STATEMENT OF BASIS

Merck and Co., Inc.
Riverside, Pennsylvania
EPA ID #: PAD 003 043 353

INTRODUCTION

This Statement of Basis (SB) explains the Proposed Remedy by the United States Environmental Protection Agency (EPA) to address the contamination found at the Merck Cherokee Facility (hereafter "Facility" or "Merck") in Riverside, Pennsylvania.

EPA is issuing this SB consistent with public participation provisions of the Resource Conservation Recovery Act (RCRA). The public is encouraged to review and comment on the Proposed Remedy. If the comments are such that significant changes are made to the Proposed Remedy, EPA will seek additional public comments on the revised Proposed Remedy. If there are no comments that result in a change to the Proposed Remedy, the remedy will become final and will be implemented through a Permit Modification to the existing EPA Corrective Action Permit.

The Permit Modification will include all existing environmental monitoring and remediation activities required under the EPA Corrective Action Permit and the Pennsylvania Department of Environmental Protection (PADEP) Consent Order and Agreement (Order) with Merck. The Permit Modification will provide a practical and efficient mechanism for EPA, PADEP, and the public to monitor the progress of the remedy.

A more detail description of the environmental activities at the Facility can be found in the body of this SB and the Administrative Record. Key information used in generating the Proposed Remedy is from reports and sources archived in the Administrative Record. The Administrative Record is available for review at the following locations:

United States Environmental Protection Agency
Region III
1650 Arch Street
Mail Code: 3WC22
Philadelphia, Pennsylvania 19103-2029
Contact: Khai M. Dao
Voice: (215) 814-5467
Fax: (215) 814-3113
E-mail: dao.khai@epa.gov
Hours: Monday-Friday: 8:30 A.M. – 5:00 P.M.

Pennsylvania Department of Environmental Protection
208 West Third Street, Suite 101
Williamsport, PA 17701
Contact: Kathy Arndt
Voice: (570) 327-3693
Hours: 8:00 A.M. – 4:00 P.M.
Note: Appointment needed to review the Administrative Record

SUMMARY OF PROPOSED REMEDY

This section summarizes the principal elements of the Proposed Remedy for the contamination found at the Merck facility. Subsequent sections of this document describe the Facility background, the results of several environmental investigations and remediations, and a detailed description of the Proposed Remedy.

1) Former Solvent Recovery Area:
Merck has implemented a pump and treat system to maintain hydraulic control and remediate the residual source area in the former solvent recovery area. Merck will continue to monitor the performance of the system.

2) Zone 5 of the Former Landfill
Merck will upgrade the cover, revegetate and/or add an appropriate wearing surface, and re-grade Zone 5 to ensure continued prevention of exposure to the waste, reduce surface water infiltration and to control stormwater runoff. Merck will continue to monitor the groundwater in the vicinity of the former landfill.

3) Groundwater Remediation and Monitoring
Merck will operate the existing pump and treat system to remediate and control the migration of the groundwater plume. Merck will implement a site-wide groundwater monitoring program to ensure protection of human health and the environment. Restoration of groundwater to drinking water standards may not be technically practicable. Therefore, with approval from EPA and PADEP Merck may propose Alternate Concentration Limits (ACLs). The proposed ACLs will continue to be protective of human health and the environment and will reflect conditions in which the concentrations in groundwater are stabilized and plume migration is under control.

4) Indoor Air
Merck conducted a vapor intrusion assessment to assess the quality of on-site and off-site indoor air. EPA has determined that the contaminant levels detected in groundwater, on-site soil and soil gas will not cause an exceedance of the Occupational Safety and Health Administration (OSHA) Permissible Exposure Levels for indoor volatile organic compounds at the Facility. Therefore, vapor intrusion does not pose an unacceptable risk to on-site workers. There are no measured adverse impacts to offsite residences due to vapor intrusion.

5) Deep Bedrock Aquifer Contamination
Merck conducted source characterization in the deep bedrock aquifer (> 300 feet below ground surface). Merck will continue to operate the existing pump and treat recovery system to maintain hydraulic control of residual shallow bedrock groundwater contaminant sources and will monitor the site groundwater quality, including the deep bedrock aquifer, to ensure protection of human health and the environment.

6) Institutional Controls
EPA, PADEP, and Merck will work with the appropriate local authorities to ensure that the public is protected from groundwater contamination from the Cherokee site. Merck will inform EPA and PADEP of any changes to land use which may impact the effectiveness or permanence of the Proposed Remedy.

