


4/6/09

**FIVE-YEAR REVIEW REPORT**  
**Second Five-Year Review**  
  
**for**  
  
**RHINEHART TIRE FIRE**  
**SUPERFUND SITE**  
  
**WINCHESTER,**  
**FREDERICK COUNTY, VIRGINIA**

**November 2002**

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**Attachments**

Attachment 1 - Figure 1 - Site Location Map  
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## **List of Acronyms**

ARAR	Applicable or Relevant and Appropriate Requirement
BTAG	Biological Technical Assistance Group
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
EPA	United States Environmental Protection Agency
ERT	Emergency Response Team
ESD	Explanation of Significant Differences
FS	Feasibility Study
LAG	Interagency Agreement
mg/kg	milligrams per kilogram
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
OU	Operable Unit
RA	Remedial Action
RAO	Remedial Action Objectives
RBC	Risk Based Concentration
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
TAL	Target Analyte List
TCL	Total Compound List
USACE	United States Army Corps of Engineers
VDEQ	Virginia Department of Environmental Quality

## EXECUTIVE SUMMARY

Superfund cleanup work at the Rhinehart Tire Fire Superfund Site in Winchester, Virginia included a removal action and three remedial actions. The objectives of the removal action were to extinguish the fire and to capture as much of the resultant oily tar as possible. The latter was first met by directing the oily tar to a sump and the existing Rhinehart's Pond and then by building another pond downgradient of the fire (later named Dutchman's Pond). The remedy in the first remedial action (an interim action) included stabilizing the slopes in the burn area by covering them with shotcrete, installing an oil/water separator, constructing a storm water collection system to carry storm water to Rhinehart's Pond, and raising the existing dam at Rhinehart's Pond to allow solids to settle by increasing the holding capacity of the pond. A water treatment plant was added in order to meet the discharge requirements for the surface water in Rhinehart's Pond. The remedy in the second remedial action included decommissioning Dutchman's Pond and excavating and removing the contaminated soil beneath the pond and disposing of the soil at an off-site facility. The remedy included in the third and final remedial action included removing and treating all of the surface water collected in Rhinehart's Pond, removing the contaminated sediment in Rhinehart's Pond and Massey Run and disposing of the sediment at an off-site facility, and decommissioning the facilities installed under the first remedial action. The decommissioning activities included: abandoning the storm sewer and monitoring wells; covering the shotcrete with soil; removing the dam at Rhinehart's Pond, the water treatment plant, the site fence, and the oil/water separator; re-channeling the stream where both ponds and the dam were formerly located; and re-grading and re-vegetating the site.

The site achieved construction completion with the signing of the Preliminary Close Out Report on September 27, 2002. The trigger for this five-year review was the date of the first five-year review report, September 12, 1997.

The assessment of this five-year review found that the remedy was constructed in accordance with the requirements of the three Records of Decision (RODs) and the two Explanations of Significant Differences (ESDs). With the completion of the third and final remedial action, the Site is protective of human health and the environment.

## Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name: Rhinehart Tire Fire Superfund Site		
EPA ID: VAD980831796		
Region: 3	State: VA	City/County: Winchester, Frederick County
SITE STATUS		
NPL status: <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify) _____		
Remediation Status (choose all that apply): Under Construction <input type="checkbox"/> Operating <input checked="" type="checkbox"/> Complete		
Multiple OUs?* <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		Construction completion date: 09/27/2002
Has site been put into reuse? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
REVIEW STATUS		
Lead agency: <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency _____		
Author(s) name: ** Andrew Palestini w/Daniel Gilroy assistance		
Author(s) title: Remedial Project Manager		Author(s) Affiliation: U.S. EPA - Region 3
Review period:***06/01/2002 to 09/30/2002		
Date(s) of site inspection: 09/18/2002		
Type of review: <input checked="" type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-lead <input type="checkbox"/> Regional Discretion		
Review number: <input type="checkbox"/> 1 (first) <input checked="" type="checkbox"/> 2 (second) <input type="checkbox"/> 3 (third) <input type="checkbox"/> Other(specify) _____		
Triggering action: <input type="checkbox"/> Actual RA Onsite Construction at OU # _____ <input type="checkbox"/> Actual RA Start at OU# _____ <input type="checkbox"/> Construction Completion <input checked="" type="checkbox"/> Previous Five-Year Review Report <input type="checkbox"/> Other (specify) _____		
Triggering action date: 09/12/1997		
Due date (five years after triggering action date): 09/12/2002		

\* ("OU" refers to operable unit.)

\*\* (If a contractor writes the report, the author name should be written as, "RPM w/ (contractor name) assistance.")

\*\*\* (Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.)

## **Five-Year Review Summary Form, cont'd**

### **Issues:**

There are no issues related to the current Site conditions which would prevent the remedy from being protective. There are currently no operations or activities occurring at the Site.

### **Recommendations and Follow-up Actions:**

EPA must ensure that the survival rate of the final seeding, trees, and bushes is in accordance with the contract documents.

### **Protectiveness Statement:**

With the completion of the third and final remedial action, the Site is protective of human health and the environment.

### **Long-term Protectiveness:**

The final remedy is functioning as designed. The final remedy will not result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure. As determined in the OU-3 Risk Assessment, all of the human health risks, except for the ingestion of possibly contaminated fish in Hogue Run, were attributed to natural background levels. Because EPA removed the contaminated sediment in Massey Run as part of the final remedy and the fact that Hogue Run (downstream of Massey Run) is a put-and-take stream, this exposure route has been mitigated.

**Rhinehart Tire Fire Superfund Site  
Winchester, Virginia  
Second Five-Year Review Report**

**I. Introduction**

The purpose of the five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and recommendations to address them.

