October 29, 2014

Thomas K. Spencer
Radiation Safety Officer
3500 Dekalb St
St. Louis, MO 63118

Dear Mr. Spencer,

By letter dated July 31, 2014, Sigma-Aldrich Company (SAC) requested that the drinking water pathway be excluded from consideration in site-specific dose modeling at the Fort Mims site in Maryland Heights, Missouri. The U. S. Nuclear Regulatory Commission (NRC) staff reviewed the request in accordance with NUREG-1757, "Consolidated Decommissioning Guidance," and in coordination with the Missouri Department of Natural Resources (MDNR). Based on the information currently provided by SAC and MDNR, there is not sufficient information to exclude the ground water pathway. Additional details regarding the NRC staff's review are provided in the enclosure.

In accordance with 10 CFR 2.390 of the NRC's "Agency Rules of Practice and Procedure," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

If you have any questions concerning the attached information, please contact George Alexander at (814) 297-8385 or at George.Alexander@nrc.gov.

Sincerely,

/RA/
Michael A. Norato, Ph.D., Chief
Materials Decommissioning Branch
Division of Decommissioning, Uranium Recovery,
and Waste Programs
Office of Nuclear Material Safety
and Safeguards

Enclosure:
NRC staff review

Docket No.: 030-10716

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ML14293A328

OFC	NMSS/DUWP	NMSS/DUWP	NMSS/DUWP	NMSS/DUWP
NAME	GAlexander	CHolston	CMcKenney	MNorato
DATE	10/21/14	10/21/14	10/21/14	10/29/14

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Background

On August 9, 2013, the U. S. Nuclear Regulatory Commission (NRC) and Sigma-Aldrich Company (SAC) held a public meeting (ML13280A564) to discuss: (i) the licensee's alternate schedule request (ML13119A405), (ii) decommissioning options, and (iii) a request to eliminate the ground water pathway (ML13116A012). During the public meeting, the NRC staff discussed that site-specific information related to physical ground water characteristics (i.e., well yield, ground water quality, and/or aquifer depth) would be needed and that any request to eliminate the drinking water pathway would be considered in coordination with the Missouri Department of Natural Resources. Since the public meeting, SAC has removed the parking lot following a request from the City of Maryland Heights (ML14276A284) and submitted to the NRC a second request to eliminate the ground water pathway (ML14212A453).

Request to Eliminate the Ground Water Pathway

By letter dated July 31, 2014 (ML14212A453), SAC requested that the drinking water pathway be excluded from consideration in site-specific dose modeling at the Fort Mims site. This current request provides several lines of evidence to eliminate the drinking water pathway, including additional information on the physical ground water characteristics, current water usage, and institutional controls on the ground water resources.

Land Use

SAC discusses that industrial land use is the appropriate land use designation for the site, based on current land use and future land use planning by the City of Maryland Heights. In its Safety Evaluation Report (ML091330309) approving SAC's decommissioning plan, the NRC staff stated that residential use of the Fort Mims site in the near future is considered unlikely due to local zoning restrictions. However, as stated in NUREG-1757, unlikely but plausible receptor scenarios should also be evaluated in order to provide insight into the robustness of the analysis. A large disparity in the doses between a resident and an industrial receptor scenario may indicate that additional justification is required for the selected receptor scenario.

Well Yield

In Exhibit 2 of the 2014 SAC letter, SAC discusses that the U. S. Environmental Protection Agency's criterion for sufficient well yield for a domestic well, which is 150 gallons per day (GPD), is not sufficient for an industrial facility. As an example of industrial water usage, SAC cited an average water use value of 2,940 GPD in 1990 for the Fort Mims Facility in Exhibit 2. However, SAC has not provided site-specific information demonstrating that ground water at the Fort Mims site is insufficient for industrial use. Conversely, an email correspondence between the NRC staff and representatives from Missouri Department of Natural Resources (MDNR), dated September 15, 2014 (ML14276A276), indicates that the well yield at the Fort Mims site is sufficient for an industrial facility. A well log from the State of Missouri – Division of Geological Survey and Water Resources from 1967 at the Fort Mims site documented a well yield in excess of 10,000 GPD.