7) Five-year Re-evaluate
Five years after the effective date (October 2003) of the first Comprehensive Groundwater Monitoring Event (CME) EPA, PADEP, and Merck will re-evaluate the remedy and make modifications as necessary.

BACKGROUND

The Merck Cherokee facility consists of approximately 300 acres along the south bank of the North Branch of the Susquehanna River in Riverside Borough, Northumberland County, Pennsylvania. The City of Danville, Pennsylvania is located north of the Facility along the North Branch of the Susquehanna River. The plant is located in an area of predominantly residential and agricultural properties.

From 1942 to 1945, the property was leased by the Heyden Chemical Company from the US Government. Heyden manufactured hexamine for munitions during World War II using such chemical components as methanol, formaldehyde, and anhydrous ammonia.

Merck began operations at the site in 1950. Under an agreement with the US Government, Merck produced hexamine during the Korean War (a six to nine month period in 1952 or 1953). Merck also manufactured such pharmaceutical products as penicillin, cortisone, and niacin. Presently, Merck Cherokee produces various pharmaceutical products for human and animal use.

REGULATORY HISTORY

State Permit (Operating Permit)
Merck operates under a RCRA Permit to manage, store and treat hazardous waste. Merck is permitted to store containerized hazardous materials in a two-celled building. Hazardous materials are also stored in any of the eleven permitted storage tanks at the site. In addition to the

storage activities, currently there is one incinerator permitted at the Facility (a fluidized bed incinerator) to treat and dispose solvent waste. The former John Zink incinerator was closed in 2003 subsequent to the startup of the new fluidized bed incinerator. Merck received closure certification approval for the John Zink unit on November 24, 2004 from PADEP.

PADEP Consent Order and Agreement (Order)
In the early 1980's, elevated levels of trichloroethylene (TCE) and chloroform were detected in several nearby residential wells immediately east of the Facility. On May 17, 1983, Merck signed a Consent Order and Agreement with PADEP to investigate and remediate the groundwater contaminant plume and to provide impacted residential properties with potable water. In December 1992, the Order was amended to specify the location, frequency, and parameters of the groundwater monitoring.

The full text of the Order, the amendment to the Order, and periodic reports required by the Order are included in the Administrative Record.

EPA Corrective Action Permit
In the mid-1980's EPA issued a Corrective Action Permit to Merck to conduct a site-wide investigation and remediation of soil and groundwater contamination at the Facility. Merck completed the investigation in 1994 and submitted the RCRA Facility Investigation (RFI) Report that identified potential releases and contamination. As a follow-up to the RFI, in 1998 Merck submitted the Corrective Measures Study (CMS) that outlines several remedial alternatives to address and remediate the contamination. Based on the CMS and other relevant sources such as small-area studies and periodic sampling reports, EPA is submitting this Proposed Remedy for public comment. If new and/or substantive information or arguments are presented to EPA through public comments, EPA may modify the Proposed Remedy. If there are no comments that result in a change to the Proposed Remedy, the remedy becomes final and is implemented through a Permit Modification to the existing EPA Corrective Action Permit (Permit). The Permit Modification will incorporate all existing environmental monitoring and remediation activities required under both the EPA Corrective Action Permit and the PADEP Order with Merck. PADEP will remain an active entity of the Corrective Action Permit Modification process.

SUMMARY OF INVESTIGATION

Groundwater
The Facility is located on a relatively flat bank along the Susquehanna River. The groundwater underneath the Facility is stratified in multiple aquifers. The Facility is immediately underlain by an alluvial aquifer consisting of soils and flat unconsolidated sediments. The saturated thickness of the alluvium varies from zero to about 20 feet and the depth to groundwater, where present, is approximately 5 to 26 feet. The alluvium is 5 to 50 feet thick and slopes gently toward the river. Groundwater in the alluvial aquifer discharges to the Susquehanna River. The bedrock aquifer lies beneath the alluvial aquifer. The alluvial and bedrock aquifers are hydraulically connected.

The bedrock aquifer consists of steeply inclined sedimentary rocks of the Rose Hill, Keefer, Mifflintown, Bloomsburg and Wills Creek Formations. In most locations, groundwater flow is downward from the alluvial aquifer to the bedrock aquifer. For the purpose of site characterization, the bedrock aquifer was divided into three zones, based on depth. The aquifer zones are designated as shallow bedrock aquifer (50-150 ft.), intermediate depth bedrock aquifer (200- 300 ft.), and deep bedrock aquifer (>300 ft).

