



**LETTER OF AGREEMENT (LOA) TO IMPLEMENT AN
EXPEDITED CORRECTIVE ACTION PROGRAM
BETWEEN
THE MISSOURI DEPARTMENT OF NATURAL RESOURCES
AND
SIGMA-ALDRICH MANUFACTURING, L.L.C.-DEKALB FACILITY
ST. LOUIS, MISSOURI
EPA ID# MOD006273726**

I. GENERAL PROVISIONS

A. Purpose

The Missouri Department of Natural Resources (“the department”) and Sigma-Aldrich Manufacturing, L.L.C. (Sigma-Aldrich), are entering into this Letter of Agreement (LOA) for the purpose of implementing an Expedited Corrective Action Program (ECAP) at the Sigma-Aldrich, DeKalb facility. This LOA describes the roles, responsibilities, and expectations of each party with respect to the activities conducted hereunder.

B. Definitions

For purposes of this LOA, the following definitions shall apply:

“Area of Concern (AOC)” means any area at the facility where an actual or potential release of hazardous waste or hazardous constituents, which is not from a solid waste management unit, is occurring and is determined by the department to pose an actual or potential threat to human health or the environment.

“Facility” means all contiguous property under the control of the owner/operator of Sigma-Aldrich at 3500 DeKalb in St. Louis, Missouri, (and as further described in Section II.A. of this LOA).

“Facility Mailing List” means the mailing list required of the facility in accordance with 10 CSR 25-8.124(1)(A)10.C.(I)(c).

“Hazardous constituent” means any constituent identified in Appendix VIII. of 40 CFR Part 261, as incorporated in 10 CSR 25-4.261.

“Hazardous waste” means any waste, or combination of wastes, as defined by or listed in 10 CSR 25-4, which because of its quantity, concentration, physical, chemical, or infectious characteristics may cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or which may pose a threat to the health of humans or other living organisms.

“Release” means any spilling, leaking, pouring, emitting, emptying, discharging, injecting, pumping, escaping, leaching, dumping, or disposing of hazardous wastes (including hazardous constituents) into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing hazardous wastes or hazardous constituents).

“Solid Waste Management Unit (SWMU)” means any discernible unit at the facility at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at a facility at which solid wastes have been routinely and systematically released.

“Stabilization” means actions to control or abate threats to human health and/or the environment from releases at Sigma-Aldrich and/or to prevent or minimize the further spread of contamination while long-term remedies are pursued.

All other terms used herein shall have the same meaning as those in 10 CSR 25-3, 10 CSR 25-4, 10 CSR 25-5, 10 CSR 25-7, and Section 260.360, RSMo, unless this LOA specifically provides otherwise. Where terms are not defined in the law, the regulations, this LOA, or U.S. Environmental Protection Agency (EPA) guidance or publications, the meaning associated with such terms shall be defined by a standard dictionary reference or the generally accepted scientific meaning of the term.

C. Acknowledgments and Expectations

The department is seeking to simplify and streamline the process through which Sigma-Aldrich addresses corrective action requirements to ensure protection of human health and the environment. By entering into this LOA, the department and Sigma-Aldrich agree to work in a cooperative and coordinated manner to ensure successful development and implementation of an ECAP at the St. Louis, Missouri, facility and to ensure efficient use of agency and facility resources in addressing corrective action requirements.

The ECAP to be implemented pursuant to this LOA is intended to ensure protection of human health and the environment. The department and Sigma-Aldrich believe that timely investigation and/or remediation at the St. Louis, Missouri, facility will be of significant benefit in the protection of human health and the environment. The department and Sigma-Aldrich also believe that expedited corrective action may be an effective substitute for corrective action performed pursuant to other formal regulatory mechanisms and may be instrumental in assisting and supporting Sigma-Aldrich in investigation, cleanup, and/or revitalization of the St. Louis, Missouri, facility.

The department and Sigma-Aldrich agree that the elements of this LOA are an integral part of Sigma-Aldrich’s ECAP and are necessary for the protection of human health and the environment, are responsive to the concerns of the department, Sigma-Aldrich, the

public, EPA, and the regulated community in general, and otherwise meet the corrective action requirements which would be applicable pursuant to a hazardous waste permit or corrective action order.

D. Implementation

Sigma-Aldrich agrees to implement an ECAP at the St. Louis, Missouri, facility as described in Section II. of this LOA. The ECAP shall be designed, as appropriate and if necessary, to identify releases of hazardous waste and/or hazardous constituents to the environment, investigate the nature and extent of such releases and implement appropriate corrective measures to protect human health and the environment.

The department will review, provide written comments on and approve Sigma-Aldrich's ECAP deliverables including, but not limited to, investigation work plans and description of current conditions report, evaluations of corrective measures alternatives, and corrective measures implementation reports. The department will utilize applicable EPA and other appropriate technical guidance within the framework of established federal/state regulations and program-specific administrative policies and procedures in reviewing, commenting on and approving Sigma-Aldrich's ECAP deliverables.

Sigma-Aldrich agrees to implement ECAP work plans as approved by the department, perform work in accordance with the schedule contained in such work plans and document/report substantial deviations from the provisions of approved work plans.

