

WHITE PHOSPHORUS UNDERWATER MUNITIONS BURIAL AREA **RECORD OF DECISION**

SEPTEMBER 1991 Aberdeen proving ground, MD

THIS DOCUMENT IS INTENDED TO COMPLY WITH THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969.



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RECORD OF DECISION

White Phosphorus Underwater Munitions Burial Area Operable Unit

U.S. Army Aberdeen Proving Ground, Maryland

September, 1991

SITE:

White Phosphorus Underwater Munitions Burial Area U.S. Army Aberdeen Proving Ground, Maryland

STATEMENT OF BASIS AND PURPOSE:

This decision document presents a determination that no remedial action will be taken at this time for the White Phosphorus Underwater Munitions Burial Area (WFUMBA) at the U.S. Army Aberdeen Proving Ground, Maryland. This determination was developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendment and Reauthorization Act of 1986 (SARA), 42 U.S.C. Section 9601 <u>et seq</u>. and the National Contingency Plan (NCP) 40 C.F.R. Part 300. This no action decision is supported by documents contained in the administrative record. The State of Maryland has concurred on the no action determination.

DECLARATION:

The no action decision is based upon the fact that the supposed white phosphorus contamination at the WPUMBA was never found using current available technology, and that no effective remedial action is possible at the site. The no action remedy calls for sampling of the water column in the WPUMBA vicinity prior to and during any dredging activities in the area, and following major storm events (hurricane force winds), to monitor and minimize releases of sediment-bound materials to the environment.

Currently, the WPUMBA presents a minimal risk to the human population and the environment. However, the monitoring requirement of the no action remedy does not provide any protection against release of or exposure to white phosphorus from WPUMBA in the future. Therefore, the no action decision does not constitute a finding that the remedy ensures adequate protection of human health or the environment. Because the no action remedy could result in possible undetected hazardous substances remaining in the sediment and being released to the environment in the future, a review will be conducted five years after the finalization of this decision. This review will identify possible technological advances that might be developed which have a greater detection/location capability for white phosphorus than currently exists today to warrant a re-investigation of the supposed underwater burial area.

Additionally, the Army and EPA are proposing, with the issuance of this Record of Decision for the WPUMBA, to initiate an investigation of a possible site on land or in a tidal marsh to be designated the "White Phosphorus Munitions Land Burial Area (WPMLBA)." The investigation of the WPMLBA will be incorporated into the Other Aberdeen Areas Study.

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Date

9/24/91

9-27-91

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SUMMARY OF REMEDIAL ACTION SELECTION

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White Phosphorus Underwater Munitions Burial Area

U.S. Army Aberdeen Proving Ground, Maryland

SITE DESCRIPTION:

U.S. Army Aberdeen Proving Ground (APG) occupies some 79,000 acres of land and water in southern Harford County and southeastern Baltimore County, Maryland, near the head of the Chesapeake Bay (See Figures 1 & 2). It is owned and operated by the U.S. Department of the Army (Army) and is an active Army test and evaluation installation primarily responsible for planning and testing of weapons, munitions, vehicles, and various equipment. APG consists of two functional areas: The Edgewood Area (13,000 land acres, including Gunpowder Neck, Pooles Island, Carroll Island, and Graces Quarters) and the Aberdeen Area (17,000 land acres, including Michaelsville and Phillips Landfills). The land portions of the two areas are separated by the Bush River. (See Figure 3)

The Aberdeen area is bordered on the west by the Bush River and northeast to south by the Chesapeake Bay. The area is drained by seven creeks plus the Bush River. Most of these creeks have their headwaters on the Aberdeen Area. The Army facilities in the Aberdeen area include firing ranges, impact areas, vehicle test tracks, and laboratories in support of testing activities.

The White Phosphorus Underwater Munitions Burial Area (WPUMBA) is located offshore of the Aberdeen area of APG, Maryland, on the western side of the upper Chesapeake Bay. The area is situated in shallow waters just beyond the mouth of Mosquito Creek, between Black Point and Gull Island (See Figure 4). Spesutie Narrows and Spesutie Island lie to the north and northeast, respectively. The open water area of APG totals approximately 37,000 acres of which 15 acres of open water comprise the supposed WPUMBA.

Based on interviews of former employees who worked on the post following World War I, an unknown amount of World War I white phosphorus munitions (ordnance) were supposedly buried in the Chesapeake Bay in the vicinity of Black Point during the period 1922-1925. The ordnance reportedly consisted of United States, British, and French land mines, grenades, and artillery shells. According to the interviews, bulk phosphorus may also have been disposed in the Bay. It is possible that this disposal event involved a single barge load of munitions; however, it may have involved considerably more. In 1933, the WPUMBA was reportedly uncovered by a strong hurricane, which led to a large waterfowl kill, where ducks supposedly "turned pink and died."

The U. S. Environmental Protection Agency (EPA) issued APG a Resource Conservation and Recovery Act (RCRA) Corrective Action Permit, on September 30, 1986, as modified on September 26, 1988. The EPA and the Army entered into a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Section 120 Interagency Agreement (IAG) on March 27, 1990, to coordinate and provide for all CERCLA/RCRA corrective action activities at APG. In this IAG, the Army and EPA agreed that all areas which were identified as RCRA corrective action study areas would be investigated and, if necessary, remediated pursuant to CERCLA. The WPUMBA was identified as a RCRA corrective action study area.



Figure 1

Location of Aberdeen Proving Ground, Maryland



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- 10. Joppe Sourage Trustment Plant 11. Whiteford Herford County Air Quality Monitor Stations

Figure 2

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Location of APG in Harford County, Maryland



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Figure 3

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SITE HISTORY

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The Aberdeen Area of APG was established in 1917 as the Ordnance Proving Ground. Testing of ammunition began in January of 1918. Large segments of the open water surrounding the Aberdeen Area have been used as ordnance impact areas since 1917. There are an estimated four million unexploded and sixteen million inert projectiles of all calibers in the restricted waters off APG.

The WPUMBA is adjacent to and offshore of the Main Front Land Range Area, which has been active since 1917. An estimated one million rounds of all calibers up to 16 inches have been fired at this range. The types of rounds fired include high explosives, anti-personnel, armor defeating, incendiary, smoke, and illuminating. Although the WPUMBA is adjacent to this range, there are no records of the open water areas of the WPUMBA having been used as an impact area.

No evidence of a disposal site at the WPUMBA was observed in any historical aerial photographs reviewed. However, one reference to a phosphorus area was found in Proclamation 2383, signed by President Franklin D. Roosevelt on January 24, 1940. Under the authority of the Migratory Bird Act of 1918 (40 Stat. 755, 16 U.S.C. 704), the acting Secretary of the Interior adopted a regulation on December 12, 1939, which designated two areas as Migratory Waterfowl Closed Areas. One of the areas approved by the subsequent Proclamation was at APG and was referred to as the "Phosphorus Area Unit." This Proclamation is the only written document found that specifically mentions phosphorus and delineates the boundary of a specific area. The size of this "Phosphorus Area Unit" encompasses approximately 130 acres. It is assumed that the area described incorporated the WPUMBA.