The Agency is preparing this five-year review pursuant to CERCLA § 121 (the Comprehensive Environmental Response, Compensation and Liability Act, as amended) and the National Contingency Plan (NCP). CERCLA § 121 states:

*If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at a site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section 106, the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The agency interpreted this requirement further in the National Contingency Plan (NCP); 40 C.F.R. §300.430(f)(4)(ii) states:

*If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

The United States Environmental Protection Agency (EPA) Region 3 has conducted a five-year review of the remedial actions implemented at the Rhinehart Tire Fire Site in Frederick County, Virginia. This review was conducted from June 2002 through September 2002. This report documents the results of the review.

This is the second five-year review conducted at the Rhinehart Tire Fire Site. The triggering action for this review is the date of the first review, completed September 12, 1997. Both reviews cover the entire site, Operable Units 1, 2, and 3.



For this five-year review, the project managers from EPA and the Virginia Department of Environmental Quality ("VDEQ") jointly inspected the site on September 18, 2002.

## **II. Site Chronology**

The purpose of this section is to list all important site events and relevant dates.

**Table 1: Chronology of Site Events**

<b>Event</b>	<b>Date</b>
Date of the fire	October 31, 1983
Placed on National Priorities List	June 10, 1986
Operable Unit 1 Record of Decision	June 30, 1988
Construction start date for Operable Unit 1	June 1990
Construction completion date for Operable Unit 1	April 30, 1992
Operable Unit 2 Record of Decision	September 29, 1992
Construction start date for Operable Unit 2	January 10, 1995
Construction completion date for Operable Unit 2	February 15, 1995
Previous Five-year review	September 12, 1997
Operable Unit 1 Explanation of Significant Differences	April 2, 1999
Operable Unit 2 Explanation of Significant Differences	April 2, 1999
Operable Unit 3 Record of Decision	September 29, 2000
Construction start date for Operable Unit 3	September 2001
Construction completion date for Operable Unit 3	September 27, 2002

## **III. Background**

The purpose of this section is to describe the site characteristics and to identify the threat posed to the public and the environment at the time of the initial ROD.

### Physical Characteristics

The Rhinehart Tire Fire Site (Site) is located in a sparsely populated rural area of western Frederick County, Virginia. The Site is approximately 65 miles west-northwest of Washington, D.C. and approximately 6 miles west of the town of Winchester, Virginia.

Surface water runoff within the Site flows into Massey Run, the northeast-southwest flowing tributary which discharges to Hogue Creek approximately 4,000 feet downstream (see Attachment 1, Figure 1). Hogue Creek is a tributary of the Potomac River system. The area topography encompassing the Site is dominated by a series of alternative northeast trending ridges and valleys. The area of concern, located on the western slope of Hunting Ridge, is underlain by 5 to 10 feet of compact clayey silt. The silt is underlain by 10 to 25 feet of weathered sandstone and interbedded with gray shale. Unweathered bedrock predominates at depth between 20 and 35 feet.

### Land and Resource Use

As stated previously, the Site is located in a sparsely populated rural area. Mr. Rhinehart apparently had plans to pyrolize the tires in his possession in an incinerator he began to construct in the tire disposal area. However, he had to abandon those plans because of the fire. The only other use of the Rhinehart property was their residence (the Site only occupied a portion of the Rhinehart property). Since Mr. Rhinehart died several years ago and Mrs. Rhinehart died recently, the property is not currently being used. The property is presently owned by the Rhinehart estate. EPA believes the Rhinehart property will continue to be used as a residence.

The current use of the land surrounding the Site is rural/residential, with a few small tree farms. EPA believes the projected use of the land surrounding the Site will remain the same.

All homeowners in the area use ground water as their water source. Because of the rural nature of the area, hunting and, to a lesser extent, fishing are quite prevalent.

### History of Contamination

Between 1972 and 1983, Mr. Rhinehart used the Site as a tire disposal area, transporting discarded tires from various locations and storing them in the natural drainage swale of the wooded slope behind his home. On October 31, 1983, an arsonist set fire to the tires in the five-acre storage area, burning an estimated seven million tires. Due to the magnitude of the fire, State officials requested assistance from EPA. The fire, producing an intense plume of black smoke that could be seen miles away, burned until July 4, 1984.

The intense heat generated by the fire caused a pyrolytic reaction with the tires, producing a free-flowing oily tar. Constituents in the oily tar included benzene, ethylbenzene, toluene, anthracene, naphthalene, pyrene, cadmium, chromium, nickel, and zinc. The fire posed an imminent and substantial threat to human health and the environment through the release of airborne contaminants, the release of hazardous substances to Massey Run, Hogue Creek, and the Potomac River, as well as the fire threat to the surrounding forest.

Shortly after the fire started, the free-flowing oily tar produced from the melting and pyrolysis of the tires began to seep out of the toe of the tire pile and into Massey Run. An undetermined quantity of tar flowed into Hogue Creek.

#### Initial Response

The EPA Emergency Response Team (ERT) initially directed the oily tar to a sump and to the existing pond constructed by Mr. Rhinehart (Rhinehart's Pond). Dutchman's Pond was constructed by ERT in mid-November 1983 as a secondary lined containment basin downslope of the fire area to contain the water and oil products generated by the fire (see Attachment 1, Figure 2). Approximately 800,000 gallons of the waste stream collected in Dutchman's Pond was subsequently recycled into fuel oils.

#### Basis for Taking Action

Aquatic toxicity was identified in the RI as the principal environmental concern at the Site. Contaminated runoff from the Site was found to be the main contributor to the problem.

### **IV. Remedial Actions**

The purpose of this section is to discuss initial plans, implementation history, and current status of the remedy.

After completing the emergency response activities at the Site, EPA split the remedial activities into three operable units. Operable Unit 1 (OU-1) addressed the control of off-site migration of contaminants via surface water runoff. OU-2 addressed Dutchman's Pond. The purpose of OU-3 was to address the site-wide contamination and the facilities constructed under the previous operable units.

