

CI No: 22-001 Final Report

Location: Verona City Missouri

Received: December 2021

Initiator: Joseph Heck

Types of Cancer Reported: non-Hodgkin lymphoma, lung and female breast cancer

Suspected Cause: Ethylene Oxide (EtO) exposure

Summary of Inquiry:

The Syntex Facility – Verona site consists of 180 acres of land, divided into two portions by the Spring River, located at 299 Extension Street, Verona, Missouri. Production activities at this site from the 1960s to 1972 resulted in the contamination of soil and groundwater with dioxin and volatile organic compounds. The site was added to the U.S. Environmental Protection Agency's National Priorities List (NPL) in 1983 and was also added to the State of Missouri Registry of Abandoned or Uncontrolled Hazardous Waste Disposal Sites in 1984. Cleanup activities at the site were completed in 1998, and site monitoring is ongoing.

In 2002, at the property owners' request, the Syntex Facility Superfund site was divided into two separate sites for purposes of the Missouri Registry of Abandoned or Uncontrolled Hazardous Waste Disposal Sites: the Syntex - Verona (West) site and the Syntex - Verona (East) site. The Syntex - Verona (East) site, located east of the Spring River, currently is owned by BCP Ingredients, Inc. (BCP). That property is where dioxin was produced as byproduct during former operations at the site. The Syntex - Verona (West) site is owned by Syntex Agribusiness, Inc. (Syntex) and is west of the Spring River. The two properties are treated as one site for remediation and regulatory purposes.

BCP continues to operate a chemical production facility on the site's east portion. BCP produces choline chloride, a nutritive additive commonly used in animal and human food and supplements. Syntex maintains ownership of, but does not perform any operations on, the site's west portion. Buried in a trench on the site's west portion is Dioxin-contaminated waste.

The City of Verona officials and residents of the area are concerned about the health impact of air emissions of Ethylene Oxide (EtO) from BCP Ingredients. EtO is a flammable colorless gas with a sweet odor. It is used mainly to produce other chemicals and as a pesticide.

The Environmental Protection Agency classifies EtO as a carcinogen by the inhalation route of exposure. Lymphoma, leukemia, breast and stomach cancers are reported to be associated with occupational exposure to EtO.

The Missouri Department of Health and Senior Services (DHSS) conducted a cancer inquiry in Lawrence County Missouri with a specific focus on the area within the 65769 zip code. The 65769 zip code includes the City of Verona. As of the U.S. 2020 Census, the Lawrence County population was 38,001. The county seat is Mount Vernon.

On December 10, 2021, Joseph Heck, Mayor of the City of Verona, requested DHSS to conduct a cancer inquiry. He was concerned about possible excess cancer and other diseases in the City of Verona related to long-term exposure to ethylene oxide (EtO) emissions from the BCP Ingredients plant in Verona. The Office of Epidemiology, DHSS, and Missouri Cancer Registry (MCR), analyzed cancer incidence and mortality data in response to Mayor Heck's request for an inquiry.

The initial zip code level analysis of cancer data identified seventeen (17) cases of non-Hodgkin Lymphoma reported in the 65769 area code from 1996-2018. The counts of non-Hodgkin Lymphoma (associated with ethylene oxide according to NCI [1] in and around Verona¹ is approximately twice than expected based on the rates of the remainder of Lawrence County and the remainder of the state.

Remaining types of cancer associated with ethylene oxide (Hodgkin Lymphoma and Leukemia) or possibly associated with ethylene oxide (Female Breast and Stomach cancer) did not have counts that differed statistically significantly from the expectation based on the rates from either the remainder of the county or the remainder of the state. The analysis suppressed observed case count and derived statistics for Hodgkin Lymphoma and Leukemia due to having six or fewer cases.

The Missouri Cancer Inquiry Committee voted to initiate a Level 1 cancer inquiry on February 23, 2022 after reviewing the analysis of data. The definition of patient with cancer in Level 1 was 1) Patient was a resident in the 65769 zip code at diagnosis; 2) Patient was diagnosed with non-Hodgkin lymphoma between 1996 to present; and 3) Missouri Cancer Registry confirmed the cancer was reported.