During 1988-1989, the EPA's Environmental Response Team (ERT) and Environmental Monitoring Service Lab conducted extensive electromagnetic and core sampling studies of the WPUMBA. The EPA ERT investigation was conducted as a CERCLA Remedial Investigation to answer questions related to; the location of the WPUMBA; possible releases to the environment surrounding the supposed burial site; potential adverse effects to the environment, aquatic organisms, higher food chain organisms, and human health that could result should there be a release from the area; the extent to which any past, present, or future dredging activities may contribute to releases from this area; and meet the requirements of the IAG.

Several techniques were used during the investigation to determine the location of the WPUMBA. A literature search was conducted to locate related information concerning the disposal, storage, and handling of white phosphorus. APG records, historical maps, and aerial photos were reviewed. Manufacturers, former employees, and historians (National Archives, Library of Congress, U.S. Army Archives) were also contacted for relevant information. An in-depth geophysical investigation at the site was conducted in October, 1988, followed by an additional geophysical survey in June of 1989.

Based on the 1988 geophysical data, four areas were selected as being highly probable locations for the WPUMBA, and sediment core sampling was scheduled for those areas. A fifth area, the channel adjacent to the WPUMBA, was selected for coring due to maintenance dredging concerns. A reference area was also selected north of the site in Spesutie Narrows. Due to the safety concerns in dealing with the burial area and the known presence of unexploded ordnance on APG, a remote coring operation was necessary.

A total of 60 cores were collected during August of 1989, ranging in depth from 1 to approximately 9 feet. Cores were screened on-site for high explosives and composite samples were collected for analysis. All samples were analyzed for elemental phosphorus, high explosives, and RCRA hazardous wastes. Select samples were analyzed for total organic carbon, grain size, and toxicity. Water samples were also collected at each of the areas cored and analyzed for elemental phosphorus and high explosives. Water quality measurements were recorded in each area and included temperature, pH, conductivity, salinity, oxidation-



reduction potential, and dissolved oxygen.

Gull Island, which is located along the eastern border of the WPUMBA, was examined as a potential past disposal site for white phosphorus. A geophysical survey was conducted in late October of 1988 to locate any potentially buried ferrous metals. Several test pits were excavated to examine the stratigraphy and soils of the island. Soil cores were collected during September of 1989 from the north and south ends of the island and analyzed for elemental phosphorus, high explosives, and grain size.

Based on the results of the EPA ERT study, the boundaries of the WPUMBA could not be discerned. The geophysical investigation showed only a minor distribution of magnetic objects, and intrusive sediment core sampling revealed only sporadic occurrences of detectable levels of phosphorus. Results indicate that trace amounts of phosphorus were detected in 11 of the 60 core samples, with the detected single maximum occurrence being less than 5 μ g/kg (See Table 1). No phosphorus was detected in the water column, or on Gull Island. No high explosive compounds were detected in the water or sediment samples. RCRA analyses (EP Toxicity) indicate that the sediment would not be considered a hazardous waste. Release of white phosphorus is not expected unless the sediments are disturbed. The location of the WPUMBA could not, therefore, be determined within the confines of the EPA ERT study. Likewise, bioassay techniques, utilizing freshwater and estuarine fish, did not elucidate any clear toxic effect of white phosphorus on aquatic life.

COMMUNITY PARTICIPATION

To provide the community with reasonable opportunity to submit written and oral comments on the Proposed Plan for the White Phosphorus Underwater Munitions Burial Area and the U.S. EPA Environmental Response Team's (ERT) report, entitled "Field Investigation of the White Phosphorus Munitions Burial Area, Aberdeen Proving Ground, Maryland - January, 1990," the Army established a public comment period from July 3rd through August 17th, 1991. A public meeting was held on July 25, 1991 to present the Proposed Plan and to answer questions and receive comments.

The Proposed Plan, EPA ERT's report, and the Administrative Record file were made available for public review at the following locations:

On-Post

U.S. Army Test and Evaluation Command Public Affairs Office Building 314 Aberdeen Area Aberdeen Proving Ground, MD. 21005-5001

Off-Post

Harford County Library - Aberdeen Branch Library 21 Franklin Street Aberdeen, Maryland 21001

<u>Harford County Library</u> - <u>Edgewood Branch Library</u> 2205 Hanson Road Edgewood, Maryland 21040

Legal notices summarizing the Proposed Plan, informing the public of document availability and locations,

Aberdeen Proving Ground, Maryland August, 1989					
Location	Core	Sample#	Phosphorus Dry Weight (µg/kg)	Phosphorus Wet Weight (µg/kg)	Core Length (ft)
Area I	3	4356	0.78	0.42	4.5
Black Point	11	4427	2.22	1.00	4
Black Point	17	4433	0.72	0.30	4.5
Black Point	18	4434	0.62	0.28	4.5
Black Point	20	4436	2.22	0.71	5.5
Black Point	25	4441	1.16	0.94	< 1
Channel	31	4448	0.74	0.34	6
Area II	40	4457	2.41	1.04	8.5
Area III	54	4475	4.64	1.90	6
Area III	55	4476	3.38	1.55	6
Area III	58	4480	3.84	1.80	9

 TABLE 1. RESULTS OF ELEMENTAL PHOSPHORUS ANALYSIS IN SEDIMENTS

 White Phosphorus Underwater Munitions Burial Area

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from ERT study "Field Investigation of the White Phosphorus Munitions Burial Area", Jan. 1990.

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and listing the time and place of the public meeting, were published in <u>The Baltimore Sun</u>, <u>The Aegis</u>, and <u>The APG News</u>. No comments were received by the EPA, State of Maryland, or the Army during the public comment period on the Proposed Plan, on the EPA ERT's report, on the no-action alternative chosen for the White Phosphorus Underwater Munitions Burial Area, or on the Administrative Record file. Several technical questions were answered during the public meeting concerning the conduct of the ERT investigation.

SCOPE AND ROLE OF THE WPUMBA OPERABLE UNIT RESPONSE ACTION

The investigation of the WPUMBA answered questions related to conditions at the underwater site, and the potential for current and future threats to human health and the environment. The location and existence of the WPUMBA in the ERT study area has not been confirmed, using the best available technology. The Army and the EPA will conduct a review, five years hence, of the technology available for the detection/location of white phosphorus to determine if any significant advancement has occurred to warrant a re-investigation of the supposed burial area.

The lack of detectable quantities of phosphorus in the water column, combined with the relatively low concentrations of phosphorus found in less than 20% of the sediment samples and the depth at which phosphorus was detected, indicates that white phosphorus is not being released into the water column at the study area. Additionally, RCRA analyses (EP Toxicity) indicate that the WPUMBA sediment would not be classified as a hazardous waste. However, the "no action" remedy does not provide any protection against exposure to white phosphorus if it is later released from the yet undiscovered WPUMBA. The "no action" remedy, therefore, requires monitoring of the WPUMBA by the Army during dredging and following major storm events.