The department will oversee the activities so that Sigma-Aldrich's ECAP is conducted in an appropriate and timely manner and will ensure that both technical/legal assistance and procedural guidance are available to support and facilitate ECAP activities at Sigma-Aldrich. Technical oversight for approved investigation and remediation activities, including field observation, split-sampling, and inspection of final remedies will be provided by the department, as appropriate.

Sigma-Aldrich shall comply with all applicable environmental laws and regulations as may be necessary in the implementation of the ECAP pursuant to this LOA. These environmental laws and regulations are administered by the department's Air Pollution Control Program, Hazardous Waste Program (HWP), Land Reclamation Program, Solid Waste Management Program, and Water Protection Program. It shall be Sigma-Aldrich's responsibility to contact the above-referenced programs and to prepare/submit any permit application(s) and/or procure any permit(s) necessitated by implementation of the ECAP pursuant to this LOA. Examples of potentially applicable permits include State Operating Permits issued by the department's Water Protection Program for facility storm water discharges, treatment/discharge of wastewater and/or contaminated groundwater, land disturbance, and underground injection control to facilitate remediation. Potentially applicable permits also include construction and/or operating

permits issued by the department's Air Pollution Control Program for remediation activities, which result in regulated air discharges.

The department and Sigma-Aldrich will, at a minimum, provide opportunities for meaningful public/community involvement in the ECAP process at the time of final remedy selection, should a final remedy prove necessary at Sigma-Aldrich. Sigma-Aldrich agrees to be responsible for providing public notice and an opportunity for comment for any proposed final remedy for a minimum of 30 calendar days. Additional public/community involvement may be necessary for significant interim or stabilization measures and will be addressed on a case-by-case basis. The department agrees to review and approve Sigma-Aldrich's public notice correspondence prior to publication and be the recipient of and respond to comments, if any, received during the public comment period.

Upon successful completion of all approved ECAP activities as verified by review of the deliverables submitted pursuant to this LOA, any necessary inspections by the department and/or establishment of any necessary institutional and/or engineering controls, the department will issue a Certification of Completion to Sigma-Aldrich acknowledging completion of ECAP activities in accordance with the approved work plan(s).

Following issuance of a Certification of Completion to Sigma-Aldrich, the department will provide to EPA, Region VII, copies of all approved ECAP work plans/reports and related correspondence, to the extent that EPA, Region VII, has not already received copies of these documents. The department will also transmit a letter to EPA, Region VII, containing the department's recommendation concerning the need, or lack thereof, for further corrective action at Sigma-Aldrich. EPA will review the department's recommendation and administrative record for the facility as specified in the October 1, 2000, Missouri Corrective Action Plan between the department and EPA, Region VII. Based on all relevant information and data, EPA will respond to specific requests for review of the department's corrective action recommendations in accordance with the Multi-Year Facility Planning Strategy, which is negotiated between the department and EPA, Region VII.

Sigma-Aldrich agrees to record the department's Certification of Completion as part of the chain of title for the property. In the event that contaminated environmental media containing hazardous waste and/or hazardous constituents remain at Sigma-Aldrich, a deed notation or restriction, as appropriate, acknowledging this condition shall be recorded as part of the chain of title for the property prior to the department's issuance of a Certification of Completion.

Sigma-Aldrich agrees to provide a copy of this LOA and the department's Certification of Completion in their entirety to any potential buyer of the facility along with a notice of

any ongoing final remedy maintenance and monitoring requirements (e.g., cap inspection/ repair, groundwater sampling and analysis, long-term financial assurance obligations, etc.), engineering controls (e.g., access restrictions, posting of signs) and/or institutional controls (e.g., deed notices/ restrictions).

Following completion of corrective action pursuant to this LOA, the department expects to administratively release the DeKalb facility from the universe of regulated hazardous waste treatment, storage, and disposal (TSD) facilities subject to corrective action. This final administrative disposition process will include a public notice announcing the successful completion of all closure and corrective action activities and include an acknowledgement by the department and/or EPA indicating that the agencies believe that no further action is required at the facility. A 30-day opportunity for public comment regarding the agencies' preliminary determination of no further action and the proposed release of the facility from the Resource Conservation and Recovery Act (RCRA) TSD facility universe will follow the public notice. If substantive comments are received during the public comment period, the department will, in coordination with Sigma-Aldrich, determine what, if any, additional action is required to address the comments and satisfy applicable regulatory requirements prior to release of the DeKalb facility from the universe of RCRA TSD facilities subject to corrective action. If no substantive comments are received during the public comment period, the department will issue a letter to Sigma-Aldrich acknowledging release of the DeKalb facility from the universe of RCRA TSD facilities subject to corrective action. This letter will include any applicable "reservation of rights" language relative to the requirements of the Missouri Hazardous Waste Management Law and Regulations and/or the federal RCRA. Following issuance of the foregoing letter, should future cleanup at the facility be needed (e.g., due to a new chemical release), such cleanup may be conducted with the oversight of the Missouri Brownfields/ Voluntary Cleanup Program, provided that the department determines that any such cleanup is not actionable pursuant to the reservation of rights clause of the final release letter.

