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[Smoke and Obscurants; a Health and Environmental Effects Data Base Assessment. A First-Order Environmental Screening and Ranking of Army Smokes and Obscurants](#) Feb 1985 115 pages
Authors: [Joseph H. Shinn](#); [Stanley A. Martins](#); [Patricia L. Cederwall](#); [Lawrence B. Gratt](#); [LAWRENCE LIVERMORE NATIONAL LAB CA](#)

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... the relative toxicity when ingested by animals, the aquatic toxicity, the environmental mobility when freshly deposited, and the ultimate mobility and fate in the environment. The major smoke types considered were various forms of **white phosphorus**, red **phosphorus**, hexachlorethane-derived smokes (HC), fog-oil (SGF-2), diesel fuel smokes (DF), and some infrared obscuring agents. The results were ranked according to: Device Impact Area and Environmental Concentration; ...

[Smokes and Obscurants: A Health and Environmental Effects Data Base Assessment. A First-Order Environmental Screening and Ranking of Army Smokes and Obscurants. Phase 1](#) Mar 1985 121 pages
Authors: [Joseph H. Shinn](#); [Stanley A. Martins](#); [Patricia L. Cederwall](#); [Lawrence B. Gratt](#); [LAWRENCE LIVERMORE NATIONAL LAB CA ENVIRONMENTAL SCIENCES DIV](#)

Full Text

... concentration, the relative inhalation toxicity, the relative toxicity when ingested by animals, the aquatic toxicity, the environmental mobility when freshly deposited, and the ultimate mobility and fate in the environment. The major smoke types considered were various forms of **white phosphorus**, red **phosphorus**, hexachloroethane-derived smokes, fog oil, diesel fuel smokes, and some infrared obscuring agents.

[Evaluate and Characterize Mechanisms Controlling Transport, Fate, and Effects of Army Smokes in the Aerosol Wind Tunnel](#) Oct 1987 202 pages
Authors: [Peter Van Voris](#); [Dominic A. Cataldo](#); [Michael W. Ligojke](#); [Thomas R. Garland](#); [Kris M. McFadden](#); [BATTELLE MEMORIAL INST RICHLAND WA PACIFIC NORTHWEST LABS](#)

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An evaluation of the terrestrial transport, transformations and ecological effects of **phosphorus** red phosphorus-butyl rubber (RP/BR) smoke obscurant was performed at Pacific Northwest Laboratory. A similar evaluation using **white phosphorus** (WP) smoke/obscurant is currently proceeding. Future testing with other smokes are planned. The objective of this research program is to characterize the effects of smokes and obscurants on: (1) natural vegetation characteristic of ...

[Mammalian Toxicology and Toxicity to Aquatic Organisms of Four Important Types of Waterborne Munitions Pollutants - An Extensive Literature Evaluation](#) Mar 1974 186 pages
Authors: [Jack C. Dacre](#); [David H. Rosenblatt](#); [ARMY MEDICAL BIOENGINEERING RESEARCH AND DEVELOPMENT LAB FORT DETRICK MD](#)

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... provide a summary review and evaluation of the toxicological and related literature on known components of four types of military-relevant wastewaters. These are nitrocellulose and nitroglycerin manufacturing wastes, 'phossy water' (from **white phosphorus** processing), and 'pink water' (from TNT production and processing). The report consists of brief descriptions of the wastes along with the most significant toxicological information concerning them, conclusions ...

[WP CASUALTIES AT EDGEWOOD ARSENAL MARYLAND, 1945](#) Mar 31, 1947 144 pages
Authors: [James](#); [Morton Galdston](#); [Jack Wexler](#); [Myna L. Hill](#); [Geraldine Midgely](#); [CHEMICAL CORPS ARMY CHEMICAL CENTER MD](#)

Full Text

The investigation was undertaken to evaluate the **white phosphorus** (WP) burn in a series of human patients received from WP loading plant accidents at Edgewood Arsenal, Maryland.

[Analysis of the Visual Obscuration Produced by Current Artillery and Mortar Delivered WP and HC Smoke](#) Aug 1977 68 pages
Authors: [Douglas N. Warrington](#); [William T. Hirnyck](#); [ARMY MATERIEL SYSTEMS ANALYSIS ACTIVITY/BERDEEN PROVING GROUND MD](#)

Full Text

... test conducted in December, 1975. The purpose of this analysis is to evaluate the effect of the number of smoke rounds fired and the effect of the position of the observers on the duration of target obscuration. Current artillery and mortar-delivered **white phosphorus** (WP) smoke rounds and current artillery-delivered

hexachloroethane (HC) smoke rounds were fired. The observers were not permitted to use visual aids to view the targets. The effect of the different types of ...