It is still possible, however, that unexploded ordnance or other safety hazards may exist within the study area. The goals, therefore, of the selected remedial action are to limit the exposure of the aquatic ecosystem and human population to any buried material contained in the current WPUMBA, and are to be accomplished through the above described monitoring/sampling program. Additionally, a review of the technology available for detecting and locating the supposed WPUMBA will be performed in five years.

Therefore, the Army and the EPA have agreed that the ERT investigation demonstrated that the supposed WPUMBA could not be located in the study area outline in Figure 4. However, historical references recently reviewed by the Maryland Department of the Environment indicate the possibility of another location for a white phosphorus burial site, in addition to the ERT underwater study location. The phosphorus burial reportedly occurred in the waterfront region near Black Point, encompassing an area of 15 acres. One historical reference alludes that when disposed, the munitions were placed in tidal flats and covered with 2 feet of sediment. The Army and EPA have agreed, with the issuance of this Record of Decision (ROD) for the WPUMBA, to initiate an investigation of a possible site on land or in a tidal marsh near Black Point, to be designated the "White Phosphorus Munitions Land Burial Area (WPMLBA)." Figure 5 depicts the proposed new study area. The investigation of the WPMLBA will be incorporated into the Other Aberdeen Areas Study.

SITE CHARACTERISTICS

APG is located on the northwestern shore of the Chesapeake Bay. Due to its proximity to two large bodies of water, the Chesapeake Bay and the Atlantic Ocean, the climate at APG tends to be moderate as compared to inland Maryland. The average temperature for APG is 54.5 'F, with an average relative



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humidity of 73.8%. Precipitation as rainfall averages 38.58 inches with a maximum rainfall occurring during the summer and the minimum rainfall occurring during autumn. Precipitation as snowfall averages 12 inches. Prevailing winds average 6.8 knots in a northwest to north-northwest direction in the winter months, and a south to south-southwest direction in the summer months.

APG is drained by eight rivers and streams. Surface waters at APG tend to be shallow and sluggish with tidal estuaries forming at the mouths of the streams and rivers. This is attributed to low land elevations and the fact that APG is bordered by the Chesapeake Bay. The northeastern area of APG, which tends to be highly developed, is drained by Swan Creek, Dipple Creek, Woodrest Creek, and the upper branches of Romney Creek. The southwestern portion, which tends to be undeveloped and includes some ranges and test areas, is drained by Mosquito Creek, Delph Creek, the lower half of Romney Creek, and the lower portion of Bush River. Spesutie Island, which is also undeveloped and includes test areas, is drained by Back Creek.

Alluvium, swamp and marsh deposits occur in the reaches of the rivers in the region that have become inundated as a result of a rise in sea level. Composition of the Alluvium ranges from clay to gravel, and the swamp and marsh deposits consist of silts, clays, and organic matter. Thus, surficial sediments are heterogeneous and vary considerably in the lateral direction. Typically, gravels are at the base and the silts and clays dominate the upper portions.

SUMMARY OF SITE RISKS

Physical and Chemical Properties of White Phosphorus

Phosphorus is a very reactive element, and thus it is never found in the free state in nature, but is widely distributed in mineral deposits. Elemental phosphorus exists in three allotropic modifications; white, red, and black, the most common form being white phosphorus. White phosphorus, which may have a slight yellow hue, is both poisonous and flammable, and is the most reactive of the three allotropes. This reactivity may result from white phosphorus maintaining its tetrahedral structure throughout its phase changes. At room temperature, white phosphorus exists as cubic crystals, called the alpha (α) form. White phosphorus' ignition temperature is only 86°F. It is a soft, waxy, translucent solid which is soluble in organic solvents, such as carbon disulfide, but is unreactive with water. White phosphorus has a high octanol/water partition coefficient which reveals a potential for bioaccumulation, and a high volatility which indicates some potential for release to the atmosphere. Elemental white phosphorus is tetratomic, having a molecular weight of 123.90, and the chemical formula P₄.

When exposed to air, white phosphorus fumes and spontaneously ignites with an odor somewhat like that of a burning match. Like carbon, phosphorus burns as a solid without vaporizing. The combustion forms either tetraphosphorus hexoxide or tetraphosphorus decoxide:

 $P_4 + 3O_2 \rightarrow P_4O_6$ $P_4 + 5O_2 \rightarrow P_4O_{10}$

Tetraphosphorus decoxide dissolves in water to form the mineral acid known as phosphoric acid:

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 $P_4O_{10} + 6H_2O \rightarrow 4H_3PO_4$

To prevent its spontaneous ignition, white phosphorus is normally stored under water, which keeps it from contact with air. Because of its low ignition temperature, white phosphorus ignites so easily that it is unsafe to handle out of water. It is also unstable, gradually changing to red phosphorus, which is less reactive.

Fires involving elemental phosphorus are extinguished with water or blanketed with wet sand or absorbent. However, it is important to recall that the oxides of phosphorus which result from combustion are capable of forming corrosive acids when they dissolve in water. Thus the atmosphere surrounding a phosphorus fire is likely to be acidic. Inhalation of the fumes of burning phosphorus can lead to serious lung injury when the oxides dissolve in the liquid within the lung and associated passages. White phosphorus is also known to cause phossy jaw (phosphorus necrosis), a rotting of the jawbone.

Three analytical methods used for the detection of white phosphorus, listed in descending order of sensitivity, are: neutron activation analysis, gas-liquid chromatography, and colorimetry. The most commonly used analytical technique in aquatic surveys and bioassays is gas-liquid chromatography.

Toxicology

It is known that white phosphorus is a powerful systemic poison. It is absorbed through the skin, by ingestion, and through the respiratory tract. The lethal dose (oral ingestion) in adult humans is about 1 mg/kg body weight, but as little as 0.2 mg/kg body weight may produce toxic symptoms. Skin contact produces severe and painful burns, with destruction of the underlying tissue. Inhalation of vapors has produced tracheobronchitis and liver enlargement. There is, however, no evidence that white phosphorus is carcinogenic in laboratory animals or humans. White phosphorus is a class D carcinogen. Insufficient evidence exists to determine whether this compound causes cancer in humans, therefore, carcinogenic risks were not evaluated.

Low concentrations of elemental phosphorus in the water column have been documented as causing acute effects on aquatic organisms. Fish appear more sensitive to the effects of white phosphorus than invertebrates. Another concern is the impacts of contamination through the food chain. Rapid bioaccumulation of white phosphorus has been documented and is related to the lipid content of the organism. Bioconcentration factors of between 20 and 100 have been reported for aquatic organism tissue. White phosphorus contamination in various fish tissues has been shown to be toxic or lethal if ingested. However, due to the reactivity of white phosphorus, the transfer of this element through the food chain would not be expected. In terms of long term food chain contamination, the potential from white phosphorus is considered nil.