E. Review and Approval

Following submission of any ECAP plan or report (excluding any progress reports and uninterpreted analytical or other data), the department will review Sigma-Aldrich's plan or report. If the plan or report is determined to be adequate, the department will approve the plan or report in writing. If the plan or report is determined to be inadequate, the department will notify Sigma-Aldrich in writing of the plan's or report's deficiencies and will contact Sigma-Aldrich to schedule a meeting or teleconference to informally discuss/resolve the deficiencies, and establish a time frame for submittal of a revised plan or report, if necessary.

If the department determines that deficiencies or issues still exist following review of a revised plan or report, which the department believes will preclude approval, the department will contact Sigma-Aldrich to facilitate additional discussions and/or meetings to resolve the remaining deficiencies or issues. The department and Sigma-Aldrich believe that in the majority of instances, resolution of any remaining deficiencies or issues may be accomplished in an informal manner. Inasmuch as this LOA is a voluntary agreement between the department and Sigma-Aldrich, this LOA does not contain provisions for independent, administrative dispute resolution. In the event that the department and Sigma-Aldrich are unable to reach a mutually acceptable resolution within a reasonable timeframe of any remaining deficiencies or issues in an informal manner, this LOA may be terminated by either party in accordance with Section I.H. below.

F. Protectiveness

All expedited response actions, including stabilization and interim measures activities, shall be protective of human health, welfare, and the environment. These actions shall comply with all applicable federal, state and local laws, regulations, and ordinances. The department will, through oversight of Sigma-Aldrich's ECAP activities, determine whether releases to the environment at the facility pose a threat to human health or the environment, and whether mitigation of the potential exposure of human and ecological receptors to such releases is warranted, consistent with applicable federal and state laws and regulations.

If required, remediation shall be consistent with applicable EPA corrective action guidance, the department's corrective action policies and procedures, and applicable federal and state laws and regulations. Final corrective action remedies shall be based on site-specific conditions and may consider projections of future land use(s) at Sigma-Aldrich.

G. Modification

The department and Sigma-Aldrich may revise this LOA at any time to simplify, clarify, and/or modify the specifications contained herein. The department will, to the extent it becomes aware, keep Sigma-Aldrich informed of any changes in applicable state or federal statutes, regulations or guidance that may impact this LOA and the work conducted hereunder. Any modification of this LOA shall be mutually agreed to in writing by the department and Sigma-Aldrich.

H. Termination of Agreement

Sigma-Aldrich may terminate this LOA at any time for any reason by giving written notice, via certified mail, to the department. The department may terminate this LOA at any time for any reason by providing 30 days written notice via certified mail to Sigma-Aldrich. Although the department reserves this LOA termination right, it is acknowledged that such termination would normally be for cause (e.g., failure to implement approved plan(s) or otherwise comply with the terms of this LOA). If this LOA is terminated, the department may pursue development and implementation of a State Corrective Action Abatement Order on Consent to complete any remaining corrective action activities at the facility.

I. Site Access and Indemnification

Sigma-Aldrich agrees to allow the department access to Sigma-Aldrich for purposes of overseeing implementation of ECAP activities including, but not limited to, sampling, conducting investigations related to the extent of contamination, performing remedial action(s), and observing or monitoring the overall progress of the work conducted pursuant to approved ECAP plans.

Sigma-Aldrich agrees to hold the department harmless and to indemnify the state of Missouri for any claims including, but not limited to, claims for property damage or personal injury arising from activities of Sigma-Aldrich that are reviewed or overseen by the department under this LOA.

J. Reservation of Rights

This LOA, while intended to assist Sigma-Aldrich in meeting applicable corrective action requirements, should not be construed to eliminate, reduce, or otherwise impair the department's or EPA's existing authority to require corrective action under applicable state and federal law. This will be the case regardless of whether this LOA is prematurely terminated or the obligations hereunder are successfully discharged.

The nature and scope of Sigma-Aldrich's ECAP is based strictly on information available at the time this LOA is executed. If, prior to or following issuance of a Certification of Completion to Sigma-Aldrich, the department, or EPA, Region VII, become aware of previously unknown conditions or information which indicates that Sigma-Aldrich's ECAP activities are not protective of human health and the environment, the department and EPA, Region VII, reserve the right to take response actions or require additional corrective action as necessary to protect human health and the environment.

The department and EPA, Region VII, reserve any and all rights and authority at all times that they respectively have, including but not limited to, legal, equitable or administrative

rights, and authority. This specifically includes the department's authority to conduct, direct, oversee, and/or require response in connection with Sigma-Aldrich's ECAP. Notwithstanding any other provision of this LOA, nothing herein affects or limits the department's or EPA's authority or ability to take any enforcement action required or issue an order by law.

Sigma-Aldrich reserves and retains all rights, claims, and defenses it has with regard to any enforcement or permitting action by EPA or the department. Sigma-Aldrich does not admit any liability or factual allegations contained in this LOA, but agrees not to contest them at this time.

K. Corrective Action Oversight Cost Recovery

Pursuant to the Missouri Hazardous Waste Management Law at 260.375(30), RSMo, Sigma-Aldrich, as an owner/operator of a hazardous waste facility performing corrective action pursuant to Sections 260.350 to 260.430 RSMo, shall pay to the department all reasonable costs, as determined by the Missouri Hazardous Waste Management Commission, incurred by the department in the oversight of corrective action investigations, monitoring or clean-up of releases of hazardous waste, or hazardous constituents at its hazardous waste facility. In general, this oversight includes review of the technical and regulatory aspects of corrective action plans, reports, documents, and associated field activities, including attesting to their accuracy and adequacy.