#### **OU-1 Remedy Selection**

The initial Remedial Investigation (RI) was performed during 1987 and 1988. Aquatic toxicity was identified in the RI as the principal environmental concern at the

Site. Contaminated runoff from the Site was found to be the main contributor to the problem. Based on these studies, an interim remedy was selected and documented in a Record of Decision (ROD) dated June 30, 1988.

#### OU-1 Remedial Action Objective

The Remedial Action Objective (RAO) for OU-1 was to reduce or eliminate the continued migration of contaminants off-site. The key issues involved with reducing the migration of contamination were minimizing soil erosion, preventing oily ground water seeps from combining with surface water, and collecting and detaining the surface water prior to discharge in order to remove settleable solids.

#### OU-1 Selected Remedy

The major components of the OU-1 interim remedy selected in the ROD include the following:

1. Installing soil erosion controls in the fire area.
2. Increasing the containment capacity of Rhinehart's Pond by raising the existing dam on the Pond.
3. Collecting the shallow oily ground water seeps and treating them at an on-site oil/water separator.
4. Constructing an extensive subsurface drainage system (storm water sewer) to collect the surface water runoff from the fire area and to transport the collected water to Rhinehart's Pond for treatment.
5. Treatment of the collected water in Rhinehart's Pond by gravity settling of the solids.
6. Discharge of the treated water from Rhinehart's Pond to Massey Run.

The remedy provided a means whereby surface waters from precipitation were systematically diverted to an enlarged and upgraded holding area in Rhinehart's Pond. The retained water was treated by gravity settling. Water with oils which could flow towards the low end of the Site (at the toe of the slopes) was intercepted by a collection pipe, sent to the oil/water separator where the oil was skimmed off and collected, and the water then diverted to the pond for final treatment (see Attachment 1, Figure 3).

The remedy was amended to include treatment of the surface water in Rhinehart's Pond in a physical/chemical water treatment plant at the Site. Even though the selected

remedy of the OU-1 ROD did not specifically require physical/chemical treatment, the plant was placed at the Site as part of the remedy for OU-1 because gravity settling alone could not meet the effluent discharge requirements. Construction of the treatment plant was formalized in an Explanation of Significant Differences (ESD) dated April 2, 1999. The inclusion of an on-site treatment plant remains consistent with the goal of the ROD (minimizing the amount of contamination leaving the Site via surface water) and all Applicable or Relevant and Appropriate Requirements (ARARs).

### **OU-1 Remedy Implementation**

EPA entered into an Interagency Agreement (IAG) with the U.S. Army Corps of Engineers (USACE) to perform the remedial design and, later, the remedial action. The remedial design for OU-1 was completed in July 1989. The USACE, acting on behalf of EPA, advertised for bids on the entire scope of work for the remedial action. However, no bids were received on the design package, even after extending the bid receipt date. EPA decided at that time to try and use a USACE pre-placed construction contract to perform all of the scope of work for OU-1. However, the estimate from the pre-placed construction contractor, OHM Remediation Services Corporation (OHM), was almost 300% higher than the government estimate. In light of this, EPA decided to award only the wastewater treatment plant portion of the project to the pre-placed contractor. The design for the remainder of the work was re-evaluated and revised for cost-effectiveness.

The wastewater treatment plant was delivered to the site in June 1990 and OHM certified that the plant was operational in December 1990. The plant was mothballed at that time and sat idle until the remaining OU-1 work was completed. EPA advertised for bids on the remaining work and a contract was awarded for this work in September 1990. Actual construction work was initiated in March 1991 and completed on April 30, 1992. EPA and the State have determined that all RA construction activities for OU-1 were performed according to the specifications.

### **OU-1 System Operation/Operation and Maintenance**

The wastewater treatment plant was operated on a periodic basis, from April to December. It was shut down for the winter from December to March when the cold temperatures prevented operation of the plant because the plant was not designed to operate in the cold weather. In the spring, the plant was used to treat the surface water that accumulated in Rhinehart's Pond during the winter months. For the remainder of the year, the plant was operated on an as-needed basis. As the pond filled up, the plant was put back into operation. The water in the pond was pumped down to elevation 940.00 mean sea level in December and then winterized. The water then collected in the pond all winter and was pumped down again when the plant was re-started in the spring. The sludge generated from the treatment process was returned to the pond to be addressed as part of the final remedy for the Site.

The only other routine maintenance performed at the Site was cutting the grass, especially on the dam at Rhinehart's Pond. The grass had to be cut on the dam to make sure nothing other than grass grew there. Larger vegetation such as bushes or trees could undermine the integrity of the dam.

All portions of the OU-1 remedial action were still in operation until they were decommissioned as part of the OU-3 remedial action.

## **OU-2 Remedy Selection**

As indicated previously, OU-2 addressed the closure of Dutchman's Pond. OU-2 was addressed before the completion of the final phase of the site-wide RI/FS because Dutchman's Pond, with only six inches of freeboard remaining, posed an immediate environmental threat of release to Massey Run. The Preamble to the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) explains that there is a bias for action and that the principle of streamlining may be appropriately considered throughout the life of the project. The Preamble specifically states that "EPA expects to take early action at sites where appropriate, and to remediate sites in phases using operable units as early action to eliminate, reduce or control the hazards posed by a site or to expedite the completion of total site cleanup. In deciding whether to initiate early action, EPA must balance the desire to definitively characterize site risks and analyze alternative remedial approaches for addressing those threats in great detail with the desire to implement protective measures quickly." 55 Federal Register at 8704 (March 8, 1990); See: 40 C.F.R. § 300.430 (a)(1)(ii)(A). The decision to select the remedy for OU-2 was made utilizing the bias for action set forth in the NCP as the guideline.