Groundwater flow in the bedrock aquifer moves from regions of higher pressure head to regions of lower pressure head. However, the direction of groundwater flow in the bedrock aquifer is influenced by the hydraulic properties of the bedrock. The sedimentary rock layers (bedding) in the bedrock aquifer exerts such an influence by accommodating flow more readily along layers, and the partings that separate individual layers, than across them. The horizontal alignment (strike) of layers in the bedrock aquifer is approximately 75 degrees east of true north. As a consequence, groundwater in all zones of the bedrock aquifer tends to flow east-northeast or west-southwest from the interior of the site and ultimately discharges into the Susquehanna River. The groundwater flow rate in the bedrock aquifer generally decreases with depth. Flow within the shallow aquifer has been shown to be at least two orders of magnitude faster than the flow in the intermediate and deep aquifers.

Contamination in the groundwater originated from two principal sources: (1) the former East End Tank Farms; and (2) the vicinity of the former Solvent Recovery Area and the Old Chemical Sewer System. The contamination consists predominantly of volatile organic compounds (VOCs). The VOCs released in the source areas included miscible liquids, light non-aqueous phase liquids (LNAPLs), and dense non-aqueous phase liquids (DNAPLs). In those source areas where the mixture of these liquids was more dense than the groundwater, the liquids could penetrate the water table and sink through the alluvial aquifer into the bedrock aquifer. Groundwater flow through these contaminant source areas resulted in dissolved groundwater contaminant in the alluvial and shallow bedrock aquifers. One of these plumes impacted several residential wells east of the Facility.

Under the PADEP Order and the EPA Corrective Action Permit, Merck conducted an extensive investigation to characterize and delineate the vertical and lateral extent of the groundwater contamination. Merck supplied impacted residences with bottled water immediately and connected the residences to the Facility's potable water system. Merck installed numerous monitoring and recovery wells to monitor, remediate, and control the migration of the groundwater contaminant plume. At PADEP's request, Merck installed three additional deep monitoring wells to assess the extent and potential impact of groundwater plume in the deep bedrock aquifer. EPA has determined that the difference in hydraulic heads between the deep and shallow aquifers will cause the groundwater plume in the deep aquifer to slowly migrate and eventually discharge toward the Susquehanna River. However, based on the groundwater flow rate, the site hydrogeology and the volume of the Susquehanna River any future contaminant discharge from the deep aquifer plume to the river should not cause an unacceptable impact to the surface water. Therefore, EPA has concluded that currently the groundwater plume in the deep aquifer does not pose an unacceptable risk to the environment and human health. If future

groundwater monitoring indicates that the deep aquifer plume poses a risk to human health and the environment Merck will be required to implement appropriate corrective action measures, which may include active remediation in the deep aquifer. Currently, groundwater monitoring data indicate that site remediation has stabilized the groundwater contaminant plume. Merck will continue to monitor and remediate the groundwater contaminant plume to ensure that human health and the environment remain protected.

Details explaining the groundwater investigation and remediation are presented in the RCRA Facility Investigation Report, the Deep Bedrock Hydrogeologic Investigation Report and the Administrative Record.

Soils

Merck conducted a site-wide soil-gas survey that entailed approximately 823 soil-gas samples. The samples were analyzed for 39 specific contaminants. Results from the survey indicated that the soil contaminants were predominantly chloroform (in 288 locations) and trichloroethylene (in 47 locations).

Based on the results of the soil-gas survey, 118 locations were further evaluated. Of the 118, 113 of the locations were located within the boundaries of existing Solid Waste Management Units. At 84 of those locations, Merck collected soil samples at 5 foot depth intervals to groundwater level. For the remaining 34 locations, soil samples were continuously collected until groundwater was encountered. At such point, shallow sampling wells were installed and groundwater was sampled.

The soil-gas, soil, and shallow groundwater results were evaluated to EPA's residential Risk-Based Concentrations. Based on the evaluations, EPA determined that concentrations in soil do not pose a risk to workers, construction workers, visitors or other site occupants at the Facility. Furthermore, the concentrations in soil do not present a leachable hazard from soil to groundwater. Details of the soil analyses are presented in the RFI Report.

