information to still be applicable today to the Palmyra site, and, furthermore, can be extrapolated across other study areas in Missouri, utilizing the present health profile process.

Health profiles are required by RSMo 260.395.7(5), as part of the hazardous waste permit required by the Missouri Department of Natural Resources (MDNR). The purpose of the profile is to identify the chemical substances that will be routinely handled (treated, disposed, etc.) at the facility and to examine the human health effects potentially associated with these substances attributable to environmental releases. Any change in the human health indicators in the area of the facility that may be attributed to be affected by these substances is thought to be able to be monitored to determine trends over time when compared to control populations.

The regulation requires that three geographic regions be identified and evaluated with regard to potential health effects associated with the substances emitted from the facility: one region that includes the plant (emitting) site, another region that includes a local comparison, and a final region that includes a state comparison group. The population residing within a 3 to 5 mile radius of the emitting source (the site) is considered to have the "highest" potential chronic and acute exposures to the emissions, and the population residing within the second comparison region is considered to have relatively lower chronic and acute exposures. The state population is considered to have insignificant exposures to the environmental contamination and thus serves as the control group.

The profile compares; mortality data, hospital discharge data, cancer incidence data, natality data, birth defect data, and fetal death data for the five most recent years that the data was available from the Missouri Department of Health, against the health effects identified or thought to be associated with emissions released from the source, utilizing specific ICD-9 codes (International Classification of Diseases) associated with the health effects for the identified emitted substances. In addition the source must request mortality and hospital discharge information on 8 major cancer ICD categories (i.e., total cancer, digestive cancer, respiratory cancer, breast cancer, genital cancer, urinary cancer, leukemia and other types of cancer) from the mortality and hospital discharge data base.

So what are some of the inherent problems with an exercise of this type?

<u>Discharge Data</u>:

First, for rural areas (as is the case of BASF's Palmyra site), hospital discharge data may be discrepant from other health indicators. For example there maybe no hospitals within

a given zip code. As in the case of the Palmyra site, persons living in the study area have a choice to utilize the health care delivery system in Quincy, IL or Hannibal, MO, thus those going to Quincy, IL are not captured by the Missouri data collection process. Inasmuch as the statistical significance of selected diagnostic categories is based upon the total number of observed discharges, if a sizable portion of a study area's hospital discharges are not counted, the resulting analysis would be skewed, Additionally hospital discharges for chronic diseases, such as cancer, which require numerous hospital visits will be overrepresented by this survey method since the data reflect the number of discharges rather than the number of diagnostic events.

The validity of the hospital discharge data not withstanding , another factor that may impact the health effect results of a given study area is age. Age is one of the most important factors in disease occurrence since many chronic diseases, such as cancer, show progressive increase in prevalence with increasing age[1]. It is impossible, given the information currently supplied by the Missouri Department of Health and Senior Services (MDHSS) to differentiate between the occurrence of disease associated with age and the occurrence of disease associated with other factors. However, it would not be unreasonable to expect, that a given study area would have a higher overall incidence of disease, versus the state, based upon its increased older population.

Study Area:

The study design used in this profile may have limitations for examining potential effects from the emitting facility. First, and most important, in order to detect health effects from an environmental exposure, it is necessary to compare baseline data from a pre-exposure period to follow-up data from the post-exposure period. For facilities that were in existence before MDHSS started collecting the data, this pre-exposure data is not available.

Secondly, the sample size of a rural study area (i.e. Palmyra zip code 63461, 5500 pop.) may be extremely small for statistical purposes. If chronic health effects were possible from certain categories of chemical exposure, the ability to detect subtle changes would be impeded by statistical power limitations, put another way, the relative risk for getting cancer from a lifetime (approximately 70 years) exposure to low doses of a cancer-causing substance may be so small that it would require an enormous sample size in order to detect that risk with sufficient power.

Third, the socioeconomic status of the population within a given study area is not factored into the determination of health effects. Morbidity, mortality and natality are all effected by the socioeconomic characteristics of a study population[1]. Socioeconomic status includes many components that are related to health outcome, such as, access to medical (or prenatal) care, attitudes toward preventive health, dietary habits, smoking patterns, alcohol consumption, working conditions, etc. If the population of the study area is almost exclusively rural in composition, they have their own unique exposure to compounds that could have an impact on health (i.e. pesticides, etc.). The importance of these factors are not considered in the present health profile process.

Fourth, the use of ecologic studies that are based upon group data versus individuals have the potential for misinterpretation.[2] While geographic correlations may provide interesting clues about a study population, interpretations based upon these correlations must be done with caution. Potentially fallacious conclusions can be drawn about groups of individuals when associations observed in groups of groups are used as the determinate. In order for interpretations about individuals to be meaningful, it is important to consider individualized factors, such as life-style, as a health effect contributor. Unfortunately, these data are usually not available for studies of this type.

Finally, when studying chronic diseases, migration patterns are an important consideration[3]. Movement in and out of a study area would likely be a major determinant of trends in disease rates, In the United States between 1975 and 1978, almost one third of the population changed residence. If there are similar population movements in Missouri over the last 10 – 30 years, then the population represented in the morbidity and mortality rates reviewed for a health profile of this nature, would not be the same as the population who received exposures 10 – 30 years ago.

In conclusion, we have attempted to point out some of the limitations we have seen in the present health profile process, not forgetting to mention the time consuming effort and substantial cost it takes to gather this information, and, the significant impact it has on slowing down the permitting process in the state of Missouri (this appears to be solely a MDHSS problem and not a MDNR problem). Given the present process with its inherent limitations, the regulated community doesn't place much value in its results.

References

1) Friedman G.D.: Primer of Epidemiology Third Edition, McGraw-Hill, New York, 1987.

2) Morgenstern, H.: Uses of Ecologic Analysis in Epidemiologic Research. AJPH 72(12), 1982, pp. 1336 – 1344.

3) Lilienfeld A.M. and Lilienfeld D.E.: Foundations of Epidemiology, Second Edition, Oxford University Press, New York, 1980.