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today
Monsanto Company

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QUESTION: WITH THE PUBLICITY CONCERNING DIOXINS AT TIMES BEACH, DON'T YOU THINK THE PEOPLE OUT HERE NEED A LITTLE MORE INFORMATION ABOUT WHAT IS GOING ON AND WHAT THE EFFECTS ARE?

RESPONSE: YES, WE ARE AWARE OF THE INTEREST IN THE SUBJECT. WITH THE PERMISSION OF THE MONSANTO WORLD NEWS, WE ARE REPRINTING AN ARTICLE THAT APPEARED IN THE JANUARY, 1983 ISSUE TITLED "DIOXIN: ITS EFFECTS ON ANIMALS AND PEOPLE".

AS A MAJOR U.S. CHEMICAL COMPANY WITH WORLD-CLASS RESEARCH EXPERTISE, MONSANTO IS FREQUENTLY SOUGHT OUT BY GOVERNMENT OFFICIALS, THE NEWS MEDIA, THE GENERAL PUBLIC AND, INDEED, ITS OWN EMPLOYEES FOR OPINIONS AND INFORMATION ON A WIDE RANGE OF CHEMICAL ISSUES.

ONE SUCH ISSUE, CURRENTLY THE OBJECT OF CONSIDERABLE PUBLIC CONCERN IN MISSOURI, CENTERS ON THE PRESENCE IN THE ENVIRONMENT OF MINUTE AMOUNTS OF A HIGHLY TOXIC, ALTOGETHER USELESS CHEMICAL WITH THE TONGUE-TWISTING NAME: 2,3,7,8 TETRACHLORODIBENZO-PARA-DIOXIN, OR TCDD. FREQUENTLY CALLED BY ITS GENERIC NAME, "DIOXIN," THIS SUBSTANCE BELONGS TO A CLASS OF CHEMICAL IMPURITIES WHICH CAN BE FORMED UNINTENTIONALLY AS CONTAMINANTS DURING THE MANUFACTURE OF CERTAIN PESTICIDES AND INDUSTRIAL CHEMICALS. RESEARCH RESULTS HAVE RECENTLY ESTABLISHED THAT MOST COMBUSTION PROCESSES LIKE POWER PLANTS, MUNICIPAL TRASH INCINERATORS, AUTOMOBILE ENGINES, AND EVEN WOOD BURNING

FIREPLACES, ALSO PRODUCE MEASURABLE AMOUNTS OF VARIOUS DIOXINS, INCLUDING TCDD. THE FORMATION OF 75 DIFFERENT DIOXIN COMPOUNDS IS CHEMICALLY POSSIBLE, BUT WE WILL FOCUS HERE ON ONLY ONE, TCDD, WHICH WE WILL REFER TO AS SIMPLY "DIOXIN."

IN 1971, WASTE OIL CONTAINING THIS DIOXIN, LATER TRACED TO A NOW DEFUNCT PHARMACEUTICAL PLANT IN SOUTHWEST MISSOURI, WAS SPRAYED ON THE GROUND TO CONTROL DUST ON MANY DIRT ROADS IN THE COMMUNITY OF TIMES BEACH AND IN SEVERAL HORSE ARENAS AS WELL. IT RECENTLY HAS COME TO LIGHT THAT DIOXIN-CONTAMINATED SOIL FROM THE HORSE ARENAS WAS SUBSEQUENTLY REMOVED AND USED AS FILL DIRT AT RESIDENTIAL SITES, THUS CREATING ADDITIONAL CONTAMINATION AND INCREASING THE POSSIBILITY OF HUMAN EXPOSURE.

MONSANTO'S KNOWLEDGE OF THE MISSOURI DIOXIN SITUATION IS LIMITED TO WHAT HAS BEEN REPORTED IN THE NEWS MEDIA. HOWEVER, A NUMBER OF COMPANY SCIENTISTS ARE KNOWLEDGEABLE IN THE CHEMISTRY AND THE ENVIRONMENTAL, TOXICOLOGICAL AND HUMAN HEALTH EFFECTS OF DIOXIN. WE ARE FURTHER FAMILIAR WITH A SUBSTANTIAL AMOUNT OF SCIENTIFIC INFORMATION THAT HAS BEEN GENERATED AND REPORTED BY INDEPENDENT RESEARCHERS ON THIS SUBJECT.

THE FOLLOWING BRIEF SUMMARY OF THE ANIMAL DATA, HUMAN HEALTH INFORMATION AND ENVIRONMENTAL CHARACTERISTICS OF THIS SUBSTANCE, AS EXCERPTED FROM THE SCIENTIFIC LITERATURE.