## **OU-2 Remedial Action Objective**

The RAO for OU-2 was to eliminate the immediate threat of release of contaminants from Dutchman's Pond to Massey Run.

## **OU-2 Selected Remedy**

The major components of the OU-2 remedy selected in the ROD include the following:

1. Oil/water separation of the surface water presently in Dutchman's Pond via the existing on-site oil/water separator.
2. Directing the water from the oil/water separator to Rhinehart's Pond for treatment in the existing water treatment plant using chemical precipitation and solids separation.
3. Discharging treated surface water to Massey Run.

4. Sampling and removing the sediments from Dutchman's Pond and mixing the sediments with a solid reagent to reduce moisture. Testing the moisture reduced sediments to determine if they are hazardous according to the Resource Conservation and Recovery Act (RCRA) and appropriately disposing of the sediments.
5. Removing and properly disposing of the synthetic liner of Dutchman's Pond.
6. Testing of the soils surrounding and beneath Dutchman's Pond. Excavating, transporting, and disposing of soils with levels of zinc greater than 50 mg/kg at an approved landfill (RCRA Subtitle C or D).
7. Backfilling the area of Dutchman's Pond, including the surrounding soils that may also be excavated, with clean soil and implementing appropriate soil erosion controls.

## **OU-2 Remedy Implementation**

Remedial action work for OU-2 began in January 1995. To remove the liquid from Dutchman's Pond, a sump was used to pump it into Rhinehart's Pond. Complete removal of the liquid was accomplished by pumping the liquid into a water truck and driving the truck to Rhinehart's Pond. An estimated 750,000 gallons of water were removed from Dutchman's Pond. The amount of water actually removed significantly exceeded the ROD estimate of 200,000 gallons because Dutchman's Pond was actually deeper than the level shown on the contract drawing.

After the liquid was removed, the contractor began solidifying the sediment at the bottom of the pond using portland cement. Due to extremely cold conditions, the portland cement was slow to solidify the sediment. Upon completion of the sediment solidification, the sediment was stockpiled at the staging area to await transportation to the disposal facility. EPA estimated in the ROD that Dutchman's Pond contained 32 cubic yards of sediment that required removal. Upon completion, a total of 125.27 cubic yards were removed from the pond. Sampling results of the sediment indicated that disposal would be to a RCRA Subtitle D facility.

With the liquid and sediment removed, the liner within the pond area was cut into small sections for disposal. The liner was disposed of at the same facility as the soil.

At that time the contractor began excavating the soil in the area of the pond. Only 18 to 24 inches of material were removed before ground water became a major problem. Composite soil samples were collected on the new surface. All of the sample results exceeded the ROD requirement for zinc of 50 mg/kg and it was deemed that it was necessary to continue excavating the soil. All excavated material was stockpiled in the

staging area awaiting transportation to the off-site disposal facility.

After the initial sampling effort, soil excavation resumed. The contractor removed an additional 18 to 24 inches of material before taking additional samples from hot spots within the pond area as well as background samples at different depths to be analyzed for TAL/TCL. However, analytical results of these samples still exceeded the ROD requirement of 50 mg/kg zinc; therefore, additional excavation was required. The pond area was then excavated to bedrock, which was encountered 6 to 8 inches below the new surface. The pond area and the south dike of the pond were excavated to complete the removal. Soil samples were collected at this point directly on the bedrock, collecting eight samples for zinc and an additional two samples for BTEX because a sheen appeared on the south end of the pond. Even though these samples still exceeded the ROD requirement for zinc, EPA decided to halt any further excavation. It was feared that additional excavation could possibly undermine the dam at Rhinehart's Pond. Because the 50 mg/kg zinc level is a ROD requirement, EPA's decision to halt further excavation mandated a change to the ROD. As such, EPA issued an Explanation of Significant Differences on April 2, 1999.

Re-grading and re-vegetating was conducted after completing the soil excavation, ensuring that all of the areas disturbed by these construction activities were brought to at least original conditions. Re-grading and re-vegetating was also conducted along the haul road and other areas disturbed by traffic, as well as the pond area.

## **OU-2 System Operation/Operation and Maintenance**

The purpose of OU-2 was to decommission Dutchman's Pond. This clean closure of the pond removed an operating facility. The only operating facilities remaining at the Site at that time were those associated with OU-1.

## **OU-3 Remedy Selection**

The purpose of the OU-3 RI/FS was to further characterize and identify potential ground water, soil, surface water, and sediment contamination from the tires that melted during the fire. Surface water and sediment sampling was conducted during the OU-3 RI/FS to characterize contamination in Rhinehart's Pond, to evaluate Site impacts on surface water and stream sediments in Massey Run and Hogue Creek, to compare surface water and sediment concentrations in Rhinehart's Pond to background conditions, to compare soil and ground water concentrations to background levels, and to evaluate the effects of surface water runoff and the collection system on Rhinehart's Pond and surface water in Massey Run and Hogue Creek. Concentrations of contaminants detected in the various sampling were compared to background levels, the Region 3 Risk Based Concentrations (RBCs) for human health (cancer benchmark value =  $1 \times 10^{-6}$ ; adjusted Hazard Quotient = 0.1), and the Biological Technical Assistance Group (BTAG)



screening values for ecological impacts. As a result of this analysis, the only possible human health risk was due to ingestion of possibly contaminated fish in Hogue Run. Surface soil, subsurface soil, and ground water were found to be either statistically comparable to background levels or they did not pose a risk to human health or the environment. Hence, these media did not require remediation and were not considered when developing RAOs. The media warranting remediation were the surface water in Rhinehart's Pond and the sediment in Rhinehart's Pond and a portion of Massey Run.