[Mammalian Toxicity of Munitions Compounds. Phase I. Acute Oral Toxicity, Primary Skin and Eye Irritation, Dermal Sensitization, Disposition and Metabolism and Ames Tests of Additional Compounds](#) Dec 8, 42
1978 pages

Authors: [Harry V. Ellis III.](#); [John R. Hodgson](#); [Shang W. Hwang](#); [Laurel M. Halpap](#); [Danny O. Helton](#); [MIDWEST RESEARCH INST KANSAS CITY MO](#)

... eyes and not sensitizing to guinea pigs. 3,5-DNT and 4- ADNT were absorbed from the gastrointestinal tract, metabolized and excreted in the urine. In the Ames test, 1,3-dinitrolycerin (1,3-DNG), 1-mononitrolycerin (1-MNG), nitrocellulose and **white phosphorus** were not mutagenic. Trinitrotoluene (TNT) 2,4-DNT, 2,5-DNT, tetranitromethane (TNM) and 1,2-DNG were mutagenic at 10 to 30 microgram/plate in one or more strains. TNM was bactericidal without activation. 1, ...

Full Text

[Characterization of Aerosol Nonlinear Effects on a High Power CO2 Laser Beam](#) Feb 73
1981 pages

Authors: [C. W. Bruce](#); [Y. P. Yee](#); [S. J. Duran](#); [ARMY ELECTRONICS RESEARCH AND DEVELOPMENT COMMAND WSMR NM ATMOSPHERIC SCIENCES LAB](#)

This report describes a set of aerosol measurements to determine the effect of a countermeasure smoke, **white phosphorus** (WP), on a pulsed high-energy laser (HEL) beam. An analysis of the aerosol (gaseous and particulate airborne material) was used as the basis for calculations of evaporative clearing, and application was made to a given specific test situation. Linear propagation properties forming the basis for the 10.6 micrometers pulsed laser nonlinear effects are obtained relatively ...

Full Text

[Migration of Hazardous Substances through Soil. Part 4. Development of a Serial Batch Extraction Method and Application to the Accelerated Testing of Seven Industrial Wastes](#) Sep 510
1987 pages

Authors: [Duane E. Long](#); [Martin J. Houle](#); [Donald C. Weatherhead Jr.](#); [Gordon K. Ricks](#); [ARMY DUGWAY PROVING GROUND UT](#)

... an experimental approach capable of simulating this dynamically-changing situation. Samples of wastes were collected from the following industries: zinc-carbon battery manufacturing, titanium dioxide pigment production, hydrofluoric acid manufacturing, **white phosphorus** production, oil re-refining, and two from zinc secondary-refining (cinders and scrubber-waste). Water extracts of these wastes were applied to Chalmers, Davidson, and Nicholson soils. The analysis of ...

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[Evaluate and Characterize Mechanisms Controlling Transport, Fate, and Effects of Army Smokes in the Aerosol Wind Tunnel](#) Feb 184
1990 pages

Authors: [Dominic A. Cataldo](#); [Peter Van Voris](#); [Michael W. Ligojke](#); [Bruce D. McVeety](#); [Harvey Bolton Jr](#); [BATTELLE PACIFIC NORTHWEST LABS RICHLAND WA](#)

This report assesses the environmental fate and effects of mixed obscurant smokes comprised of **White Phosphorus**, Fog Oil (FO), and Hexachloroethane (HC) smokes. Overall, based on the environmental fate and effects of the individual obscurant smokes investigated previously significant synergistic effects are indicated in some instances. The chemistry of the FO and HC smokes following deposition to surfaces was generally consistent with their reported individual behavior. However, with WP, the combustion products or rates of conversion of ...

Full Text

[Chemical Reactions and Properties of Organosilicon Compounds Related to New Materials](#) May 29, 11
1992 pages

Authors: [Robert West](#); [WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY](#)

... 1,3-cyclodisiloxanes. Disilenes were found to react with aldehydes, ketones and thioketones by 2+2 cycloaddition to produce four-membered ring compounds. Reactions of disilenes with ketenes and acid chlorides were also investigated. With **white phosphorus**, disilenes react to produce nobel bicyclobutane molecules which may be further converted to tricyclic asterane structures. The first platinum derivatives of disilenes were synthesized. The first siladiimides have been ...