Corrective action cost recovery billing will be based on the hourly rate(s) of departmental staff performing corrective action oversight multiplied by a fixed factor of three and one-half. This fixed factor is comprised of direct labor; fringe benefits including, but not limited to, the following: insurance, medical coverage, Social Security, Workers' Compensation and retirement; direct overhead, including, but not limited to, clerical support and supervisory review and HWP administrative and management support; general overhead, including, but not limited to, utilities, janitorial services, building expenses, supplies, expenses and equipment, and department indirect costs; and other support activities, including, but not limited to, training, peer review, tracking, and coordination.

Sigma-Aldrich agrees to pay direct costs associated with travel of departmental staff to Sigma-Aldrich for the purpose of corrective action oversight including, but not limited to, expenses incurred for lodging, meals, and mileage based on the rates established by the state of Missouri. Corrective action-related costs associated with public notification and

departmental public hearings, including legal notice costs, media broadcast costs, mailing costs, hearing officer costs, court reporter costs, hearing room costs, and security costs, are also recoverable at actual cost.

Sigma-Aldrich's total cost for corrective action oversight will depend on the nature, scope, and complexity of corrective action activities and the corresponding level of departmental oversight required. All funds remitted by Sigma-Aldrich pursuant to this LOA will be deposited in the hazardous waste fund created in Section 260.391 RSMo.

II. FACILITY-SPECIFIC PROVISIONS

A. Sigma-Aldrich Location and Legal Description

Sigma-Aldrich is located at 3500 DeKalb Street, St. Louis, Missouri, and consists of a seven-acre site that includes parking lots on the south and west sides of the facility. The operating portion of the facility is estimated to be approximately 3 acres in size. Surrounding land use to the south, southwest, and west is largely residential and light manufacturing. Interstate 55 borders the facility on the northeast and east side of the facility. The Sigma-Aldrich facility consists of one main building, one hazardous waste storage building, one guard building, and one New Solvent Storage Area.

Sigma-Aldrich is connected to the municipal sanitary sewer system and municipal water supply. The facility was issued an Industrial User Wastewater Discharge Permit (Permit No. 31121441-00) on September 15, 1992, from the St. Louis Metropolitan Sewer District. There are no on-site drinking wells. The facility receives all of its water from the city of St. Louis.

This property does not carry ongoing restrictions as to its use. The property lies within the city of St. Louis, Missouri, at geographic coordinates 38°35'17" N latitude and 90°12'56" W longitude. The active portion of the site is not subject to 100-year floods. Figure 1 is a copy of the facility map of the Sigma-Aldrich property.

B. Sigma-Aldrich Regulatory Status

Sigma-Aldrich was a RCRA permitted hazardous waste TSD facility pursuant to applicable federal and state laws and regulations. Sigma-Aldrich is subject to corrective action but is not subject to issuance or reissuance of a Missouri Hazardous Waste Management Facility permit. Certain wastes and the constituents thereof found at Sigma-Aldrich are hazardous wastes or hazardous constituents pursuant to 40 CFR Part 261, as incorporated by reference in 10 CSR 25-4.261(1). In addition, there is sampling data

indicating a potential release of hazardous wastes and/or hazardous constituents into the environment at Sigma-Aldrich as indicated by the results of a RCRA Facility Assessment (RFA) Report.

C. Ownership and Use of Property

From 1895 to 1955, the property was owned and occupied by Medart Patent Pulley Company. Products manufactured by Medart included shafting, couplings, hangers, pillow blocks, bearings, steel rim, cast iron and wood pulleys, sheaves for manila and wire rope transmission, and machine molded, pattern molded, and cut cast iron gearing.

From 1955 to 1956, the property owner was Mr. John M. Grady. It is not known what tenants occupied the site or what types of products were manufactured during this time period.

In 1956, the property was acquired by Midwest Consultants Company, a predecessor to Sigma Chemical Company. Sigma occupied the site, and, in addition to manufacturing biochemicals, early operations at the facility included the production of cosmetics, shoe dressings, adhesives and inks for cardboard packaging, and corrosion resistant paints. These operations were discontinued in the late 1950's when construction of I-55 claimed a building at the facility. Manufacturing, processing, packaging, storage, and labeling of research biochemicals expanded.

The facility is currently operated by Sigma-Aldrich Manufacturing, L.L.C., and is owned by a related company. Currently, the facility produces approximately 6000 different biochemical compounds. An additional 14,000 products are packaged, warehoused, or quality controlled at this facility.

D. Regulatory History and Previous Investigations/Remediation

Sigma-Aldrich submitted a general information form to EPA indicating the facility was a TSD facility on November 14, 1980. The form stated that Sigma-Aldrich operated as a manufacturer and packer of research biochemicals. A hazardous waste permit application was simultaneously submitted which stated the facility stored 16,750 gallons of hazardous waste in containers and tanks.

The Missouri Department of Natural Resources issued a hazardous waste storage permit on September 14, 1984.