Former Landfill

Merck operated a landfill from the 1950s to 1970s for disposal of various plant waste materials. The former landfill was divided into five zones. Soil samples were collected from several zones to characterize the wastes. Groundwater beneath the landfill was evaluated and will continue to be monitored as part of the site-wide groundwater monitoring program.

Zones 1 and 2

Zone 1 is currently covered and supports a wastewater treatment. Merck collected multiple soil samples beneath the cover to assess the soil structural characteristics and stability.

Zone 2 contained two former stormwater basins. In the 1970's, the basins were decommissioned and backfilled with clean fill. Therefore, soil analysis was not necessary.

Zone 3 and 4
Zones 3 and 4 contained trenches filled with fermentation sludge. The sludge was associated with the penicillin production and consisted of cells, nutrients, and trace minerals. Subsurface soil samples (between 2 and 12 feet below the ground surface) were collected and analyzed for volatile organic constituents. The results did not indicate any levels of contamination that required further investigation.

Zone 5
Zone 5 is about 11 acres and is the largest portion of the former landfill. It contains approximately 180,000 cubic yards of various waste products. In accordance to the Final Design Report for the Zone 5 Landfill Stabilization Project, Merck will improve the existing cover, vegetate as necessary and regrade Zone 5 to eliminate potential exposure to waste, reduce surface water infiltration and to control stormwater runoff. A portion of Zone 5 will be covered with a suitable wearing surface to allow use as a construction staging area. Merck will continue to monitor the groundwater in the vicinity of the former landfill.

Surface Water
Under the National Pollutant Discharge Elimination System (NPDES) permit, Merck currently discharges treated wastewater and stormwater from a combined outfall into the Susquehanna River. Stormwater runoff originating from the vicinity of the former landfill will be discharged through a separate NPDES-permitted stormwater outfall to the west of the landfill.

Surface water samples from the Susquehanna River during 1991 indicated the presence of tetrahydrofuran and chlorobenzene at concentrations above reporting limits. Based on the RFI risk assessment potential exposures to impacted surface waters are not expected to pose potential human health or environmental concerns. The existing groundwater recovery systems will continue to manage the migration of contaminated groundwater toward the Susquehanna River until such time that groundwater recovery is discontinued based on achievement of EPA drinking water standards for the constituents of concern or Alternate Concentration Limits (ACLs) approved by PADEP and EPA.

Indoor Air
The original RFI site characterization did not include analysis of indoor air in the process buildings located above the groundwater contaminant plume. Subsequent to the approval of the Merck RFI Report, EPA established a nation-wide agency initiative to assess indoor air quality on the basis that groundwater contamination may pose a potential intrusion of volatile organic compounds into buildings located above the groundwater plume. In June 2003 and as updated in August 2005, Merck submitted the Vapor Intrusion Assessment Report to evaluate the quality of on-site and off-site indoor air. In September and October 2005, respectively, EPA concluded that the levels of on-site soil, groundwater, and soil gas contamination will not cause an exceedance of the Occupational Safety and Health Administration (OSHA) Permissible Exposure Levels for indoor volatile organic compounds at the Facility. Therefore, vapor intrusion does not pose an unacceptable risk to on-site workers. There are no measured adverse impacts to off-site residences due to vapor intrusion.

Risk Assessment
Initially, Merck conducted a preliminary screening of constituents detected in soil, groundwater and surface water to the EPA residential and industrial Risk-Based Concentrations. Through this process, Merck determined that many of the detected constituents in the surface water and soil contaminants do not pose a human health and environmental risk. As a result, many of the constituents did not require further evaluation.

For the constituents that potentially pose a health risk Merck performed a risk assessment to determine whether the levels of contaminants are a concern. The risk assessment evaluated such parameters as current and future use of the property, the physical soil conditions, groundwater flow characteristics, environmental and toxicological properties of the site-specific chemicals, and the exact paths by which workers and visitors may be exposed.

Based on the risk assessment, the existing conditions at the Facility are not expected to pose potential human health or environmental concerns. Potential exposures to impacted soil and groundwater by onsite workers and/or by residents located within the Facility are under control as documented in EPA's Environmental Indicators. Contaminated soils were either excavated and disposed offsite or covered and do not present an exposure pathway. Residences that have been impacted by the contaminant groundwater plume were connected to the Facility's potable water system. Therefore, there are no current human health exposures to the groundwater contaminant plume.