Full Text

[Analysis of Artillery Winter Test Firing into Eagle River Flats, Fort Richardson, Alaska](#) Jan 20
1995 pages

Authors: [Charles M. Collins](#); [Darryl J. Calkins](#); [COLD REGIONS RESEARCH AND ENGINEERING LAB HANOVER NH](#)

... HE) projectiles on the ice-covered terrain. Eagle River Flats is an estuary at the mouth of the Eagle River used as the artillery impact range for Ft. Richardson. The Army suspended use of the impact range following the discovery that **white phosphorus** (WP) deposited in the salt marsh was responsible for large numbers of waterfowl deaths each summer. The purpose of these tests was to assess if seasonal firing of HE projectiles from 60- and 81-mm mortars and 105- mm ...

Full Text

[Initial Analyses of Eagle River Flats Hydrology and Sedimentology, Fort Richardson, Alaska](#) Mar 47
1995 pages

Authors: [Daniel E. Lawson](#); [Susan R. Bigl](#); [John H. Bodette](#); [Patricia Weyrick](#); [COLD REGIONS RESEARCH AND ENGINEERING LAB HANOVER NH](#)

... disrupting drainage. The physical environment of ERF needs to be understood to help remediate a problem of unusually high mortality rates in migrating waterfowl. This high mortality of ducks is attributable to ingestion of elemental **white phosphorus** (P4) particles (from smoke-producing devices), which are now distributed within near-surface sediments of the ponds and marshes. The complexity of this dynamic environment makes it extremely difficult to predict what physical ...

Full Text

[Silt Fence Testing for Eagle River Flats Dredging](#) Dec 18
1995 pages

Authors: [Karen S. Henry](#); [Susan T. Hunnewell](#); [COLD REGIONS RESEARCH AND ENGINEERING LAB HANOVER NH](#)

Full Text

An estimated 1,000 to 2,000 waterfowl deaths have been noted annually since 1980 in Eagle River Flats (ERF), Alaska, an artillery impact area used by the Army. Waterfowl die because of the ingestion of unburned **white phosphorus** (WP) particles deposited by incendiary. Remediation of the site is currently being planned, and one of the techniques being considered is the use of a remote-control dredge to excavate WP-contaminated sediment. Dredged material will be placed ...

[Low Temperature Reactions for the Preparation of Group 13-15 Materials from Organo-gallium\(I\) and -indium\(I\) Compounds](#) Dec 6, 15
1997 pages

Authors: [O. T. Beachley Jr.](#); [Jeffrey F. Lees](#); [Matthew J. Noble](#); [STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY](#)

Full Text

The reactions of pentamethylcyclopentadienylin-dium(I) In(C5Me5) with **white phosphorus** (P4) at 175 deg C and of neopentylgallium(I) Ga(CH2CMe3)n with P4 at 350- 400 deg C and with NH3 at 460-480 deg C in sealed tubes provide routes to indium phosphide, gallium phosphide and hexagonal gallium nitride, respectively. The formation of these group 13-15 materials as black solids was confirmed by their X-ray photoelectron spectra, X-ray powder diffraction patterns and physical properties. The other products were (C5Me5)2 in ...

[Eagle River Flats Remediation Project Comprehensive Bibliography - 1998 to 2003](#) Aug 54
2003 pages

Authors: [Michael R. Walsh](#); [ENGINEER RESEARCH AND DEVELOPMENT CENTER HANOVER NH COLD REGIONS RESEARCH AND ENGINEERING LAB](#)

Full Text

White phosphorus (WP) has been implicated in the deaths of thousands of waterfowl annually at Eagle River Flats (ERF), an estuarine salt marsh located on Fort Richardson near Anchorage, Alaska. The source of WP contamination at ERF was the firing of WP-containing munitions into the area by the U.S. military. WP is a well known toxicant and is lethal to a wide range of species. However, WP contamination at ERF is the first documented case of a U.S. Army munitions impact area contaminated with WP particles. This has led to the designation of ERF as a Superfund site by the U.S. Environmental ...

[Use of Military Demolition Explosives in a Remediation Project](#) Oct 35
2003 pages

Authors: [Michael R. Walsh](#); [Charles M. Collins](#); [Michael T. Meeks](#); [Alvin O. Lee](#); [Eric G. Wahlgren](#); [ENGINEER RESEARCH AND DEVELOPMENT CENTER HANOVER NH COLD REGIONS RESEARCH AND ENGINEERING LAB](#)

Full Text

Control of surface and subsurface water is a critical factor in the efficiency of remediation efforts at Eagle River Flats, an active impact range on Fort Richardson, Alaska, contaminated with particulate **white phosphorus** from artillery and mortar rounds. The Flats is an estuarine salt marsh bordered by bluffs with water groundwater influx from the edges as well as periodic tidal and river inundation and rain events. The uneven topography and presence of ...