Toxicity testing was performed on approximately ten percent of the sediment cores from the WPUMBA area to determine the effects of white phosphorus or other contaminants that might be present on aquatic life. A freshwater and an estuarine fish species were utilized due to the low salinities found at the WPUMBA site. It was important to test both types of species, since this site is within the range of the seasonally moving freshwater/saltwater interface. Marine, estuarine, and freshwater fish are present in the vicinity during the year. The fathead minnow (*Pimephales promelas*) and silverside (*Menidia beryllina*) were used in 96 hour acute elutriate tests. The midge (*Chironomun tentans*), a benthic invertebrate, was

utilized in ten-day acute solid phase tests. The toxicity test results did not clearly indicate any effect of sediment-bound white phosphorus on aquatic life. It appears, though, that metals present in the sediment samples may exert some toxic effect on aquatic life and, therefore, monitoring of the water column in the WPUMBA during dredging activities and after major storm events (hurricane force winds) will be accomplished by the Army.

The absence or low levels of phosphorus detected in WPUMBA sediments, combined with published soil toxicity results, utilizing worms (chironomids), suggest a low probability of white phosphorus toxicity to the lower food chain organisms. Bioaccumulation to an upper level consumer, such as waterfowl, has also been investigated. Avian (bird) toxicity data is minimal, but the lethal dose for phosphorus has been cited as 3 mg/kg. Several factors, though, suggest that bioaccumulation in waterfowl may be negligible. Migratory waterfowl use the waters in the APG vicinity during the winter season. Therefore, exposure to the small quantities of phosphorus detected should be minimal. Additionally, waterfowl lipid content during the winter is elevated. This may serve to isolate any white phosphorus ingested and prevent manifestation of acute symptoms. Furthermore, large birds rather than sensitive precocial young would be utilizing the food resources. For these reasons, sub-lethal effects on waterfowl should be isolated or of a low probability.

Fate and Transport

The processes by which white phosphorus is transformed in air, water, and soil are oxidation, hydrolysis, and volatilization. White phosphorus is not transformed by photolysis, and it is also resistant to biodegradation by anaerobic organisms. Although hydrolysis and volatilization can have significant effects on the environmental fate of white phosphorus, its fate in air, soil, and water is generally determined by oxidative processes. Several investigators observed that the phosphorus oxidation rate in aqueous systems can be affected by dissolved oxygen concentration, temperature, pH, salinity, and the presence of metals.

The primary pathway of the degradation of white phosphorus at sediment surfaces is by oxidation, with the rate dependent upon the available oxygen. White phosphorus in sediment usually will oxidize to the more stable red allotrope. With the abundance of oxygen at the sediment-water interphase, white phosphorus will be predominantly oxidized to phosphates roughly within weeks to months. Since several of these phosphate compounds are possible, fixation of phosphorus probably takes place over a relatively wide pH range. Also, the large quantities of hydrous iron and aluminum oxides present in most sediments make possible the fixation of tremendous amounts of phosphorus. However, because most sediments are anaerobic short distances below the water-sediment boundary surface, phosphorus degradation/oxidation may be extremely lengthy at such depths. Experiments determined that surface deposits of only a few ppm of phosphorus oxidize quickly, whereas deeper deposits of higher concentration could remain for years. Anaerobic sediments can, therefore, serve as sinks for white phosphorus that can, in turn, serve as longterm sources for mobilization of white phosphorus into the environment if disturbed.

In determining the effect of the phosphorus sedimentation process, the interaction of the phosphorus species with the sediment present must be understood. It appears that in some sediments, phosphorus is held in a complex form involving iron as the complexing metal, the stability of which is related to the salt content of the water. It has been demonstrated in an estuary that the availability of phosphorus from such sediments decreases with increasing salinity. It has been suggested that salts coagulate the colloidal particles present, thereby retarding sediment exposure to oxygen. It also appears that the rate and quantity of phosphorus fixation depends on the type of sediment present. It has been reported that noncalcerous sediments will absorb and retain more added phosphorus than calcerous lake sediments.

In aquatic systems, phosphorus oxidation can be affected by the concentration above and below the phosphorus solubility limit (3 mg/l at 59°F). The ability of a sediment to absorb added phosphorus will decrease with an increase in the water-to-sediment phosphorus concentration. This means that as phosphorus is added to the water column, the absorbing power of the sediment peaks at a specific range,

and then decreases, leaving the excess concentration of phosphorus in the aqueous phase. At the same time, if the water-to-sediment phosphorus concentration continues to increase, the retention capacity of the sediment will decrease, which would add more phosphorus to the water. In opposition, the percentage of white phosphorus removed by sediments will increase at lower water-to-sediment phosphorus concentrations. Its appears that white phosphorus undergoes oxidation during this partitioning phase, and that the overall effect of phosphorus binding to sediments depends on water-to-sediment phosphorus equilibrium.

In applying the above to the WPUMBA, phosphorus tending to remain in the water column would be indicative of a sediment being oversaturated with phosphorus and releasing it to the aqueous environment. However, at the WPUMBA no phosphorus was detected in the water column above the supposed burial area. Additionally, only low concentrations of phosphorus were detected in a few sediment core samples from the WPUMBA. The environmental release of white phosphorus should cause visible changes in the aquatic ecosystem. No adverse environmental stress was observed at the WPUMBA. Additionally, white phosphorus release to the environment would have some abiotic effects as well, such as increased acidity and decreased dissolved oxygen. Yet, no abnormalities in the abiota were found at the WPUMBA. Thus, one can assume that the bottom sediments at the WPUMBA are not saturated with phosphorus and at present are not releasing phosphorus to the aqueous environment. Likewise, the same can be assumed in the case of groundwater; if the bottom sediments are not saturated with phosphorus, then there is no reason to suspect phosphorus releases to groundwater.

However, if in the future the waters off APG start to receive an increased amount of phosphorus due to the accelerating use of fertilizers, the bottom sediments at the WPUMBA could theoretically become saturated with phosphorus. Also, because of dredging activities that occur in the WPUMBA vicinity, bottom sediments could be disturbed, causing the release of phosphorus to the environment. With this in mind, therefore, monitoring of the WPUMBA during dredging activities and following major storm events (hurricane force winds) will be conducted by the Army.

The no effect level for white phosphorus in sediment lies below 2 μ g/kg (wet weight). All phosphorus wet weight concentrations were below 2 μ g/kg for the EPA ERT investigation. This indicates that the sediment contains no effect concentrations of white phosphorus. The lack of detectable quantities of phosphorus in the water column indicates the stability of the white phosphorus in the sediments. The current U.S. EPA "Quality Criteria for Water" (1986) lists the criteria for total phosphorus as 0.10 μ g/l for marine and estuarine waters. However, it is possible that undetected white phosphorus could be released to the water column during disruption of the sediment.