Although current conditions at the Facility do not pose significant health risks, Merck recognized that remediating and controlling the migration of the groundwater contaminant plume will ensure the continued protection of human health and the environment. During 1998, Merck submitted a Corrective Measures Study ("CMS") in which they proposed several measures to be considered as part of a final remedy. After several modifications and additions, EPA approved the CMS in 2001. EPA evaluated the recommendations in the CMS along with other relevant information to present the Proposed Remedy.

PROPOSED REMEDY AND RATIONALE

The Facility is zoned for industrial use. The remedy is designed to protect human health and the environment under industrial use. This approach is consistent with EPA guidance regarding the use of reasonably anticipated land-use in the remedy selection process.

Proposed Remedy for Surface Soil
EPA is not proposing remediation or removal of any soils.

Rationale
Comparative to the OSHA Permissible Exposure Levels, the levels detected in soil gas and soil samples do not pose an unacceptable health risk to onsite workers and visitors at the Facility or to

the environment.

Proposed Remedy for the Former Landfill
EPA is proposing no further action for Zones 1, 2, 3, and 4 of the former landfill. The majority of these Zones are covered with soil, paved over or contain structures. The impacted soils in these Zones do not pose a risk to human health or the environment. For Zone 5, the Proposed Remedy entails installing an enhanced cover, vegetating, or application of a suitable wearing surface and regrading to reduce surface water infiltration and to control stormwater runoff.

Merck proposes to use Zone 5 as a staging area for trailers and for temporary offices/fabrication areas. Under the Proposed Remedy, Merck may utilize the area as long as the utilization of Zone 5 does not compromise the efficacy of the remedy.

Merck will continue to monitor the groundwater in the vicinity of the former landfill. If the groundwater monitoring indicates an adverse change in groundwater quality in the vicinity of the landfill, Merck will notify EPA and PADEP and will propose an appropriate course of action. Details of the remedy are presented in the Final Design Report for the Zone 5 Landfill Stabilization Project.

Rationale
Impacted soils in the former landfill do not pose an unacceptable risk to human health or a concern to the groundwater at this time. Zones 1-4 are currently covered or paved over. Merck, in accordance to PADEP requirements, will enhance the existing cover, vegetate or apply a suitable wearing surface and regrade Zone 5, which will eliminate the exposure pathways to the impacted soils and waste materials. Therefore, it is not necessary to remove materials from the former landfill to be protective of human health and the environment.

Historic groundwater data indicate that low groundwater contaminant concentrations in the vicinity of the former landfill have been improving with time. Therefore, groundwater monitoring will be used to continue to document continued improvement.

Proposed Remedy for Groundwater
The goal of the proposed remedy is to monitor, remediate and control the migration of the groundwater contaminant plume. Merck will continue to implement the current pump and treat system until groundwater quality meets the EPA drinking water standards for the constituents of concern or Alternate Concentration Limits (ACLs) approved by PADEP and EPA. Upon the achievement of the groundwater quality standards for two consecutive years, Merck may temporarily discontinue the groundwater remediation system. Merck will continue to monitor the groundwater under static conditions for an additional two consecutive years. If the levels of contaminants continue to meet groundwater quality standards and the groundwater plume migration is under control during this period Merck may discontinue the groundwater monitoring. However, if the groundwater data indicate a change in position or concentration of the groundwater plume that pose a potential risk to human health and the environment, Merck will restart the pump and treat system to control the migration of the groundwater plume. Merck

will implement a site-wide groundwater monitoring program to monitor the position and concentration of the groundwater contaminant plume in all four aquifers as well as to monitor the performance of the source area containment systems in SWMU1, SWMU2 and the pumping system in the former Solvent Recovery Area. The monitoring plan must meet both EPA and PADEP requirements and will follow the recommendations of the October 2003 comprehensive groundwater monitoring report (including subsequent agency-approved modifications) with respect to monitoring locations and methodology. Merck will sample the wells every five quarters for a period of five years (i.e., four monitoring events). At such time, Merck will re-evaluate the effectiveness of the groundwater remediation and monitoring program. If necessary, Merck will modify the remediation to meet the objectives of the cleanup and any regulatory requirements.