The three stages of the RFA were conducted at the Sigma-Aldrich DeKalb facility (EPA No. MOD006273726) in St. Louis, Missouri. Metcalf & Eddy conducted the first two stages of the RFA. The third stage of the RFA was conducted under the RCRA Enforcement, Permitting, and Assistance Contract No. 68-W4-0005. The RFA included

three stages of investigation: A Preliminary Review, Visual Site Inspection, and two sampling visits. The information gathered during these investigations has been assessed and is presented in the RFA report requested by EPA and generated by Science Applications International Corporation, on November 3, 1995, with revisions on January 12, 1995, and April 5, 1996. The report identifies and evaluates the Solid Waste Management Units (SWMUs) and the Areas of Concern (AOCs) at the facility for releases or potential releases of hazardous wastes or hazardous constituents. The RFA Report, as supplemented by review of the HWP's files for the facility, indicated that there were several SWMUs and AOCs that required additional research and/or investigation.

In response to the RFA, Sigma-Aldrich submitted a letter, dated April 16, 1997, to the department containing clarifying information.

Also in response to the issues identified in the RFA, Sigma-Aldrich collected additional data for certain SWMUs and/or AOCs, performed a risk assessment of the available data, assessed the need for future evaluation and/or investigation, and developed recommendations for actions to protect human health and the environment. The results of this work were presented to the department in a report entitled SWMU/AOC Management Report, RCRA Facility Investigation (RFI) and Corrective Measures (June 4, 1999). The report included a Soil Management Plan (SMP) that specified proper handling and disposal procedures for soils encountered during on-site below-grade construction activities at or near SWMUs and/or AOCs at the Sigma-Aldrich - DeKalb facility, to help ensure protection of on-site workers and the environment. It was Sigma-Aldrich's intent that the SWMU/AOC Management Report would fulfill the requirements for a RFI and Corrective Measures Study (CMS) under the RCRA Corrective Action process.

Based on a October 13, 1999, meeting between Sigma-Aldrich and the department, Sigma-Aldrich submitted a revised SWMU/AOC Management Report, including a revised SMP (October 21, 1999). The department approved the SMP in a letter dated November 2, 1999. The department has not performed a formal review of the remaining elements of the SWMU/AOC Management Report.

Sigma-Aldrich has managed the site consistent with the SMP. Consistent with the SMP and other recommendations presented in the SWMU/AOC Management Report, Sigma-Aldrich has collected certain additional soil data as the opportunity has been presented during the course of site maintenance and construction. This additional data has not yet been submitted to the department.

E. Scope of Work

The scope of work specified in Sections II.F. through II.K. of this document will be implemented at the following SWMUs and AOCs at Sigma-Aldrich (which were originally listed in the RFA):

SWMUs

1. Hazardous Waste Storage Building;
2. Aboveground Storage Tanks and Drum Storage Area;
3. Hazardous Waste Satellite Accumulation Areas;
4. Waste Staging Area;
5. Laboratory Sumps;
6. Spent Solvent Distillation Units, Filtration Devices, and Centrifuges;
7. M-Pad Storage Area;
8. Three Former Underground Storage Tanks;
9. Special Waste Handling Area; and
10. Material Safety Data Sheet Sanitary Sewer System.

AOCs

1. Glycerol Phosphorylcholine Release to Sanitary Sewer System;
2. Release of Pentafluorobenzylbromide at Packaging Department;
3. Tank Farm Loading/Unloading Area;
4. Distillate Bottoms Release Behind Warehouse; and
5. Area of Stressed Vegetation.

F. SWMU/AOC Management Report Addendum

As described in Section II.D., a RFI and Corrective Measures Report has been previously submitted by Sigma-Aldrich to the department. The most current version of this report is dated June 28, 2000. Sigma-Aldrich shall prepare a SWMU/AOC Management Report Addendum that includes the following information:

1. A chronology of RCRA corrective action events at the facility, including the soil sampling events conducted pursuant to the SWMU/AOC Management Report and associated SMP;
2. A description of current conditions at each of the SWMUs and AOCs identified in the RFA, highlighting any new developments since the 2000 SWMU/AOC Management Report;
3. A discussion of any new solid and hazardous waste generation, TSD areas/activities at the facility, including information on associated waste streams (approximate volume and chemical composition);

4. For any product and/or waste spills or releases to the environment that have occurred since the RFA and SWMU/AOC Management Report, identification of the materials spilled, the amount released, the location where released, and a description of the response actions conducted (local, state, or federal response units or private parties), including any inspection reports or technical reports generated as a result of the response, and a map showing approximate locations of release areas at the facility;
5. Compilation and presentation of all analytical data generated in sampling of soil and groundwater performed at the facility since the SWMU/AOC Management Report, including the soil sampling conducted pursuant to the SWMU/AOC Management Report and associated SMP; and
6. A summary of the SWMU/AOC management recommendations made in the SWMU/AOC Management Report, and a discussion of the impact, if any, of recent developments and new data (generated since the June 28, 2000, report) on those recommendations.