Periodic storms and shifts in winds and waves are the cause for changes in the geomorphometric processes observed by aerial photographs at the site. An examination of the wind rose at APG indicates that winds which may cause accretion occur approximately 26% of the time. Winds which may cause erosion occur approximately 16% of the time. The WPUMBA is sheltered from winds approximately 58% of the time. Waves of sufficient height and energy are required to cause significant geomorphometric changes and only occur with high winds. Winds greater than 17 knots in the erosional or accreting directions only occur about 1% of the time. This indicates that significant erosion or accretion would only occur during high winds and the occasional severe storm. Therefore, significant sediment disturbance caused by storms is low.

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DESCRIPTION OF THE "NO ACTION" REMEDY

The EPA ERT investigation of the WPUMBA did not discover any supposed white phosphorus burial area within the confines of the study location. Based on current site conditions, minimal impacts upon the aquatic ecosystem are expected. Release of any yet undetected large amounts of white phosphorus is not expected unless the sediments are disturbed. Likewise, bioassay techniques utilizing fish did not elucidate any clear toxic effect of white phosphorus on aquatic life. These results lead to a conclusion that any safety or environmental hazard which may have existed in the past due to the WPUMBA no longer exists. It is still possible, however, that unexploded ordnance or other safety hazards may exist within the study area. The goals, therefore, of the selected remedial action are to limit the exposure of the aquatic ecosystem and human population to any buried material contained in the WPUMBA, and are to be accomplished through a monitoring/sampling program. Additionally, a future review of the technology available for detecting and locating the supposed WPUMBA will be performed.

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Any supposedly buried white phosphorus at the WPUMBA or other sediment-bound material could be released to the environment if the sediment is disturbed. The Army will, therefore, conduct sampling of the water column, prior to and during any dredging activities in the area and following major storm events (hurricane force winds), to monitor and minimize releases of sediment-bound materials to the environment. Water samples will be analyzed for phosphorus, using a detection limit of 0.01 ppb which is 10% of the established aquatic toxicity concentration, and metals utilizing approved EPA quantitation detection limits. A five year review will be performed to identify possible technological advances that might be developed which have a greater detection/location capability for buried white phosphorus then currently exists today.

All activities at the WPUMBA will be conducted in compliance with Federal and State law including:

- Rivers and Harbors Act of 1899, Section 10
- Clean Water Act of 1972, as amended (33 USC 466), emphasizing Sections 115, 313(a), and 404
- Fish & Wildlife Coordination Act of 1958 (16 USC 661 et. seq.)
- Fish & Wildlife Conservation Act of 1980
- Endangered Species Act of 1973, as amended (16 USC 1531)
- Migratory Bird Act of 1918
- Migratory Bird Treaty Act of 1972 (16 USC 703-711)
- Coastal Zone Management Act of 1972 (16 USC 1451), Sec. 307 c3
- National Environmental Policy Act of 1969 (42 USC 4321 et seq)
- Executive Order 11990

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RESPONSIVENESS SUMMARY

The purpose of this Responsiveness Summary is to provide the public with a summary of citizen comments, concerns, and questions about the White Phosphorus Underwater Munitions Burial Area and the U.S. Environmental Protection Agency's (EPA's) and U.S. Army's responses to these concerns. During the public comment period from July 3rd through August 17th, 1991, no written comments, concerns, or questions were received by the EPA, Army, or the Maryland Department of the Environment. A public meeting was held on July 25, 1991 to present the Proposed Plan and to answer questions and receive comments. Several technical questions were answered during the public meeting regarding the conduct of the investigation. The responsiveness summary for the White Phosphorus Underwater Munitions Burial Area is divided into the following sections:

- I. Summary of major questions and comments
- II. Public meeting attendance roster
- \blacksquare . Panel of experts
- IV. Selected newspaper notices announcing dates of the public comment period and location and time of public meeting.

All comments and concerns summarized in this document have been considered by the EPA in making a decision regarding the selection of the No Action alternative for the White Phosphorus Underwater Munitions Burial Area. Additionally, the Army and EPA are proposing, with the issuance of the Record of Decision to initiate an investigation of a possible site on land or in a tidal marsh which has been identified by the Maryland Department of the Environment during their review of the investigation and the Proposed Plan. The site will be designated the White Phosphorus Munitions Land Burial Area and will incorporated into the ongoing Other Aberdeen Areas study.

L SUMMARY OF MAJOR QUESTIONS AND COMMENTS

- COMMENT: A resident questioned why in the search of the alleged dump site, a metal detecting device was used and whether the white phosphorus was contained within 55 gallon drums or in munitions?
- ARMY RESPONSE: Based on a records search, which involved primarily interviews with former employees, the alleged dumping involved the disposal of World War I-era munitions both U.S. and foreign. In addition, during the preliminary stages of the investigation, transportation regulations were reviewed to determine how white phosphorus was shipped. Rail regulations required white phosphorus to be shipped submerged in water inside a metal container. Therefore, the use of metal detecting devices was appropriate to attempt to locate a disposal location.
- COMMENT: A resident questioned the choice of the investigation location in the water area adjacent to Black Point?
- ARMY RESPONSE: The investigation focussed on an area which had been delineated in a Proclamation signed by President Franklin D. Roosevelt on January 24, 1940, designating a Migratory Waterfowl Closed Area as "the Phosphorus Area Unit." This Proclamation is the only written document found that specifically mentions phosphorus and delineates the boundary of a specific area. All installation maps have depicted this boundary as the most likely area for the disposal site.
- COMMENT: A resident questioned the environmental fate of white phosphorus?
- ARMY RESPONSE: Phosphorus is a very reactive element and is rarely found in a free state in nature, but is found in subsurface mineral deposits. The nature of white phosphorus is such that its spontaneously ignites with contact with air, and so is normally stored under water. White phosphorus is resistant to biodegradation and will hydrolyze into phosphates.
- COMMENT: A resident questioned whether aerial photographs were used to delineate the alleged dump site and whether former employees were interviewed?
- ARMY RESPONSE: All available aerial photographs were examined for the area in question. The oldest photograph was from 1938. The consensus reached after interviewing past employees was that the underwater location was the most likely site for the alleged white phosphorus disposal. However, due to the length of time since the disposal (1922-1925 time frame), there were no first hand accounts but rather second hand accounts from employees who began employment at APG during the mid to late 1930's. It was during Maryland Department of the Environment review of the aerial photographs that a possible site on land or in a tidal marsh near Black Point could be the disposal location. The Army and EPA have agreed, with the issuance of this Record of Decision for the White Phosphorus Underwater Munitions Burial Area, to initiate an investigation of this possible land burial site.

П. PUBLIC MEETING ATTENDANCE ROSTER

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TENDANCE REGISTER

PROPOSED PLANS ON O-FIELD GROUNDWATER AND WP SITE PUBLIC MEETING JULY 25, 1991 7:00 PM

Please print your name, address, and phone number.