[Screening Level Ecological Risk Assessments of Some Military Munitions and Obscurant-related Compounds for Selected Threatened and Endangered Species](#) Oct 255
2006 pages

Authors: [Katherine Von Stackleberg](#); [Craig Amos](#); [C. Butler](#); [Thomas Smith](#); [J. Famely](#); [M. McArdle](#); [B. Southworth](#); [Jeffrey Stevens](#); [ENGINEER RESEARCH AND DEVELOPMENT CENTER CHAMPAIGN IL CONSTRUCTION ENGINEERING RESEARCH LAB](#)

Full Text

... with munitions. This study evaluates the potential long-term impacts on selected threatened and endangered species resulting from dispersion and deposition of vapors and particles found in the fog oils, hexachloroethane smoke, colored smokes, **white phosphorus**, and obscurants such as brass flakes and graphite flakes used during training. Residue from these constituents can deposit directly on plants and prey species favored by higher vertebrates and other ...

[Combat Burn Life Support: A Military Burn-Education Program](#) Apr 5 pages
2005

Authors: [David J. Barillo](#); [Leopoldo C. Canclo](#); [Brad G. Hutton](#); [Paul J. Mittelsteadt](#); [Glen E. Gueller](#); [John B. Holcomb](#); [ARMY INST OF SURGICAL RESEARCH FORT SAM HOUSTON TX](#)

Full Text

... center for patient transfer. In preparation for hostilities in Iraq, we developed several add-on modules to the standard Advanced Burn Life Support course to meet specific needs of military audiences. These modules cover the treatment of **white phosphorus** burns; the treatment of mustard gas exposure; the long- range aeromedical transfer of burn patients; the management of burn patients beyond the first 24 hours; and the delivery of burn care in austere environments. ...

[Synthesis and Structural Characterization of Alkyl, Gallium-Phosphorus Compounds, X-Ray Crystal Structures of \(Me3CCH2\)2\(Cl\)Ga.P\(SiMe3\)3, R2GaP\(SiMe3\) 2GaR2Cl\(R=Me3CCH2 and Me3SiCH2\), and \(\(R\)\(X\)GaP\(SiMe3\)2\)2 \(R=Me3CCH2, X=Cl; R=Me3CCH2, X=Me3CCH2; R=Me3S](#) Dec 20, 35
1995 pages

Authors: [Richard L. Wells](#); [Ryan A. Balwin](#); [Peter S. White](#); [William T. Pennington](#); [Arnold L. Rheingold](#); [DUKE UNIV DURHAM NC DEPT OF CHEMISTRY](#)

Full Text

Continued activity in the development of single-source precursors to 13-15 semiconductor materials has motivated our laboratory to investigate the synthesis of novel organogallium **phosphorus** compounds which might serve as potential precursors to GaP. Recently, our efforts to produce the gallium- **phosphorus** bond have led to the formation of interesting ring compounds and simple adducts.

[Phosphorus-, Nitrogen-, Sulfur-, and Chlorine-Containing Molecules on Surfaces](#)

Oct 9, 1992 7 pages

Authors: [J. M. White](#); [TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY](#)[Full Text](#)

The research is in the area of chemical reactions on surfaces and deals with molecules and solids that model systems of technological and environmental significance to ARO. In particular, we study heteroatom organic adsorbates containing halogens, sulfur, oxygen, **phosphorus** and nitrogen. The fundamental surface chemical decomposition kinetics of selected molecules, especially simulants, are studied on metal and metal oxide substrates that model technological materials used to destroy and render them harmless. Our goal is to acquire fundamental and quantitative molecular level descriptions of ...

[Synthesis and Characterization of an Organothallium-Phosphorus Adduct: Crystal Structure of \(Mes₃SiCH₂\)₂sub₃Ti*P\(SiMes₃\)₃](#)

Oct 30, 1996 17 pages

Authors: [Ryan A. Baldwin](#); [Richard L. Wells](#); [Peter S. White](#); [DUKE UNIV DURHAM NC DEPT OF CHEMISTRY](#)[Full Text](#)

The organothallium **phosphorus** adduct (Me₃SiCH₂)₂sub₃Ti-P(SiMe₃)₃ (1) was prepared by combining (Me₃SiCH₂)₃Ti and P(SiMe₃)₃ at room temperature. Compound 1 was characterized by ¹H, ¹³C(¹H), and ³¹P(¹H) NMR, partial elemental analysis, EI mass spectrometry, and single-crystal X-ray analysis, the first to be reported for a thallium-group 15 adduct. Crystal data for 1: trigonal system, space group P 3₁, with a = 16.063(6) Å, c = 12.148(3) Å, D_{calcd} = 1.315 g cm⁻³, and V = 2714.3(11) Å³ for Z = 3. Refinement converged at R = 0.042 (R_w = 0.045). The TI-P bond length in 1, previously unreported for ...