G. RCRA Facility Investigation

As described in Section II.D, a RFI and Corrective Measures Report has been previously submitted by Sigma-Aldrich to the department. A RFI Work Plan covering additional investigation activities may be required pursuant to this LOA. If required, this RFI Work Plan shall be designed to: 1) identify any releases of hazardous waste and/or hazardous constituents from the SWMUs and AOCs defined in II.E. above; 2) characterize the nature, vertical and horizontal extent, rate of migration, and any actual or potential receptors of any identified releases; and 3) collect any other pertinent data which may be utilized to substantiate future corrective action investigation and/or remediation decisions.

The content of the RFI Work Plan and resulting RFI Report shall be appropriate for facility-specific conditions and shall be consistent with and address all applicable investigation elements described in the EPA guidance document entitled Interim Final RCRA Facility Investigation Guidance; EPA 530/SW-89-031, May 1989. The RFI Work Plan shall include: 1) a description of current site conditions; 2) all proposed investigation activities and procedures to be conducted at the facility; 3) a schedule for implementing and completing the RFI and submitting a final RFI Report; 4) the qualifications of all personnel, including contractors, performing or directing the investigations and overall management of the RFI; 5) a Quality Assurance Project Plan which specifies, with respect to the RFI objectives, the sampling procedures, analytical methods, field and laboratory quality control samples, chain-of-custody procedures and data review, validation, and reporting procedures which are designed to achieve the data

quality goals of the RFI; and 6) a health and safety plan that assures the RFI activities are conducted in a manner that is protective of human health and the environment.

The RFI Work Plan will be reviewed and approved by the department in accordance with I.E. Sigma-Aldrich shall implement the RFI in accordance with the schedule contained in the approved RFI Work Plan.

Due to the complexity of defining the extent of contamination, it may become necessary for Sigma-Aldrich to use a phased investigation approach which may, in turn, necessitate the submittal of a supplemental RFI Work Plan(s) for approval.

During the course of the RFI or other corrective action activities pursuant to this LOA, Sigma-Aldrich may discover new SWMUs, AOCs, and/or releases from previously identified SWMUs/ AOCs not currently targeted for further corrective action as part of this LOA. The necessity for investigation and/or remediation of any newly identified SWMUs, AOCs, or release(s) will be evaluated on a case-by-case basis. If any such investigation/remediation proves necessary, Sigma-Aldrich is advised that the department will not issue a Certification of Completion to Sigma-Aldrich until all necessary work has been completed.

Sigma-Aldrich shall submit a RFI Report to the department in accordance with the schedule contained in the approved RFI Work Plan. The RFI Report shall present all information gathered under the approved RFI Work Plan in a form that is consistent with Section 5 of the EPA guidance document entitled Interim Final RCRA Facility Investigation Guidance; EPA 530/SW-89-031, May 1989. The RFI Report shall provide an interpretation of the RFI information gathered, supported with documentation, to enable the department to determine whether further investigation, monitoring, stabilization, a CMS, and/or a final remedy are necessary.

The RFI Report shall describe the procedures, methods, and results of all investigations of SWMUs/AOCs and associated releases including, as applicable, the following:

- 1) characterization of the nature, concentration(s), horizontal and vertical extent, and direction/rate of movement of releases from SWMUs/AOCs;
- 2) characterization of the environmental setting of the facility including hydrogeological and climatological/ meteorological conditions, soil and bedrock characteristics, surface waters and sediment quality, and air quality;
- 3) characterization of SWMUs/ AOCs from which releases have been or may be occurring, including unit and waste characteristics;
- 4) descriptions of human and environmental receptors which are, may have been, or based on site-specific circumstances, could be exposed to release(s) from SWMUs/AOCs;
- 5) information that will assist the department in assessing risks to human health and the environment from releases from SWMUs/AOCs;
- 6) extrapolations of future contaminant movement;
- 7) laboratory, bench-scale, pilot-scale, and/or tests or studies to determine the feasibility or effectiveness of treatment technologies or other technologies that may be appropriate

in implementing remedies; 8) statistical analyses to aid in the interpretation of data; and 9) results of any stabilization measures previously implemented.

The RFI Report will be reviewed and approved by the department in accordance with I.E. If, after review of the RFI Report, the department determines that the objectives of the RFI have not been met, additional investigation may be required. Upon approval of the RFI Report by the department, Sigma-Aldrich and the department will meet to discuss and reach agreement concerning the next step in the ECAP process at Sigma-Aldrich.

H. Interim/Stabilization Measures

If, during the course of any activities undertaken pursuant to this LOA, Sigma-Aldrich or the department determines that a release or potential release of hazardous waste, including hazardous constituents, may pose a short-term threat to human health or the environment, implementation of interim/stabilization measures may be necessary to slow or stop the further spread of contamination until a final remedy can be implemented. In certain situations, implementation of interim measures may be desirable even though stabilization does not appear to be necessary based on short-term threats posed by an actual or potential release. The necessity for and/or desirability of interim/ stabilization measures and any associated technical (e.g., nature and scope of action) and administrative (e.g., reporting, public participation) requirements will be evaluated on a case-by-case basis and will be discussed by and between the department and Sigma-Aldrich.

As indicated under Section I.D. above, public/community involvement may be necessary for significant interim/stabilization measures. The need for any such involvement will be determined by the department on a case-by-case basis. Any final agreements between the department and Sigma-Aldrich with respect to interim and/or stabilization measures and associated actions including, but not limited to, submittal of work plan/reports and scheduling shall be reduced to writing by Sigma-Aldrich. This LOA may require modification pursuant to I.G. to incorporate any interim/stabilization measures agreed to by the parties.