(Please Print)

COMMENTS PEONE NUMBER ADDRESS YES OR NO NAME ALINGDON MD 21009 CRALD M. POLLIS VOGLAURPHINGUM PKWY 278-577 NO JackPoth USAN-PC-SA 434 Cr. shield 415 629361 ANNIALER Jos E538-3524 NO 1626A HARBORSIDE DE JURAMO General Pr Joulse NO 616 - 8835 NO 676 8835 RUBERT 179-2917 NO NARK > A YA N/C JOP I FN 2-308 702 ABERDA 1100 1/3 13 old Sound Rond 675-5443 ISFIGN -eeun HARFORD (EHERGE OPS NO ICHALON) 838-5700 TECOM 278-4285 ND :278-4/393 TECOM NQ w Maryland Deot of 14 Env. 631-3003 No oheer U.S. E. PA. PI Phila, PA (215) 597-9809 No o Kolouski

ATTENDANCE REGISTER

PROPOSED PLANS ON O-FIELD GROUNDWATER AND WP SITE PUBLIC MEETING JULY 25, 1991 7:00 PM

Please print your name, address, and phone number.

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ATTENDANCE REGISTER

PROPOSED PLANS ON O-FIELD GROUNDWATER AND WP SITE PUBLIC MEETING JULY 25, 1991 7:00 PM

Please print your name, address, and phone number.

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ATTENDANCE REGISTER

PROPOSED PLANS ON O-FIELD GROUNDWATER AND WP SITE PUBLIC MEETING JULY 25, 1991 7:00 PM

Please print your name, address, and phone number.

(Please Print)

NAME	ADDRESS	PEONE NUMBER	YES OR NO
Cinder Couch	DSHE	671-4842	NO
Wendy Thomi	EPA Herdets.	(703) 508- 8627.	NO
Bob Rizzier	FAO COLPS ENS.	10000 278-4095	10
BobShikahf	H Boy 99 Ganzarde-	Breach 6714714	$\frac{1}{\sqrt{2}}$
JUEN D. LOCEZ	TECOM ENV.O	FILE 278-4476	ho.
TIM TOPHE	TECOM ENV.	FF185 273-5189	No
JIM CARMODY	1202 KENNARD AV	EDGFWADD 676-8427	NO
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III. PANEL OF EXPERTS

The following list represents the panel members who participated in the public meeting held on 25 July 1991.

John Wrobel, WPUMBA Deputy Program Manager for APG

Ken Stachiw, Installation Restoration Program Manager for APG

John Fairbank, State of MD Program Manager for the WPUMBA, CERCLA Program

Milton Marder, State of MD Federal Facilities Section Head, CERCLA Program

Hank Sokolowski, U.S. EPA Chief Federal Facility Section Superfund Office

Frank Henderson, State of MD Acting Program Administrator, CERCLA Program

Steven Hirsh, U.S. EPA Region III Remedial Program Manager



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IV. SELECTED NEWSPAPER NOTICES ANNOUNCING DATES C. LOCATION AND TIME OF PUBLIC MEETING

ORIGINAL

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WEDNESDAY JULY-3, 1991

LEGAL NOTICES (265)

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Alternative E-6: Circumferential Extraction with Downgrademt Re-injec-tion The draft FFS also evaluated the following remedial action alternatives to treat the con-taminated groundwater after it is extracted; and prior to discharges; and prior No Action 1-11 Attemative T-3: Precipitation/UV-Oxidation Attemative T-5: Precipitation/Biological Treat-ment/Carbon Adsorption Attemative T-5: Precipitation/Rowdered Acti-vated Carbon Treatment Based on equifer pumping tests and treatability tests; the preferred option at this time is the combination of Attemative the groundwater and Attema-tive T-4 to treat the contami-nated groundwater and Attema-tive T-4 to treat the contami-nated groundwater on site. Al-though this is the preferred attemative at the present time, the Amy, in consultation with EPA and Maryland Department of the Environment (MDE) may modify the preferred al-temative of select another response action presented in the proposed plan based on new information or public comments. Therefore; the public comments on ALL the atterna-tives!

In addition, the Army and the PA also seek comments on the identified preferred remod-al alternative for the White Phosphorus Underwater Muni-tions Burnel Area (WPUMBA) located at: the: U.S.: Army Aberdeen Proving Ground (APG), Maryland, The WPUM-BA is located on the vestern side of the Upper Chespoake Bay. The area is situated in the shallow water off the mouth of Mosquito Creek be tween. Black Point' and Gull Island. Spesulie Narrows and Spesulie Island lie to the north and northeast: respectively. At-though the WPUMBA is adja-cent to the Minn Front Land Range, Area, which has been active since 1917, there are no records of the open water areas of the WPUMBA having been used as an impact area. Based on interviews of former employees who worked on the biss following WWI, the pos-able, existence of the WPUMBA BA was discovered in the late 1970's. Reportedy: an un-known amount of WWI write phosphorous (WP) munitions were buried in the Chespoake Bay in; the vicinity of Black Point. during 'the 'period 1922-25. The only, written documentation known to exist defineating the site boundaries is Proclamation 2383 signed by 'President Franklin D. Roo-seet, on January 24, 1940 designating 'B' Migratory Wa-terfow Cosed Area at APG of the area encompasses ap-proximately '130 acres: It is assumed the 'area 'described incorporated the WPUMBA. response, Toam, CERT) investi-gation has been conducted to answer' questions related to the supposed burial site, and potential adverse, effects to the anyonment, 'aquistic or-parisms', higher food' chain organisms', and human 'health that could result from potential reseas to groundwater under the supposed burial site, and potential adverse, effects to the anyonment, 'aquistic or-parisms', higher (adverse the stad, at the site was conducted in October, 1988, followed by an edditional geophysical investi-gation the site was conducted. A dati on Boy bards ampled for the presence of WP. 25 Based on the results of this study. It, appears' that 'the boundaries of the WPUMBA.

BALTIMORE, MARYLAND in a standard water w

The investigation of the WPUMBA asswered questions related to conditions of the site and the potential, for current and future threats to human health and the environ-ment. The location and axis-tence of the WPUMBA never was confirmed. The lock of detectable quantities of WP in the water column, combined with the relatively low concen-tration of WP found in less than 20% of the sediment samples indicate that WP is not, being released to the water column. Therefore, mini-mal risk is present to human population and the environ-ment at the suspected WPUMBA, which leads to the selection of the "no action"

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VOL: 309 NO. 4 Any remaining buried WP could be released to the environment if sectiment is disturbed. The Army will con-duct sampling of the water column, prior to and during any dredging activities in the area and following major storm events to monior and minimize released of any sect-ment bome materials to the environment. A five year re-visw will be parformed to determine if conditions at the environment. A five year re-visw will be parformed to determine if conditions at the environment. A five year re-visw will be parformed to determine if conditions at the environment. A five year re-visw will be parformed to determine if conditions at the environment. A five year re-visw will be parformed to determine if conditions at the environment. A five year re-visw will be parformed to determine if conditions at the main symbolicy the afterna-tive of select another response at the present time, the Army, in consultation with EPA and MDE, may modify the afterna-tive or select another response action presented in the pro-posed plan based on new information or public com-ments. Therefore, the public is encouraged to review and comment on the ERT investi-gative report and related docu-ments contained in the Admin-istrative Record. The Army, EPA, and MDE will choose the final remedy after the public comment period ends. During the conduct of the ERT underwa-ter study location. The EPA is proposing, with the finalization and dose-our of the ERT underwater site, to initiate an investigation of a possible site in a tidal marsh near Black Point. The area will be desig-nated the While Designonous Land Burial Area (WPLBA). The investigation of the WPLBA will be incorporated into the other Aberdeen Areas Study. To ensure that community concerns are property ad-VOL. 309 NO. 41 mea Concernation of