Rationale

Currently there are no unacceptable human exposures to the contaminated groundwater. Residences that were once impacted by contaminated groundwater were connected to the Facility's potable water system. There are two residential properties within the boundaries of the plume; they are located immediately east of the facility. The remaining properties east of the Facility fence line that are impacted by contaminated groundwater have been purchased by Merck and incorporated into the Facility. The current pump and treat system effectively controls the migration of contaminants from the residual contaminant source areas in the shallow bedrock aquifer and alluvial aquifer in the Solvent Recovery Area.

At PADEP's request, Merck installed three additional deep monitoring wells to assess the extent and potential impact of groundwater plume in the deep bedrock aquifer. EPA has determined that the difference in hydraulic heads between the deep and shallow aquifers will cause the groundwater plume in the deep aquifer to slowly migrate and eventually discharge toward the Susquehanna River. However, based on the groundwater flow rate, the site hydrogeology and the volume of the Susquehanna River any future contaminant discharge from the deep aquifer plume to the river should not cause an unacceptable impact to the surface water. Therefore, at this time EPA has determined that the groundwater plume in the deep aquifer does not pose an unacceptable risk to the environment and human health. If future groundwater monitoring indicates that the deep aquifer plume poses a risk to human health and the environment Merck will be required to implement appropriate corrective action measures.

The Comprehensive Groundwater Monitoring Events (CMEs) will document the position and concentration of the plume, and will ensure the continued protection of human health and the environment. Merck will continue to operate the existing pump and treat system to remediate and control the migration of the groundwater plume.

Proposed Remedy for Surface Water

EPA is not proposing a remedy for the surface water (Susquehanna River). The existing groundwater recovery systems will continue to manage the migration of contaminated groundwater toward the Susquehanna River until such time that groundwater recovery is discontinued based on achievement of EPA drinking water standards for the constituents of

concern or Alternate Concentration Limits (ACLs) approved by PADEP and EPA.

Rationale
Based on the RFI risk assessment potential exposures to impacted surface waters are not expected to pose potential human health or environmental concerns. Potential contamination to the surface water from the seeps, springs, and groundwater will be addressed by the site-wide groundwater recovery and the groundwater monitoring program.

Proposed Remedy for Indoor Air
EPA is not proposing a remedy for Indoor Air.

Rationale
Merck conducted a Vapor Intrusion Assessment to assess the quality of on-site and off-site indoor air. EPA concluded that the levels of soil, groundwater and soil gas contamination do not pose an unacceptable risk to on-site workers or off-site residents.

MEDIA CLEANUP STANDARDS AND POINTS OF COMPLIANCE

Merck will continue to implement the current pump and treat system until groundwater quality meets the EPA drinking water standards at the Facility boundary and throughout the plume for the constituents of concern.

Presently, EPA has determined that the Susquehanna River is the only potential receptor. Restoration of groundwater to drinking water standards may not be technically practicable. For this reason, Merck may propose Alternate Concentration Limits (ACLs) standards that will be protective of the Susquehanna River. The ACLs will reflect static conditions in which the concentrations in groundwater are stabilized and plume migration is under control.

INSTITUTIONAL CONTROLS AND OVERSIGHT

EPA, PADEP, and Merck will work with the appropriate local authorities to insure that the public is protected from groundwater contamination. Merck will inform EPA and PADEP of any changes to land use which may impact the effectiveness or permanence of the Proposed Remedy.

EPA and PADEP will review the progress of the proposed remedy to ensure that Merck is fulfilling the cleanup requirements. If EPA or PADEP determines that Merck is not achieving the cleanup requirements, EPA/PADEP may require Merck to perform additional studies and/or to perform modifications to the existing Corrective Measures. In the event that EPA/PADEP requires Merck to perform additional studies and/or to perform modifications to the existing Corrective Measures, EPA will provide an opportunity for public comment prior to the initiation of change(s) to the existing Corrective Measures.

EVALUATION OF PROPOSED REMEDY

EPA's Criteria for Remedy Selection

The criteria EPA considers in a remedy are set forth in EPA's "Guidance on RCRA Corrective Action Decision Documents: The Statement of Basis Final Decision Response to Comments" (OSWER Directive 9902.6) dated February, 1991, and the Advance Notice of Proposed Rulemaking, 61 *Federal Register*, no. 85:19451-52 (1996). These documents describe four general standards and five corrective measure selection decision factors that assist in evaluating the overall effectiveness of the Proposed Remedy.

The general standards for corrective measures are:

1. *Overall Protection of Human Health and the Environment* addresses whether a remedy provides adequate protection and describes how risks are eliminated, reduced, or controlled.