I. Corrective Measures/Final Remedy

If, based on the RFI findings and/or other relevant facility-specific information, Sigma-Aldrich or the department determines that a release(s) of hazardous waste and/or hazardous constituents presents an actual or potential threat to human health or the environment, a CMS may be necessary. The necessity for a CMS and any associated requirements will be evaluated on a case-by-case basis and will be discussed by and between the department and Sigma-Aldrich. If a CMS is required, the department will notify Sigma-Aldrich in writing of this decision indicating the hazardous waste and/or hazardous constituent(s) of concern, environmental media of concern, and remedial

alternatives to be evaluated by Sigma-Aldrich (based on previous discussions with Sigma-Aldrich) including any specific alternatives which, in the department's judgment, may be capable of achieving applicable standards for protection of human health and the environment.

A CMS will not necessarily be required for Sigma-Aldrich. Sigma-Aldrich may propose, in the RFI Report, or another LOA deliverable, one or more specific potential remedies for removal, containment and/or treatment of hazardous waste, including hazardous constituents in contaminated media, that are capable of achieving protection of human health and the environment.

Any proposed final remedy, whether presented in the CMS, RFI Report or another deliverable, shall be consistent with and address the specific remedy evaluation standards and general decision factors contained in Chapter IV. of the EPA guidance document entitled RCRA Corrective Action Plan (Final), May 1994, OSWER Directive 9902.3-2A and EPA's Subpart S Advance Notice of Proposed Rulemaking, May 1, 1996; 61 FR 19432-19464, as summarized below. Risk-based standards for corrective action may be based on the *Departmental Missouri Risk-Based Corrective Action Technical Guidance*.

Any proposed final remedy shall present and discuss any interim and/or stabilization measures previously implemented at the Sigma-Aldrich facility, including how these measures are consistent with the proposed final remedy and how they addressed the remedy evaluation standards outlined in the following paragraph. Any proposed final remedy shall also include a discussion of other potentially viable remedial alternatives which were considered, but were dropped from further consideration, including the rationale for elimination.

Any proposed final remedy shall include appropriate technical support and documentation and shall describe in detail, and summarize in a Statement of Basis, how the following remedy evaluation standards are addressed: 1) protection of human health and the environment; 2) attainment of media clean-up standards; 3) control of the source of releases so as to reduce or eliminate, to the extent practicable, further releases that may pose a threat to human health or the environment; 4) compliance with applicable standards in the management of contaminated environmental media and wastes; and

5) other general remedy decision factors (balancing criteria) including long-term reliability and effectiveness; reduction in contaminant toxicity, mobility and/or volume of wastes; short-term effectiveness; implementability; cost; and community acceptance.

Any proposed final remedy, whether presented in the CMS, RFI Report, or another deliverable, shall specify the scope of work for final remedy implementation by addressing applicable elements of Chapter V. of the EPA guidance document entitled RCRA Corrective Action Plan (Final), May 1994, OSWER Directive 9902.3-2A and EPA's Subpart S Advance Notice of Proposed Rulemaking, May 1, 1996; 61 FR 19432-19464.

As indicated above, opportunities for meaningful public/community involvement in the ECAP process will, at a minimum, be necessary at the time of final remedy selection. Sigma-Aldrich agrees to be responsible for providing public notice and opportunity for comment for any proposed final remedy for a minimum of 30 calendar days. Sigma-Aldrich also agrees to be responsible for establishing and updating, as necessary, a facility mailing list in accordance with 10 CSR 25-8.124(1)(A)10.C.(I)(c) and a repository (typically the public library closest to Sigma-Aldrich) containing the complete corrective action administrative record, as determined by the department, for Sigma-Aldrich for public viewing prior to publishing any public notice pursuant to this LOA. The department agrees to make Sigma-Aldrich's complete corrective action administrative record available for public review at its offices, approve Sigma-Aldrich's public notice correspondence prior to publication, and be the recipient of and respond to comments, if any, received during the public comment period. Following the close of the public comment period, any public comments concerning the proposed final remedy will be addressed by the department in consultation with Sigma-Aldrich. Modification of the proposed final remedy in response to public comments, if necessary, shall be accomplished prior to final remedy implementation by Sigma-Aldrich including any necessary modification of documents and/or this LOA.

J. Final Remedy Implementation and Completion

Upon completion of the public comment period for the proposed final remedy, the department's response to any public comments and remedy modification, if any, in response to those comments, Sigma-Aldrich may be required to prepare and submit a work plan for final remedy implementation to the extent that other deliverables submitted pursuant to this LOA do not adequately describe the scope of work for the final remedy and the schedule for remedy implementation. Chapter V. of the EPA guidance document entitled RCRA Corrective Action Plan (Final), May 1994, OSWER Directive 9902.3-2A and EPA's Subpart S Advance Notice of Proposed Rulemaking, May 1, 1996; 61 FR 19432-19464 shall be used in developing the site-specific scope of work to be included in the work plan (if required) for final remedy implementation.