Ground Water Quality

In Exhibits 3 and 4, SAC provides generalized information on water quality and well yield. The licensee discusses that the water quality and yields are poor east of the fresh water/saline divide. Figure 3 of the "1986 *USGS National Water Summary – Groundwater Quality: Missouri Report"* and Figure 9 of the "*Water Resources Report Number 62 Topics in Water Use: Eastern Missouri"* both indicate that the Fort Mims site is to the east of the fresh water/saline divide. However, SAC has not provided site-specific information demonstrating that the water quality is

not suitable for domestic use. Again to the contrary, information provided by MDNR (ML14276A276) indicates that the formations in the vicinity of the site generally contain less than 1,000 mg/L of total dissolved solids[1]. Based on the aforementioned site-specific well yield and general water quality data, MDNR stated, "[a]t this point, we cannot preclude the suitability of this aquifer for domestic use." However, site-specific information may demonstrate that the ground water at the site is not suitable for domestic use. In a second email correspondence with MDNR dated September 25, 2014 (ML14293A309), MDNR staff discussed the site-specific information that they would need to accept the ground water pathway being excluded from consideration at the Fort Mims site.

Current Water Usage

In Exhibit 2, SAC argues that municipal water is readily available in St. Louis County, which is obtained entirely from surface water. However, the existence of a current municipal water supply does not preclude the future use of ground water and is not a sufficient justification for the NRC to exclude the ground water pathway at the Fort Mims site, which includes relatively long-lived carbon-14 contamination.

Classification of Near-Site Wells

As additional support for SAC's argument that the Fort Mims site cannot provide suitable ground water, SAC referenced a survey from the MDNR Well Information Management System in Exhibit 5. The survey documents 205 permitted wells within a 1-mile radius of the site, almost all of which were used for monitoring and/or characterization and that none of the wells were permitted as a drinking water well. Although the well survey does indicate that the majority of the permitted wells are for monitoring, there are wells that were categorized as domestic, supply, extraction, and unknown. In addition, there is the potential for unpermitted drinking water wells in the surrounding area. Accordingly, this is not sufficient information to exclude the ground water pathway for a site contaminated with a relatively long-lived radionuclide.

Institutional Controls on Ground Water Resources and Land Use

SAC also discussed a State of Missouri well regulation, which provides a type of institutional control on the shallow ground water. In the Missouri Code of State Regulation (CSR) 10 CSR 23-3.090(1) for Area 1, where the Fort Mims site is located, domestic wells shall set no less than 80 ft of casing, extending not less than 30 ft into bedrock. SAC argues that this prohibits the use of any ground water within 80 ft of the surface. However, justification for excluding the ground water pathway is generally based on physical ground water characteristics of the site (e.g., well yield, ground water quality, and/or aquifer depth) rather than institutional controls. For long-lived radionuclides in particular, physical ground water characteristics provide more confidence than institutional controls that the site will pose little to no threat to human health and the environment.

Path Forward to Excluding Ground Water Pathway

Based on the currently available information provided by SAC and MDNR, it does not appear that the ground water pathway can be excluded from consideration at the Fort Mims site. To exclude the ground water pathway from consideration, site-specific information from the Fort Mims site demonstrating that the ground water is not suitable for use would be required. If SAC

[1] As stated in Section 3.5.2 of EPA's Guidelines for Ground-Water Classification Under the EPA Ground-Water Protection Strategy EPA/440/6-86-007, "[m]any State and Federal programs currently use 10,000 mg/L TDS to distinguish potable from non-potable water."

decides to collect site-specific information to exclude the ground water pathway, SAC should coordinate with MDNR and the NRC to help ensure that sufficient information is provided.