### OU-3 Remedial Action Objectives

The RAOs developed for the surface water in Rhinehart's Pond and the sediment in Rhinehart's Pond and Massey Run include the following:

1. Prevent ecological exposure to levels of zinc exceeding 1,600 mg/kg in the sediment in Rhinehart's Pond and Massey Run.
2. Prevent migration and leaching of contaminants in the sediment that may contaminate the surface water in Rhinehart's Pond, Massey Run, and Hogue Creek.
3. Decommission the remaining facilities at the Site, including: removal and proper disposal of the oil/water separator, water treatment plant, and Site fence; abandoning the subsurface drainage system and monitoring wells; removing the shotcrete; and removing the dam on Rhinehart's Pond..

The final RAO was added because this is the final ROD for the Site and these facilities (constructed as part of the interim remedy of OU-1) would not be needed after implementing this final ROD remedy.

### OU-3 Selected Remedy

The selected remedy consists of removing all of the sediment from Rhinehart's Pond and the sediment exceeding 1,600 mg/kg of zinc from approximately the first 150 feet of Massey Run, dewatering or stabilizing the sediment (if necessary), and disposing of the sediment in a Subtitle D landfill. Specifically, this alternative included the following components:

1. Removing the surface water from Rhinehart's Pond and treating the water to the existing NPDES discharge requirements prior to discharge to Massey Run.
2. Removing all of the sediment (approximately 1,000 cubic yards) from Rhinehart's Pond.

3. Covering the excavated area with appropriate material suitable for sustaining an aquatic habitat if the dam is left in place or sustaining a stream channel and bank if the dam is removed.
4. Removing the sediment which exceeds 1,600 mg/kg of zinc from Massey Run (approximately 15 cubic yards), estimated to be within the first 150 feet of the stream's length.
5. Placing clean sediment in the excavated area of Massey Run.
6. De-watering/stabilizing the excavated sediment (if necessary) and treating the excess water (either in the on-Site treatment plant or at an off-Site facility) to the applicable NPDES discharge requirements prior to discharge.
7. Disposing of the sediment in a Subtitle D landfill.

In addition, as part of the selected remedy, EPA would also decommission the previously constructed facilities. Specifically, this work included the following components:

1. Conducting an evaluation during the remedial design to determine whether to remove the shotcrete from the face of the slopes or leave it in place after covering it with soil; if removed, the shotcrete will either be disposed of off-Site or used as fill on the Site.
2. Removing the dam on Rhinehart's Pond. The material from the dam will be used as backfill only if it does not exceed the RBCs or local background levels, whichever one is greater. The concrete portions of the dam may also be backfilled on-Site.<sup>1</sup>
3. Re-grading and re-vegetating the face of the slopes and the benches; the pile of fill material which is presently staged on the property will be used as backfill on the Site only if it does not exceed the RBCs or local background levels, whichever one is greater.
4. Abandoning the existing subsurface drainage system, in accordance with generally accepted engineering practices.

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<sup>1</sup>The ROD contained a provision whereby EPA could decide to leave the dam intact if, by the completion of remedial design, Frederick County or some other entity obtained possession of the dam and of the land on which the dam and pond are located and agreed to maintain the dam and pond. This provision was not implemented.

5. Abandoning the existing monitoring wells installed for the RI in accordance with generally accepted engineering practices.
6. Removing and properly disposing of the oil/water separator, water treatment plant and the Site fence.
7. Re-channeling the stream where Rhinehart's Pond was.
8. Re-grading and re-vegetating the remaining portions of the Site.

### **OU-3 Remedy Implementation**

EPA performed additional sediment sampling in Massey Run during the RD to fill in data gaps. This additional sampling showed that zinc levels in the sediment exceeded the Site-specific cleanup level of 1,600 mg/kg to the confluence of Massey Run and the unnamed tributary. As such, the length of sediment removal in Massey Run was revised from 150 feet to 1,200 feet. In addition, the procedure to remove the sediment was revised from excavating the stream bed to vacuuming just the sediments that settled in the pools of the stream. This innovative process reduced the amount of clean material removed and eliminated the need to place clean sediment back into the stream channel.

A geotechnical evaluation performed by EPA during the RD indicated that it was feasible to cover over the shotcrete on the face of the slopes with clean soil and to re-vegetate the slopes. As such, the shotcrete was left in place.

Since Frederick County did not obtain possession of the dam, EPA decommissioned the dam and used the material as fill (since it did not exceed the RBCs or local background levels). With the dam removed, EPA placed material in the area of Rhinehart's Pond which is able to sustain a stream channel and bank. EPA worked closely with the U.S. Fish and Wildlife Service to design the re-channeling of the stream as well as the type of plantings to re-vegetate the stream bank and floodplain.

Remedial action work for OU-3 began in April 2002. Based on the pre-final inspection, EPA and the VDEQ determined that the following RA activities were completed by the contractor:

- A total of 2,818,900 gallons of surface water was pumped from Rhinehart's Pond, treated in the existing on-site water treatment plant to VDEQ NPDES effluent limits, and discharged to Massey Run.
- A total of 1,574 tons of contaminated sediment was excavated from Rhinehart's Pond and disposed off-site as non-hazardous waste.
- A total of 4 tons of contaminated sediment was removed via a low impact vacuum extraction method from approximately 40 pools in Massey Run and disposed off-

site as non-hazardous waste.