2. *Attainment of Cleanup Standards* addresses whether a remedy will meet the appropriate federal and state cleanup standards.

3. *Controlling the Sources of Contamination* relates to the ability of the selected remedy to reduce or eliminate, to the maximum extent practicable, further releases.

4. *Compliance with the Waste Management Standards* assures wastes are managed in a protective manner during the implementation of the corrective measures.

The five selection decision factors for corrective action are:

1. *Long-Term Reliability and Effectiveness* refers to the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals are achieved.

2. *Reduction of Toxicity, Mobility, or Volume of Waste* addresses the degree to which remedial alternatives employ recycling or treatment that reduces toxicity, mobility, or volume of contaminants.

3. *Short-Term Effectiveness* addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be imposed during the construction and implementation period until cleanup goals are achieved.

4. *Implementability* addresses the technical and administrative feasibility of the remedy, including the availability of materials and services needed to implement a particular remedy.

5. *Cost* includes estimated capital costs, operation costs, and present worth costs.

Evaluation of Proposed Remedy

The Proposed Remedy encompasses several remedial actions to ensure that human health and the environment are protected. The Remedy consists of groundwater remediation and monitoring, an enhanced cover and controlling stormwater runoff at the former landfill, and the implementation of institutional controls.

Four General Standards for Corrective Action

1. Overall Protection of Human Health and the Environment

Based on the RCRA Facility Investigation and the Risk Assessment, EPA concludes that the only potential receptor is the Susquehanna River. To address the groundwater contamination and to ensure that human health and the environment are protected, Merck has implemented several remedial actions. These actions encompass contaminant source removal, elimination of potential human health exposure pathways and implementation of the pump and treat system to remediate and control the migration of the groundwater contaminant plume. Merck will implement a site-wide groundwater monitoring program to monitor the position and concentration of the groundwater contaminant plume in all four aquifer zones as well as to monitor the performance of the source area containment systems in SWMU1, SWMU2 and the pumping system in the former Solvent Recovery Area. In the event that constituent concentrations in the monitoring wells indicate a change in position or concentration of the groundwater plume that pose a potential risk to human health and the environment, Merck will implement appropriate action, as necessary.

Under the Proposed Remedy, Merck will continue to remediate and monitor the groundwater contaminant plume to ensure that human health and the environment are protected.

2. Attainment of Cleanup Standards

Merck will continue to implement the current pump and treat system until groundwater quality meets the EPA drinking water standards for the constituents of concern or Alternate Concentration Limits (ACLs) approved by PADEP and EPA for two consecutive years throughout the plume for the constituents of concern.

3. Controlling the Sources of Contamination

Merck identified several potential sources of contamination. These sources include the East End Underground Storage Tank Farms, the former Solvent Recovery Area, the old Chemical Sewer System, and various spill areas. Merck removed the underground storage tanks, which were identified as an original source of the groundwater contamination. To prevent future releases from the old Chemical Sewer System, Merck upgraded the system with 12,000 feet of stainless

steel piping enclosed in a concrete secondary containment that collects and traps potential releases. The complete list of past cleanups and upgrades is presented in the RFI Final Report.

Merck will reduce surface water infiltration and control stormwater runoff by enhancing the existing cover, re-vegetating and/or adding a suitable wearing surface and regrading Zone 5 of the former landfill.

4. Compliance with Waste Management Standards

This Proposed Remedy complies with all relevant state and Federal laws concerning the management of wastes during the implementation of the remedies.

Five Remedy Selection Decision Factors for Corrective Action

1. Long-Term Reliability and Effectiveness

The proposed remedy will ensure that human health and the environment will remain protected now and in the future. Contaminant sources have been removed and no longer contribute to groundwater contamination. Merck will continue to operate the pump and treat system to remediate and control the residual sources of the groundwater contaminant plume in the shallow bedrock aquifer. Merck will implement a site-wide groundwater monitoring program to monitor the position and concentration of the groundwater contaminant plume in all four aquifer zones as well as to monitor the performance of the source area containment systems in SWMU1, SWMU2 and the pumping system in the former Solvent Recovery Area. Manufacturing operations are expected to continue at this location and all elements of the Proposed Remedy will be maintained.

2. Reduction of Toxicity, Mobility, or Volume of Waste

The groundwater pump and treat system and the remediation of contaminant source areas have reduced the overall volume of wastes (i.e., contaminants in groundwater).