A Level 1 inquiry provides education about what is cancer, burden of cancer in Missouri and resources for cancer information to the person making the initial inquiry. The inquirer distributes the Cancer Patient information form during a level 1 inquiry to gather more information from cancer patients or their family. Once the cancer survivor or their family return the patient information forms, the DHSS and MCR staff verifies the information in the Missouri Cancer Registry and analyzes the information on the forms. Then, the Cancer Inquiry staff and DHSS epidemiologist prepares a report to present to the Missouri Cancer Inquiry Committee.

On March 14, 2022, the Missouri Cancer Inquiry Program sent Mayor Heck copies of the Patient Information form to distribute to concerned citizens. Twenty-four (24) individuals returned completed forms about their cancer history to the Bureau of Cancer and Chronic Disease Control. The Missouri Cancer Inquiry Coordinator and DHSS, Office of Epidemiology staff reviewed the forms. The MCR staff compared the names of the people who sent in patient information forms against the cases in the

^[1] NIH NCI, "Ethylene Oxide," 28 December 2018. [Online]. Available: <https://www.cancer.gov/about-cancer/causes-prevention/risk/substances/ethylene-oxide>.

Missouri Cancer Registry. The Office of Epidemiology staff and MCR staff analyzed the data collected from the patient information forms and reported cancer data.

Data:

The initial inquiry prompted 24 individuals to submit Patient Information forms to DHSS. The Office of Epidemiology and MCR staff reviewed the forms for association to ensure they were residents of zip code 65769; diagnosed with non-Hodgkin lymphoma since 1996; and documented cases in the MCR.

According to cancer inquiry protocols, the DHSS Office of Epidemiology and MCR staff reviewed and analyzed the forms received. The DHSS received 24 forms, with 4 multiple and/or metastatic or recurrence tumors resulting in 28 tumors reported. Also, the forms included the names of 11 additional individuals who were checked in the MCR database; resulting in a total of 39 tumors.

Out of the 39 tumors, 23 tumors were confirmed reportable tumors² in the MCR database. 16 tumors were not confirmed and/or not reportable, 4 of the not confirmed and/or not reportable tumors were diagnosed prior to MCR's reference year, and 7 of them did not specify a diagnosis year and type of cancer. 3 tumors were non-reportable, and 2 tumors were not NHL sites but rather recurrence/metastatic sites of the original tumor. Of the 23 confirmed reportable tumors 16 were diagnosed between 1996 and 2018 and were included in the SIR analysis, 1 NHL in 2019.

The MCR showed that 15 of those 23 lived in zip code 65679 when diagnosed with cancer. The PIFs did not identify any additional tumors in MCR's initial zip code level analysis.

Several of the confirmed cancers were breast and lung which are common cancers with known risk factors. Lung cancer is not associated with exposure to Ethylene Oxide.¹ Breast cancer may be associated with Ethylene Oxide but the rate was not statistically significantly elevated. Further, the analysis of the PIFs confirmed less than five non-Hodgkin lymphoma cancers.

The relatively small number of forms received by DHSS limited analysis of the data in the forms. In addition, there was a potential perplexity from different levels of potential exposure and fewer than five cases met the inquiry criteria. In addition, several of the forms reported non-cancerous conditions.

Criteria:

The population surveillance data from the MCR between 1996 and 2018 indicated the observed number of non-Hodgkin lymphoma cases in zip code 65769 was significantly greater than expected compared to the rest of Lawrence County and compared to the remainder of the state. The DHSS could not determine the exact cause or causes for the difference in cases.

^[2] Reportable tumors: malignant/cancerous tumors (cancers with behavior codes 2 or 3 identified in the ICD-O-3 manual). Not reportable tumors: benign tumor or growth that is not cancerous or harmful.

Most identified cancer excesses are not related to environmental causes, but instead are due to normal random variation in cancer occurrences, or to personal behaviors, genetic causes, or other unknown factors. However, the suspected environmental or occupational exposure to EtO is plausibly linked to one of the cancers of concern. In addition, the DHSS believed that the heightened community concern about the public's health warranted further action. Therefore, the Verona City query met the criteria for a Level 1 cancer inquiry.

The Missouri Cancer Inquiry Advisory Committee did not proceed to a Level 2 inquiry for several reasons. Several different types of cancer were confirmed among the individuals submitting the Patient Information form and the majority of cases did not meet the case definition. The relatively small number of Patient Information Forms and confirmed cases of cancer limited the analysis. There is also a lack of information or the ability to collect information on the degree of residents' exposure to EtO from the facility throughout the years.