- A total of 12 tons of debris material, 67 tons of tire scraps, and 193 tons of contaminated soil from the toe drain excavation were removed and disposed off-site as non-hazardous waste.
- The dam at Rhinehart's Pond was excavated and used as backfill to cover over the shotcrete wall slopes. The concrete and metal rebar from the dam overflow structure, oil/water separator, and the decontamination pad were all demolished and disposed off-site as non-hazardous waste.
- The site slopes and benches were backfilled and compacted to meet the design grades and in accordance with the percent compaction and optimum moisture content design requirements.
- The shotcrete toe drains were excavated and backfilled, and the bench drainage features were abandoned in place by removing the manholes and capping the ends in place, except for the lower reaches where they were removed.
- Three french drains were constructed below the slopes to facilitate drainage of water away from the slopes, and a permanent diversion channel was constructed to transport storm water runoff to the stream.
- A total of 22 existing monitoring wells were abandoned in accordance with VDEQ and Virginia Department of Health requirements.
- The water treatment plant was demolished and recycled by a local firm.
- The contractor re-graded the area where Rhinehart's Pond, the former dam, and Dutchman's Pond were and restored the stream with a step/pool/riffle configuration to meet the design requirements.
- All of the disturbed areas of the site were finished with topsoil to meet the final design grades and planted with a temporary annual rye grass seed mixture.

A Preliminary Close Out Report was issued by EPA on September 27, 2002, indicating that all OU-3 construction activities were completed in accordance with the ROD and the remedial design plans and specifications, except for the final grass seeding and the planting of trees and shrubs which were subsequently completed in October 2002.

### **OU-3 System Operation/Operation and Maintenance**

The purpose of OU-3 was to remove all of the contaminated surface water and sediment at the Site and to decommission the facilities constructed as part of OU-1. This clean closure of the Site included removing the treatment plant, the only operating facility at the Site. There is no further operation and maintenance required at the Site.

## **V. Progress Since the Last Review**

The purpose of this section is to discuss the progress taken on follow-up actions included in the previous five-year report.

The previous five-year review report stated that the remedy at the Site was not protective of human health and the environment at that time. Although the five-year review report did not include any issues which required followup actions, it is presumed that the report was referring to the sediments in Rhinehart's Pond and the fact that the Site-wide RI/FS was not completed at that time. As stated above, the Site-wide RI/FS has since been completed and the sediments in Rhinehart's Pond have been removed from the Site and properly disposed of.

## **VI. Five-Year Review Process**

The purpose of this section is to describe the activities performed during the five-year review process as well as providing a summary of findings, when appropriate.

The OU-3 ROD was issued by EPA on September 29, 2000. In preparation for the OU-3 ROD, EPA performed an RI/FS to characterize and identify the potential Site-wide ground water, soil, surface water, and sediment contamination. As a result of the review of the sampling data and the risk assessment, it was determined that ground water, surface soil, and subsurface soil did not require remediation because they were found to be either statistically comparable to background levels or they did not pose a risk to human health or the environment. EPA determined in the OU-3 ROD that the only media warranting remediation were the surface water in Rhinehart's Pond and the sediment in Rhinehart's Pond and a portion of Massey Run. As part of the OU-3 remedial action, all of the surface water in Rhinehart's Pond was treated at the on-site water treatment plant and the sediments in both Rhinehart's Pond and Massey Run were removed and disposed of at an off-site facility. For this Five-Year Review Report, the clean-up levels and the activities identified in the OU-3 ROD were reviewed by EPA and are considered protective of human health and the environment.

With the removal and proper disposal of the remaining contamination at the Site, there are no concerns with contamination and no further treatment processes are in operation at the Site.

A Site inspection was performed by Andrew Palestini, the EPA Remedial Project Manager, and Thomas Modena, the VDEQ Project Manager, on September 18, 2002. At that time, all of the remedial action work was completed, except for the final seeding and the planting of bushes and trees. This remaining work was completed in October 2002, in accordance with the recommendations of the U.S. Fish and Wildlife Service.

## **VII. Technical Assessment**

The purpose of this section of the five-year review is to answer the following three questions:

- Is the remedy functioning as intended by the decision documents?
- Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?
- Has any other information come to light that could call into question the protectiveness of the remedy?

Question A: Is the remedy functioning as intended by the decision documents?

OU-1

The interim remedy selected in the OU-1 ROD and the ESD included placing shotcrete on the slopes, constructing a storm water collection system, raising the dam at Rhinehart's Pond, and installing an oil/water separator and a water treatment plant. Since all of these facilities were decommissioned as part of the OU-3 remedy, there are no present operations and maintenance and/or long-term monitoring associated with the OU-1 interim remedy. The OU-1 interim remedy functioned as intended by the OU-1 ROD until these facilities were decommissioned.

OU-2

The remedy selected in the OU-2 ROD and the ESD included decommissioning Dutchman's Pond. There are no operations and maintenance and/or long-term monitoring associated with the OU-2 remedy. The OU-2 remedy functioned as intended by the OU-2 ROD.

OU-3

The remedy selected in the OU-3 ROD included removing the contaminated surface water from Rhinehart's Pond and the contaminated sediment from Rhinehart's Pond and Massey Run and decommissioning the facilities previously selected in the OU-1 ROD. The results of the Site inspection, RA progress reports, and previous RA oversight inspections indicates that the OU-3 remedy is functioning as intended by the OU-3 ROD.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?

OU-1

Because EPA selected an interim remedy in the OU-1 ROD, the ROD focused on the existing human risks and the environmental exposures presented at the site. The

potential future human carcinogenic risks and adverse health effects were planned to be evaluated as part of the second operable unit for the site. Because the material in Dutchman's Pond was close to overflowing the banks of the pond, EPA had to expedite issuing the OU-2 ROD and the potential future human carcinogenic risks and adverse health effects were subsequently evaluated as part of the OU-3 ROD. The objective of the OU-1 remedy was to minimize or eliminate the continued off-site migration of contaminants which was successfully accomplished.

## OU-2

EPA selected an early action remedy in the OU-2 ROD because Dutchman's Pond was close to overflowing its banks and the surface water and sediment there posed an environmental risk. The OU-2 remedy included removal and treatment of the surface water; removal and off-site disposal of the sediments, liner, and the contaminated surrounding soil; backfilling the area with clean soil; and, seeding the area. Only an environmental risk assessment was performed on the surface water and sediment in the pond because zinc was the primary contaminant and zinc is known to cause acute and chronic toxicity in aquatic life. The objective of the remedy was to remove the pond which presented an immediate threat to Massey Run and this was successfully accomplished.