The final remedy implementation work plan (or equivalent information in the RFI Report and/or CMS shall outline the objectives of the final remedy and shall contain, as applicable: 1) a detailed description of the design, construction, operation, monitoring, quality assurance, and maintenance requirements; 2) a cost estimate to define costs for design, construction, operation, maintenance and monitoring; 3) a schedule for design, construction, and monitoring; and 4) management procedures for hazardous wastes and/or hazardous constituents during implementation of the final remedy.

Should corrective measures for groundwater prove necessary, Sigma-Aldrich shall demonstrate that groundwater contamination has not exceeded appropriate regulatory levels (e.g., promulgated standards, maximum contaminant levels, etc.), guidelines or other criteria (may include protective facility-specific risk-based levels) throughout the identified plume of groundwater contamination for a period of three consecutive years prior to submission of the final remedy implementation report, described below, to document that the final remedy is complete.

In the event that a long-term final remedy (e.g., groundwater pump and treat system with groundwater monitoring) is necessary, financial assurance for final remedy operation, maintenance and monitoring may be required of Sigma-Aldrich. The amount of financial assurance will generally be based on the cost estimate contained in the final remedy implementation work plan or equivalent. The need for timing and acceptability/use of specific financial assurance instruments will be discussed/negotiated with Sigma-Aldrich on a case-by-case basis.

Upon completion of the final remedy (i.e., once the clean-up criteria for all contaminated media have been attained and/or long-term institutional/engineering controls are in place), Sigma-Aldrich shall submit a final remedy implementation report to the department. This report shall contain a summary of corrective measures activities conducted at the facility and a detailed description of any long-term operation and maintenance and/or monitoring program associated with the corrective measures. The final remedy implementation report shall be accompanied by a written certification stating that the final remedy has been completed in accordance with the approved work plan(s). This certification shall be signed by Sigma-Aldrich and an independent professional engineer and/or registered geologist licensed/registered in the state of Missouri.

K. Deliverables

A SWMU/AOC Management Plan Addendum (with content as specified in Section II.F.) shall be submitted by Sigma-Aldrich pursuant to this LOA. The necessity for and submission of any other work plans or reports covering investigation, monitoring,

interim/stabilization measures, corrective measures evaluation, and remedy implementation will be discussed with Sigma-Aldrich and addressed on a case-by-case basis.

SWMUs and/or AOCs requiring extended time periods for final remedy implementation (e.g., groundwater remediation) may necessitate submission of periodic progress reports which are more detailed than the Quarterly Progress Reports described below. Again, the necessity for and submission of such reports will be discussed with Sigma-Aldrich and addressed on a case-by-case basis.

From the time of execution of this LOA until a Certification of Completion has been issued to Sigma-Aldrich, Sigma-Aldrich shall submit to the department, within 60 days of the end of each calendar quarter, Quarterly Progress Reports summarizing all corrective action activities undertaken during the preceding calendar quarter. The Quarterly Progress Reports shall include the following information: 1) a description of the work completed; 2) summaries of all findings, including summaries of laboratory data; 3) summaries of all problems or potential problems encountered during the reporting period and actions taken to rectify the problems; 4) deviations from approved work plans or schedules including justification for any delays and a revised projection of the completion date(s); and 5) projected work for the next reporting period. Detailed technical information submitted as part of other deliverables pursuant to this LOA need not be reproduced as part of the Quarterly Progress Reports.

Sigma-Aldrich shall submit two copies of all reports, documents, plans or specifications required under the terms of this LOA to:

Chief, Permits Section
Missouri Department of Natural Resources
Hazardous Waste Program
P.O. Box 176
1738 East Elm Street (Lower Level)
Jefferson City, MO 65101 (65102 if use P.O. Box)

Sigma-Aldrich shall submit one copy of all reports, documents, plans or specifications required under the terms of this LOA to:

Chief, RCRA Corrective Action and Permitting Branch
U.S. Environmental Protection Agency, Region VII
Air, RCRA, and Toxics Division
901 North Fifth Street
Kansas City, KS 66101

L. Schedule

Except as otherwise agreed to and noted in this LOA, Sigma-Aldrich shall be allowed to propose, in the work plan(s), reports, and/or other deliverables required by this LOA, its own schedule(s) for conducting the activities hereunder. Any schedule(s) proposed by Sigma-Aldrich will be of reasonable duration and, once such schedule(s) have been approved by the department, Sigma-Aldrich will comply with the schedule(s). Formal processing of extension requests is not necessary. It shall be Sigma-Aldrich's responsibility to document deviations from approved schedules in the Quarterly Progress Reports required by Section II.J., including the justification for the delay and a revised projection of the completion date(s). Failure by Sigma-Aldrich to make good faith efforts to meet the self-imposed schedules established pursuant to this LOA will be grounds for termination of this LOA by the department.

This Letter of Agreement has been developed by mutual cooperation and consent by and between:

[Original signed by Daniel R. Schuette]	9/6/07
_____	_____
Daniel R. Schuette	Date
Director	
Division of Environmental Quality	
[Original signed by Cheryl Stipsits]	8/2/2007
_____	_____
Cheryl A. Stipsits	Date
Director, Environmental, Health and Safety	
Sigma-Aldrich Manufacturing, L.L.C.	

Figure 1