[Quantum Chemical Study of the Phosphite-Phosphonate Tautomerization: Applications to bis\(2-Ethylhexyl\) Phosphonate \(BIS\) and Other Simulants for Chemical Warfare Agents](#)

Nov 2002 58 pages

Authors: [William E. White](#); [EDGEWOOD CHEMICAL BIOLOGICAL CENTER ABERDEEN PROVING GROUND MD](#)[Full Text](#)

Quantum chemical methods (ab initio, semiempirical, and Hartree-Fock) were used to calculate the energy of several phosphite-phosphonate tautomers, and thereby determine the position of equilibrium in the gas phase. Unless the **phosphorus** moiety contains significant electron withdrawing groups, the equilibrium lies far toward the phosphonate. None of the methods consistently produced thermodynamic values that agreed within 5 kcal/mole. In the most stable conformation of trimethyl phosphite, two of the methoxy ligands were oriented upward (with respect to the lone pair) in a pseudocisoid or ...

[Catalytic Oxidation of Volatile Organic Liquids](#)

Mar 2004 10 pages

Authors: [Shane E. Roark](#); [Jimena Cabrera-Fonseca](#); [Michael C. Milazzo](#); [James H. White](#); [Joseph D. Wander](#); [AIR FORCE RESEARCH LAB TYNDALL AFB FL](#)[Full Text](#)

... of organic contaminants in air to acceptable levels before the air is released into the atmosphere or recirculated. Specific applications include ventilated work spaces for spray painting and engine maintenance, indoor air decontamination, dry cleaning, food processing, fume hoods, residential use, and solvent-intensive industrial processes. Catalyst powders and monolith-supported catalysts were screened for conversion of 1-butanol, toluene, and methyl ethyl ketone to carbon dioxide and water. ... However, the catalysts quickly deactivated in the presence of sulfur and **phosphorus**.

[A NEW SYNTHESIS FOR 3-CHLORO-2,2',4,4',6,6'-HEXANITROBIPHENYL, PIPICL](#)

Jan 18, 1966 22 pages

Authors: [JOSEPH C. DACONS](#); [Mortimer J. Kamlet](#); [NAVAL ORDNANCE LAB WHITE OAK MD](#)[Full Text](#)

... and m-chloro- or m-bromoanisole. The first step involved the formation of m-picrylanisole by means of a mixed Ullmann reaction. Using 90% nitric acid and 30% oleum, the picrylanisole was nitrated to 3-methoxy-2,2',4,4',6,6'-hexanitrobiphenyl which was in turn converted to PIPICL by treatment with pyridine and **phosphorus** oxychloride. When m-bromoanisole was used in the Ullmann reaction, the overall yield for the three steps was about 59%. The use of m-chloroanisole resulted in a lower yield in the first step and an overall yield of about 52%. Several variations in procedure are given for the ...

[UV/Blue III-Nitride Micro-Cavity Photonic Devices](#)

Mar 4, 2002 5 pages

Authors: [Hongxing Jiang](#); [Jingyu Lin](#); [III-N TECHNOLOGY INC MANHATTAN KS](#)[Full Text](#)

... I optional phase duration, we learned how to achieve **white** light emission from InGaN/GaN QW micro-size emitters. We have employed three-color emitting (red-blue-green) **phosphorus** coating on near UV micro-size LEDs and conventional LEDs to obtain **white** light emission. Comparing with coating a yellow-emitting phosphor on blue LEDs, the three-color phosphors approach yielded improved **white** light color rendering. We have also further ... the optional phase laid the groundwork for the development of solid-state **white** lighting, which is a technology with an enormous market interest worldwide ...

[Electrical Compensation in InP Produced by Background Impurities and Structural Defects](#)

Oct 1980 25 pages

Authors: [B. L. Mattes](#); [MICHIGAN UNIV ANN ARBOR ELECTRON PHYSICS LAB](#)[Full Text](#)

... a low humidity (<20% relative) room the reproducibility of epitaxial growths has been improved. The discoloration of the bone **white** pyrolytic boron nitride growth cell has helped to identify several sources of contamination that oxidize the In-melt and lead to premature nucleation. The nucleation and growth of epitaxial InP now appears to be limited by **phosphorus** transport instabilities in the P-saturated In-melt. A thermochemical analysis of **phosphorus** equilibria with In and InP may provide an insight into liquid solid stability conditions. The results are in excellent agreement with the ...

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