THE "ACUTE ANIMAL TOXICITY" OF DIOXIN-- THAT IS THE AMOUNT THAT WILL CAUSE IMMEDIATE POISONING--DIFFERS

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CONSIDERABLY FROM ONE ANIMAL SPECIE TO ANOTHER. IN THE GUINEA PIG, THE LABORATORY ANIMAL FOUND TO BE THE MOST SENSITIVE, A SINGLE ORAL DOSE OF AN EXTREMELY MINUTE AMOUNT (IN THE BILLIONTHS OF AN OUNCE RANGE) MAY PROVE FATAL. HOWEVER, OTHER TEST ANIMALS, SUCH AS ROBBITS, DOGS AND HAMSTERS, CAN TOLERATE DOSES RANGING FROM 100 TO MORE THAN SEVEN THOUSAND TIMES THAT WHICH CAN KILL A GUINEA PIG.

LABORATORY STUDIES ALSO HAVE SHOWN THAT SOME TEST ANIMALS, FED DAILY DOSES OF DIOXIN IN THEIR DIETS FOR A PROLONGED PERIOD OF TIME, HAVE EXPERIENCED OTHER SERIOUS HEALTH PROBLEMS INCLUDING CANCER AND BIRTH DEFECTS.

FROM THE HUMAN EXPERIENCE, IT'S CLEAR THAT MAN IS MUCH MORE TOLERANT OF DIOXIN THAN MOST ANIMAL SPECIES. SINCE NO HUMAN IS KNOWN TO HAVE DIED FROM DIOXIN POISONING, THE AMOUNT REQUIRED TO KILL A HUMAN IS UNKNOWN. HOWEVER, MUCH IS KNOWN ABOUT OTHER HUMAN HEALTH EFFECTS.

TO CITE THE MOST RECENT ARTICLE, THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION REPORTED ON OCT. 15, 1982, THAT THERE IS NO SCIENTIFIC EVIDENCE THAT DIOXIN HAS CAUSED CANCER OR BIRTH DEFECTS IN HUMANS.

THIS STATEMENT IS BASED IN PART ON FINDINGS FROM MANY HEALTH STUDIES, SOME DONE RECENTLY, ON SIZEABLE GROUPS OF PEOPLE KNOWN TO HAVE BEEN EXPOSED TO RELATIVELY HIGH LEVELS OF DIOXIN, GOING AS FAR BACK AS 30 YEARS. THESE STUDIES FOUND NO INCREASED CANCER RATES OR OTHER LONG-TERM HEALTH PROBLEMS EXCEPT A PERSISTENT ACNE-LIKE SKIN CONDITION ATTRIBUTED TO EXPOSURE TO DIOXIN.

THIS SKIN CONDITION, KNOWN AS CHLOR-ACNE, IS THE HALLMARK (OR VISIBLE INDICATION) OF BOTH ACUTE AND CHRONIC TOXIC EXPOSURE TO DIOXIN IN HUMANS. CHLORACNE MANIFESTS ITSELF SHORTLY AFTER EXPOSURE (USUALLY WITHIN TWO TO THREE MONTHS) AND, IN ITS Milder FORMS, IS CHARACTERIZED BY CLUSTERS OF BLACKHEADS OVER THE CHEEKBONES, AROUND THE EARLOBES, ON THE FACE, CHEST AND BACK. IN SEVERE CASES,

PUS POCKETS, LARGE CYSTS AND SCARRING HAVE OCCURRED. IN SOME INDUSTRIAL WORKERS, CHLORACNE HAS PERSISTED FOR UP TO 30 YEARS, BUT MILD CASES USUALLY CLEAR UP SHORTLY AFTER EXPOSURE CEA S.

IN SUMMARY, THE PREPONDERANCE OF MEDICAL EVIDENCE PUBLISHED IN THE SCIENTIFIC LITERATURE INDICATES THAT CHLORACNE WILL MANIFEST ITSELF AS THE FIRST CLINICAL SYMPTOM IN HUMANS EXPOSED TO TOXIC LEVELS OF DIOXIN. IN THE ABSENCE OF CHLORACNE, OTHER ADVERSE EFFECTS ARE IMPROBABLE.

IN THE ENVIRONMENT, DIOXIN TENDS TO BIND ITSELF TO SOIL PARTICLES MAKING IT A FAIRLY IMMOBILE SUBSTANCE. IT IS NOT MOBILE OR SOLUBLE IN WATER EITHER. RATHER, IT SETTLES TO THE BOTTOM OF RIVERS AND STREAMS, BINDING ITSELF TO THE SILT OR SEDIMENT. THIS CHARACTERISTIC PREVENTS IT FROM CONTAMINATING DRINKING WATER SUPPLIES. HOWEVER, FISH THAT FEED ON THE SEDIMENT CAN BECOME CONTAMINATED. IN RECOGNITION OF THIS, THE U.S. FOOD & DRUG ADMINISTRATION HAS ESTABLISHED 25 PARTS-PER-TRILLION AS THE MAXIMUM AMOUNT OF DIOXIN PERMITTED IN FISH FOR HUMAN CONSUMPTION. U.S. ENVIRONMENTAL PROTECTION AGENCY REGULATIONS CURRENTLY PERMIT THE SALE AND USE OF HERBICIDES CONTAINING UP TO 100 PARTS PER BILLION OF THIS CONTAMINANT. USING UP-TO-THE MINUTE TECHNOLOGY, THE CHEMICAL INDUSTRY NOW PRODUCES HERBICIDES TYPICALLY CONTAINING ONLY ONE-TENTH THIS AMOUNT.