The mobility of groundwater contamination in the source areas is under control with the current pump and treat system. Merck will continue to monitor the groundwater contaminant plume to ensure that the plume remains stable.

The installation of a cover, regrading and re-vegetation and/or application of a suitable wearing surface at and/or application of a suitable wearing surface at Zone 5 of the former landfill will reduce the potential for surface water infiltration and contaminant transport from stormwater runoffs.

3. Short-Term Effectiveness

Much of the remediation elements are currently in place and are operating effectively. This

includes the remedial system installed under the PADEP Order to control offsite groundwater contamination in the alluvial aquifer and shallow portion of the bedrock aquifer.

4. Implementability

Most of the elements of the Proposed Remedy are currently in place. In addition, implementation of the remaining portions of the Proposed Remedy will not interfere with the Facility's pharmaceutical operations. The Proposed Remedy will be implemented through a Permit Modification to the existing EPA Corrective Action Permit.

5. Cost

Merck is a viable company with the financial resources to implement and to maintain the operation and maintenance (O&M) costs of the Proposed Remedy. The estimated costs are:

The cost for remediation at Zone 5 of the former Landfill is estimated to be $550,000 in initial capital costs with estimated annual O&M costs of $14,000.

The cost to optimize the recovery well system operation at the Former East End UST Farms was estimated to be $220,000 in capital expenses with estimated annual O&M costs of $25,000. The costs to implement the Corrective Measure at the former Solvent Recovery Area were estimated to be $190,000 in capital expenses with an estimated annual O&M cost of $13,000. This remedy was completed during 2003 at a cost of approximately $195,000 and pumping was initiated in January 2004.

COMMUNITY INVOLVEMENT/PUBLIC PARTICIPATION

EPA is requesting comments from the public on the Proposed Remedy for remediation of the contamination at the Merck Cherokee Facility. The public comment period will last forty-five (45) calendar days after the public notice first appears on November 3, 2006 in the Danville News/Daily Item. Comments should be sent to EPA in writing at the address listed below. EPA must receive the comments within the 45-day period ending on December 18, 2006.

A public hearing will be held upon request. Requests for a public hearing should be made to Mr. Khai M. Dao of the EPA Region III Office (215-814-5467) or Mr. Ted Loy of the PADEP (570-327-3377). A hearing will not be scheduled unless one is requested.

EPA may modify the Proposed Remedy based on new information and/or public comments. Therefore, the public is encouraged to review the Administrator Record, and comment on the Proposed Remedy presented in this document.

Key information used in generating the Proposed Remedy are from reports and sources archived in the Administrative Record. The Administrative Record is available to the public for review

and can be found at the following locations:

United States Environmental Protection Agency
Region III
1650 Arch Street
Mail Code: 3WC22
Philadelphia, Pennsylvania 19103-2029
Contact: Khai M. Dao
Voice: (215) 814-5467
Fax: (215) 814-3113
E-mail: dao.khai@epa.gov
Hours: Monday - Friday: 8:30 A.M. - 4:30 P.M.

Pennsylvania Department of Environmental Protection
208 West Third Street, Suite 101
Williamsport, Pa 17707
Contact: Kathy Arndt
Voice: (570) 327-3693
Hours: 8:00 A.M. – 4:00 P.M.
Note: Appointment needed to review the Administrative Record

Following the forty-five (45) calendar day public comment period, EPA will prepare a final decision which will address all written comments and any substantive comments presented verbally at the public hearing. This final decision will be incorporated into the Administrative Record. If the comments are such that significant changes are made to the Proposed Remedy, EPA will again seek public comments on the revised Proposed Remedy.

If there are no comments that result in a change to the Proposed Remedy, the remedy will become final and will be implemented through a Permit Modification to the existing EPA Corrective Action Permit. EPA will announce the Permit Modification. Anyone who submitted comments which did not result in a change to the Proposed Remedy may contact EPA at the above address within 30 days of the signed date to challenge the Permit Modification. This challenge must be on the points made in the original comments. If EPA does not receive a challenge to the Permit Modification, the Permit Modification will become effective 30 days after the date it was signed by EPA.

If EPA does not receive any comments to the Proposed Remedy, the remedy will become final through a Permit Modification, which will become effective on the date it is signed.

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Date

Abe Ferdas, Director
Waste and Chemicals Management Division