## OU-3

Since the previous operable units focused on the immediate threats posed by the contamination at the site, EPA evaluated long-term threats as part of OU-3. The risk assessment developed by EPA for the OU-3 ROD evaluated exposure to Site soils for current youth and adult trespassers, future child and adult residents, and future construction workers. Exposure to ground water was evaluated for current and future residents. The risk assessment evaluated exposure to these media and neither the surface soil, subsurface soil, or ground water required remediation because they were found to be either statistically comparable to background levels or they did not pose a risk to human health or the environment. The exposure assumptions, toxicity data, and clean-up levels used in the OU-3 ROD are still valid.

The remedial objectives of eliminating exposure to the contaminated media at the Site have been met. All of the surface water in Rhinehart's Pond has been treated to the effluent requirements and discharged to Massey Run. All of the contaminated sediment (exceeding the Site-specific cleanup level of 1,600 mg/kg zinc) has been removed from Massey Run and Rhinehart's Pond and properly disposed of (along with any surface water collected at the same time) at an off-site facility.

In addition, the remedial objective of decommissioning the facilities previously constructed as part of the OU-1 interim remedy has also been met. The dam, oil/water

separator, and treatment plant have been removed, the shotcrete has been covered, and the storm water sewer and monitoring wells have been abandoned in accordance with industry practice. Finally, the creek has been re-channeled through the area where Rhinehart's Pond, the dam, and Dutchman's Pond were formerly located and the Site has been re-graded and re-vegetated. The final seeding and the planting of bushes and trees was completed in October 2002 in order to meet the recommendation made by the U.S. Fish and Wildlife Service that this work be performed in the fall. The recommendation was made to increase the chance of survival for the re-vegetation.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that could call the protectiveness of the remedy implemented for OU-1, OU-2, or OU-3 into question.

## **VIII. ISSUES**

The purpose of this section is to detail any issues related to the current site operations, conditions, or activities which would prevent the remedy from being protective.

There are no issues related to the current Site conditions which would prevent the remedy from being protective. There are currently no operations or activities occurring at the Site. The contractor completed the final seeding and the planting of bushes and trees in October 2002.

## **IX. Recommendations and Follow-up Actions**

The purpose of this section is to specify the required and suggested improvements to current site operations, activities, remedy, or conditions.

A Preliminary Close Out Report for this site was issued on September 27, 2002. All construction activities called for under OU-1, OU-2, and OU-3 are complete. At the direction of the U.S. Fish and Wildlife Service, the final seeding and plantings were completed in the fall to increase their chance of survival. EPA must ensure that the rate of survival of the final seeding, bushes, and trees meets the requirements of the contract documents. However, this activity does not impact the overall protectiveness of the remedy.