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WPLBA will be incorporated into the other Aberdeen Areas Study. To ensure that community concerns are properly ad-dressed, a public comment period on these proposed plans will begin on July 3, 1991 and close on August 17, 1991. During this tima the public is encouraged to submit written comments on these proceed plans. A public meet-ing to discuss these proposed plans will be held on July 25, 1991 at the CRDEC Conter-ence Center Auditorium, build-ing E4810, located at the intersection of Boadley and Austin Roads in the Edgewood Area of Aberdeen Proving Grounds. If you have questions about the public meeting, con-tact Mr. Yaquiant. The address and telephone number is listed below. The preferred alterna-tive may be modified or a new alternative developed if the public response warrants such action, or if new material is presented. The remedies ae-lected will be documented on Records of Decision that sum-marize APG's decision-making process.

Records of Decision that sum-marize APG's decision-making process. Background documents re-garding these sites, as well as cocies of USGS studies, and ERT's investigative report are available for public review at the information repositories lo-cated at the Hardord County Aberdeen and Edgewood pub-fic libraries.

Aberdeen ena _____ fic libraries, Interested parties may con-tact APG, EPA, and the State of Maryland representative-

act APG, EPA, and the State of Maryland representative-below: Mr. John Yaquiant Public Atlairs Office U.S. Army Aberdeen Proving Ground ATTN: AMSTE-PA Aberdeen Proving Ground, MD 21005-5001 (301) 278-2013 Mr. Steve Hirsh Hazardous Waste Management Div. U.S. EPA--Region III 841 Chestnut Building Philadelphia, PA 19107 (215) 597-0549 Frank Henderson MD Department of the Environment 2500 Broening Highway Baltimore, MD 21224 (301) 631-3454 All written comments re-ceived during the comment period will be summanized and the response will be provided in the Responsiveness Summa-ry of the Record of Debision for each site

LEGAL NOTICE

Proposed Remedial Action Plans Aberdeen Proving Ground

The U.S. Department of the Army and the U.S. Environmental Protection Agency Invite Public Comment on the Proposed Plan for Containment of Contaminated Groundwater at the Old O-Field Area, along with the identified Field Area, along with the identified preferred alternative for a suspected White Phosphorous Underwater Munia, tions Burial Area of Aberdeen Proving Ground, Harford County, Maryland. "The U.S. Department of the Army (Army) and the U.S. Environmental Protection Agency (EPA) seek com-ments on the Proposed Plan for the containment of contaminated; ground-water at the Old O-Field area of Aber-deen Proving Ground - Edewood deen Proving Ground - Edgewood Area. Old O.Field area is located mid-Area. Old O-rield area is located mid-way down the Gunpowder Neck be-tween Watson Creek and the Gunpowder River. Old O-Field contains an approximately 4.5 acre area which was used during the 1940s and early 1950s for the disposal of chemical-war-fore area to the disposal of chemical-warfare agents, munitions, contaminated equipment, and miscellaneous hazard-ous wastes. These wastes have im-pacted the groundwater at Old O-Field and the interconnecting surface water in Watson Creek

A Focused Feasibility Study (FFS) has been prepared by the Army for the contaminated groundwater at Old O-Field. The draft FFS evaluated the following remedial action alternatives for extracting and discharging the contami-

extracting and unservery nated groundwater: Alternative ~E-1:Downgradient Extraction with Discharge to Surface Water Alternative E-4: Circumferential Ex-traction with Capping and Discharge to Surface Water traction with Capper Surface Water Alternative E-5: Circumferential Ex-traction with Spray Irrigation/Source Flushing Alternative E-6: Circumferential Ex-

traction with Downgradient Re-Injec-

The draft FFS also evaluated the following remedial action alternatives to treat the contaminated groundwater af-ter it is extracted and prior to dis-charge charge: harge: Alternative T-1: No Action Alternative T-2: Minimal Action ÷.,

Alternative T-3: Precipitation/Air Alternative T-5: Precipitation/UV-Ox-idation

Alternative T-6: Precipitation Powdered Activated Carbon Treatment Based on aquifer pumping tests and treatability tests, the preferred option at this time is the combination of Alternative E-1 to extract and discharge the groundwater and Alternative T-4 to treat the contaminated groundwater on-site. Although this is the preferred alternative at the present time, the Army, in consultation with EPA and Maryland Department of the Environ-Ament (MDE), may modify the preferred alternative or select another response action presented in the proposed plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the alternatives. In addition, the Army and the EPA also seek comments on the identified preferred remedial alternative for the White Phosphorus Underwater Munitions Burial Area (WPUMBA) located at the U.S. Army Aberdeen Proving Ground (APG), Maryland, The WPUMBA is located on the western side of the Upper Chesapeake Bay. The area is situated in the shallow water off the mouth of Mosquito Creek between . Black Point and Gull Island. Spesutie Narrows and Spesutie Island lie to the north and northeast, respectively." Al-though the WPUMBA is adjacent to the "Main Front Land Range Area, which has been active since 1917, there are no records of the open water areas of the WPUMBA having been used as an im-

pact area. Based on interviews of for-mer employees who worked on the base following WWI, the possible existence of

the WPUMEA was discovered in the the WPUMBA was discovered in the late 1970s. Reportedly, an unknown (WP) imunitions were buried in the Chesapeake Bay in the vicinity of Black Point during the period 1922-25. The conly written documentation known to exist delineating the site boundaries is. Proclamation 2363 signed by President Franklin D. Roosevelt on January'23, '1940, designating a Migratory Water-fowl Closed Area at APG referred to as the "White Phosphorous Unit." The size of the area encompasses approxiaize of the area encompasses approx-mately 130 acres. It is assumed the area described incorporated the WPUMBA. A U.S. EPA Environmental Response. Team '(ERT) investigation has been conducted to answer questions related to the location of the WPUMBA, releases to groundwater under the sup-posed burial site, and potential adversa effects to the environment, aquatic organisms, higher food chain organisms; and human health that could result ganisms, higher food chain organisms; and human health that could result from potential releases from this area. An in-depth geophysical investigation at the site was conducted in October, 1988, followed by an additional geophy-sical survey in June of 1959. Based on the geophysical data, four areas were helected as being highly probable loca-tions for the WPUMBA, and sediment core sampling was conducted. Addition-mediately adjacent to the area was sampled. A total of 60 cres were fol-lected in August of 1989. In addition-several test pits were excavated on Guilt for the presence of WP. Based on the results of this study, it appears that the 'boundaries of the WPUMBA no longer exist. Results indi-cate trace amounts of WP were detected in 11 of 60 cores at less than 50g/kg (micrograms/kilogram). No WP was de-

In 11 of ob cores at less than ougkg (micrograms/kilogram). No WP was de-tected in the water column, or on Gull Island. No high explosive compounds were detected in the water or sediment samples. Resource Conservation Recov-ery Act (RCRA) analysis indicates that the sediment would not be considered a

hazardous waste. The field investigation showed only a minor distribution of magnetic objects, and intrusive sediment core sampling, revealed only sporadic occurrences of idetectable levels of WP. In spite of this intensive search, the location of the WPUMBA could not be confirmed. Likewise bio azaay techniques did not demonstrate any clear toxic effect on aquatic life. These results lead to a conclusion that any safety or environmen-tal hazard which may have existed in the past due to the WPUMBA no longer exists. It is still possible, however, that Unexploded Ordnance (UKO) or other safety hazards may exist within the atudy area.