DIOXIN IS A SOLID MATERIAL WITH A HIGH MELTING POINT, (ABOUT 500 DEGREES FAHRENHEIT), THUS IT DOES NOT GENERATE FUMES. THIS MEANS EXPOSURE THROUGH INHALING THE SUBSTANCE IS NOT A CONCERN. THE MOST LIKELY ROUTE OF HUMAN EXPOSURE IS BY ABSORPTION THROUGH THE SKIN FROM DIRECT SKIN CONTACT WITH CONTAMINATED SOIL. INGESTION IS ALSO POSSIBLE, ESPECIALLY BY CHILDREN WHO TEND TO PUT THEIR FINGERS IN THEIR MOUTHS.

SUNLIGHT DESTROYS DIOXIN'S TOXIC PROPERTIES RAPIDLY ON PLANT AND SOIL SURFACES. THE LENGTH OF TIME REQUIRED TO BREAK IT DOWN INTO HARMLESS COMPONENTS BELOW THE SURFACE RANGES FROM SEVERAL MONTHS TO MANY YEARS, DEPENDING ON A NUMBER OF VARIABLES

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Dioxin: Its Effects on Animals and People

As a major U.S. chemical company with world-class research expertise, Monsanto is frequently sought out by government officials, the news media, the general public and, indeed, its own employees for opinions and information on a wide range of chemical issues.

One such issue, currently the object of considerable public concern in Missouri, centers on the presence in the environment of minute amounts of a highly toxic, altogether useless chemical with the tongue-twisting name: 2,3,7,8, tetrachloro-dibenzo-para-dioxin, or TCDD. Frequently called by its generic name, "dioxin," this substance belongs to a class of chemical impurities which can be formed unintentionally as contaminants during the manufacture of certain pesticides and industrial chemicals. Research results have recently established that most combustion processes like power plants, municipal trash incinerators, automobile engines, and even wood burning fireplaces, also produce measurable amounts of various dioxins, including TCDD. The formation of 75

different dioxin compounds is chemically possible, but we will focus here on only one, TCDD, which we will refer to as simply "dioxin."

In 1971, waste oil containing this dioxin, later traced to a now defunct pharmaceutical plant in southwest Missouri, was sprayed on the ground to control dust on many dirt roads in the community of Times Beach and in several horse arenas as well. It recently has come to light that dioxin-contaminated soil from the horse arenas was subsequently removed and used as fill dirt at residential sites, thus creating additional contamination and increasing the possibility of human exposure.

Monsanto's knowledge of the Missouri dioxin situation is limited to what has been reported in the news media. However, a number of company scientists are knowledgeable in the chemistry and the environmental, toxicological and human health effects of dioxin. We are further familiar with a substantial amount of scientific information that has been generated and reported by independent researchers on this subject.

Following is a brief summary of animal data, human health information and environmental characteristics of this substance, as excerpted from the scientific literature.

Animal Data

The "acute animal toxicity" of dioxin — that is the amount that will cause immediate poisoning — differs considerably from one animal species to another. In the guinea pig, the laboratory animal found to be the most sensitive, a single oral dose of an extremely minute amount (in the billionths of an ounce range) may prove fatal. However, other test animals, such as rabbits, dogs and hamsters, can tolerate doses ranging from 100 to more than seven thousand times that which can kill a guinea pig.

Laboratory studies also have shown that some test animals, fed daily doses of dioxin in their diets for prolonged periods of time, have experienced other serious health problems including cancer and birth defects.

Human Health Information

From the human experience, it's

clear that man is much more tolerant of dioxin than most animal species. Since no human is known to have died from dioxin poisoning, the amount required to kill a human is unknown. However, much is known about other human health effects.

To cite the most recent article, the *Journal of the American Medical Association* reported on Oct. 15, 1982, that there is no scientific evidence that dioxin has caused cancer or birth defects in humans.

This statement is based in part on findings from many health studies, some done recently, on sizeable groups of people known to have been exposed to relatively high levels of dioxin, going as far back as 30 years. These studies found no increased cancer rates or other long-term health problems except a persistent acne-like skin condition attributed to exposure to dioxin.

This skin condition, known as chloracne, is the hallmark (or visible indication) of both acute and chronic toxic exposure to dioxin in humans. Chloracne manifests itself shortly

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