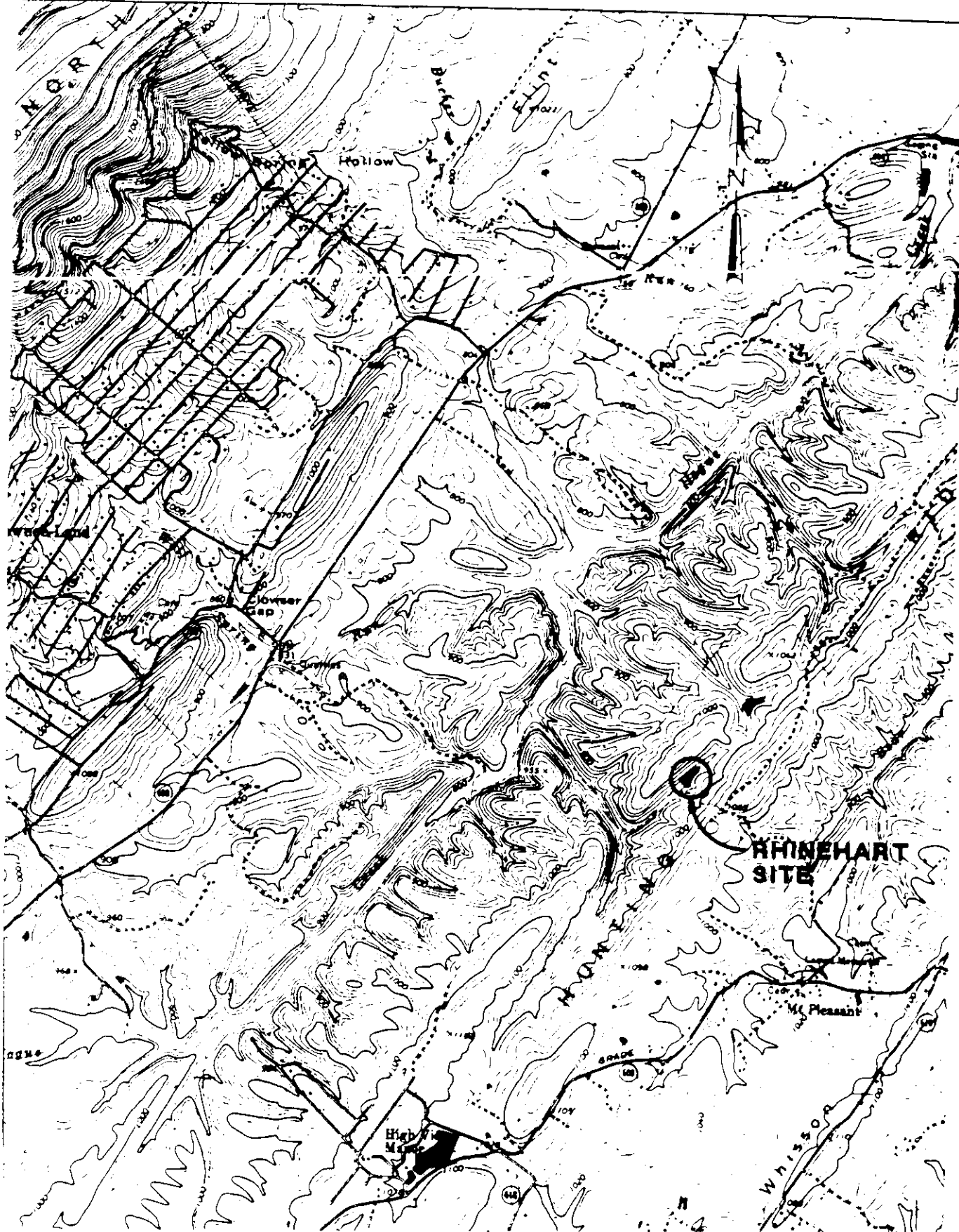


**X. Protectiveness Statement**

With the completion of the third and final remedial action, the Site is protective of human health and the environment.

**XI. Next Five-Year Review**

Since Site conditions now allow for unlimited use and unrestricted exposure, EPA does not need to conduct another five-year review of the Rhinehart Tire Fire Site.



SOURCE USGS 7.5 MINUTE QUADRANGLE MAP  
(HAYFIELD, VIRGINIA)

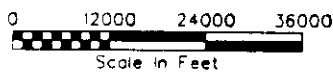


Figure 1  
Location of Rhinehart  
Tire Fire Site

**CH2MHILL**



Approximate Scale 1"=160'

● MW-10  
● MW-15

Rhinehart's Pond  
(Unlined)

Massey Run

Former  
Dutchman's  
Pond

MW-50

MW-55

Treatment  
Facility

Partially  
Constructed  
incinerator

MW-30

MW-35

North Access Road

MW-20

MW-25

MW-45

MW-40

Bench 4

To Maque Creek

Oil/Water  
Separator

MW-60

MW-65

Fire Area

Bench 3

Bench 2

Bench 1

MW-50

MW-55

Entrance  
Gate

Sheds

### Legend

----- Site Boundary

— Fence

● MW-70 Existing Monitoring Well

○ Storm Sewer

▨ Shotcrete-covered slope

▩ Dam

■ Decon Pad and Holding Tank

● MW-10

● MW-15

0 100 200 300  
Scale in Feet

Figure 1  
Common Site  
Feature Location  
Rhinehart Tire Fire Site

**CH2MHILL**

AR301944

AR301945

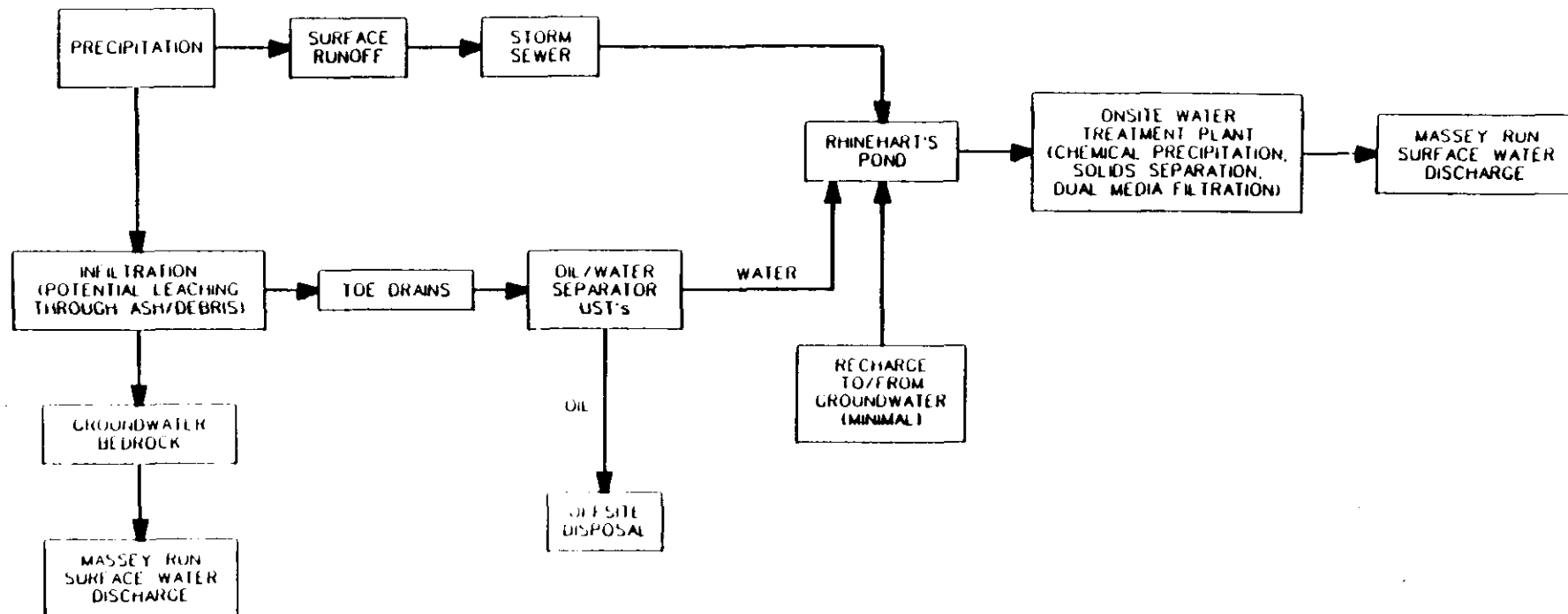


Figure 3  
Water Flow Path  
Rhinehart Tire Fire Site