The investigation of the WPUMBA "The investigation of the WPUMBA answered 'questions' related to' condi-tions of the aits and the potential for 'current' and 'future' threats to 'hungan' health'and the environment. The loca-tion'' and existence of the WPUMBA pever was confirmed. The lack of detec-table quantities of WP in the water col-'umn, 'combined with the 'relatively low 'concentration of WP found in less than '2004' of the acdiment samples indicate concentration of WP found in less than 20% of the sediment samples indicate that WP is not being released to the wa-ter column. Therefore, minimal risk is-present to human population and the environment at the "suspected. WPUMBA, which leads to the selection of the "no action" remedy.

WEDNESDAY, JULY 3, 1991

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Any remaining buried WP could be is disturbed. The Army .. will . conduct weampling of the water column, prior to and during any dredging activities in the area and following major storm events to monitor and minimize releases of any sediment borne materials leases of any sediment borne materials to the environment. A five year review will be performed to determine if condi-tions at the WPUMBA have changed ito-any extent that would warrant further re-investigation of the supposed burial area. Although this is the preferred rai-ternative at the present time, the Armiy, in consultation with EPA and MUE, may modify the alternative or select an-other response action presented in the proposed plan based on new informaother response action presented in the proposed plan based on new informa-tion or public comments. Therefore, the public is encouraged to review and com-ment on the ERT investigative report and related documents contained in the Administrative Record. The Army, EPA and MDE will choose the final remedy ender the public comment period ender after the public comment period ends. During the conduct of the ERT investi-gation, MDE has identified another possibie location for a white phosphorus burial site, in addition to the ERT un-derwater study location. The EPA' is proposing, with the finalization and close-out of the ERT underwater site; to initiate an investigation of a possible to initiate an investigation of a possible site in a tical marsh near Black Point. The area will be designated the White Phosphorus Land Burial Area (WPLBA). The investigation of the WPLBA will be incorporated into the other Aberdeen Areas Study. To ensure that community concerns are properly addressed, a public com-ment period on these proposed plans will begin on July 3, 1991, and close on 'August 17, 1991. During this time the public is encouraged to submit written 'comments on these proposed plans.

comments on these proposed plans-A-public meeting to discuss these pro-posed plans will be held on July 25, 1991, at the CRDEC Conference Center-Auditorium, building Z4510, located at the intersection of Hoedley and Aughin-Paede in the Fdewood Area of Aber-Roads in the Edgewood Area of Aber-deen Proving Ground. If you have quesdeen Proving Ground. If you have ques-tions about the public meeting, contact Mr. Yaquiant. The address and tele-phone number is listed below. The pre-ferred alternative may be modified or a-new alternative developed if the public. "response warrants such action, of, if 'new material is presented. The rema-'dies selected will be documented on Re-cords of Decision that summarize APG's decision that summarize APG's decision-making process.

Background documents regarding these sites, as well as copies of USGS studies, and ERT's investigative repor-are available for public review at the in-formation repositories located at the Harford County 'Aberdeen and Edgewood public libraries. Interested parties may contact AFG. EPA and the State of Maryland rep-resentatives below: Mr. John Yaquiant Public Affairs Office U.S. Army Aberdeen Proving Ground. ATTN: AMSTE-PA Aberdeen Proving Ground, MD 21005-5001 21005-5001 (301) 278-2013

Mr. Steve Hirsh

Hazardous Waste Management Div U.S. EPA — Region III 841 Chestnut Building Philadelphia, PA 19107 (215) 597-0549 Frank Henderson

MD Department of the Environment 2500 Broening Highway Baltimore, MD 21224 (301) 631-3454 All written comments received during

the comment period will be summarized and the response will be provided in the Responsiveness Summary of the Record of Decision for each site.

Contaminated water is public meeting topic

By George Mercer **TECOM Public Affairs**

Aberdeen Proving Ground will hold a public meeting July 25 to provide information and to solicit comments on the proposed plan for containment of contaminated groundwater at the Old O-Field Area. The meeting also will address the identified preferred alternative proposed for the suspected White Phosphorus Underwater Munitions Burial Area.

The meeting will begin at 7 p.m. at the Edgewood Area Conference Center auditorium, corner of Hoadley and Austin Roads. Old O-Field Area is located on the Gunpowder Neck between Watson Creek and the Gunpowder River. The 4.5 acre area was used during the 1940s and early 1950s for the disposal of chemical warfare agents, munitions, contaminated equipment and imiscellaneous hazardous wastes. Based on recent environmental studies, the Army proposes to contain contaminated groundwater which is migrating from the disposal site. The White Phosphorus Underwater Munitions Burial Area operable unit is in the shallow water off the mouth of Mosquito Creek between Black Point and Gull Island. While there are no records of the area being used as an impact zone, interviews in the 1970s with former APG employees led to the possibility of the area's existence. Reportedly, an unknown number of World War I-era white phosphorus muni-tions were buried in the area during the early 1920s. A geophysical investigation in 1988, a 1989 geophysical survey and sub-Frequent sediment sampling and analysis were unable to confirm the location of the site, and results lead to the conclusion that any safety or environmental hazard which may have existed due to underwater burial of munitions no longer exists. However, there is a possibility of unexploded ordnance in the area. To ensure that community concerns are properly addressed, a public comment period on these proposed plans began on July 3 and will continue until Aug. 17. During this time, the public is encouraged to submit written comments on the plans. Background documents regarding these sites, as well as copies of USGS studies and the

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cy's Environmental Response Team's investigative report are available for public review at the information repositories located at the Harford County Aberdeen and Edgewood public libraries.

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Persons wishing to submit comments on the O-Field Plan may send them to: U.S. Army Aberdeen Proving Ground, STEAP-SH-EE (ATTN: Cindy Couch), Aberdeen Proving Ground, Md. 21010. Comments concerning the White Phite Phosphorus Underwater Munitions Burial Site may be sent to: building E-4810, located at the U.S. Army Aberdeen Proving Ground, STEAP-SH-EE (ATTN: John Wrobel), Aberdeen Proving Ground, Md. 21010.