

Health Consultation

Site Follow-up and Update

PICATINNY ARSENAL

ROCKAWAY TOWNSHIP, MORRIS COUNTY, NEW JERSEY

EPA FACILITY ID: NJ3210020704

MARCH 18, 2008

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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Prepared By:

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Summary and Statement of Issues

ATSDR's Public Health Assessment (PHA) for the Picatinny Arsenal in Morris County, New Jersey, was finalized on July 20, 2001 (ATSDR 2001). This Site Follow-up and Update (SFU), a follow-up to recommendations made in the PHA, ensures completeness of public health actions related to those recommendations. It also includes further evaluation if significant changes that could alter our health assessment have emerged (such as regulatory changes or new health-based comparison values).

There were three recommendations in the PHA requiring follow-up:

1. ATSDR recommends that the Army notify developers of land located in the downgradient groundwater flow path about on-site groundwater contamination to provide assurance to the public that new water supplies are safe to drink.
2. Although a groundwater treatment program is in place, ATSDR recommends that the Army inform the agency if the treatment program is altered. ATSDR will evaluate the effectiveness of new remedial options in protecting public health.
3. If warranted or if requested to do so, ATSDR will review new information that may be generated from remedial investigation activities, such as contamination found in fish tissue, and investigations of past well closure practices to evaluate impacts on public health.

Our follow-up on these recommendations indicates that no new data that could change our public health conclusions for Picatinny Arsenal are currently available. However, the USACE is placing "no fishing" signs on brooks at Picatinny Arsenal and in 2007, the pump and treat for VOC-contaminated groundwater in Area D was completed. Additionally, ATSDR provided input on air emissions from the Burning Grounds Area, Site 34, Area A due to changes in EPA regulatory standards in 2006. ATSDR recommends further sampling of air emissions from the Burning Grounds Area.

The Apple Trees Recreational Area is also within Area D. ATSDR prepared a separate Health Consultation for this area (Site 192) because the contamination (arsenic in soil) is not believed to have been generated by activities at Picatinny Arsenal (ATSDR 2007). We concluded that estimated doses associated with exposure to the maximum detected levels of arsenic are lower than those expected to result in illness or disease for a *recreational* land use scenario. Even for a *residential* land use scenario, no adverse health effects are expected for children with a chronic soil ingestion rate of 200 mg/day or approximately 1/16 of a teaspoon (the standard default amount used for incidental ingestion by children).

Discussion

Update on Recommendations

1. ATSDR recommends that the Army notify developers of land located in the downgradient groundwater flow path about on-site groundwater contamination to provide assurance to the public that new water supplies are safe to drink.

New Jersey has denied property developers a permit to install production wells because of the potential of drawing contaminated groundwater from Picatinny Arsenal. The developers, the township, and the state are aware of Picatinny groundwater contamination and the potential for drawing that contamination into new wells (email correspondence with EPA Remedial Project Manager B. Roach on 7/26/2007). Additionally, as stated in ATSDR's 2001 PHA for Picatinny Arsenal, off-site residents near the southern boundary, whose well water was found to be contaminated with explosives, have been provided with municipal water since 1996.

2. Although a groundwater treatment program is in place, ATSDR recommends that the Army inform the agency if the treatment program is altered. ATSDR will evaluate the effectiveness of new remedial options in protecting public health.

Groundwater from production wells is treated, as necessary, prior to distribution to Picatinny Arsenal employees and residents as drinking water and for other uses. This treatment program is regulated by the State (NJDEP). The Picatinny water supply met all State and Federal Drinking Water standards through 2003 (EPA 2004). Although ATSDR has no information after the 2003 sampling, no one currently ingests untreated groundwater from Area D. The Arsenal's 3,000 employees obtain their drinking water from two on-site wells which have been found to be contaminated with volatile-organic compounds (VOCs) and trace amounts of explosive compounds. Drinking water is treated on-site to remove VOCs and explosive compounds which are at least an order of magnitude below (less than 10% of) health-advisory levels (EPA 2004). The Army monitors this source of drinking water to ensure that treatment for VOCs has been effective and that explosive-compound levels remain low. ATSDR would like to receive notification if treated water at Picatinny Arsenal exceeds any State or Federal standard because of the recent changes in groundwater treatment (the pump and treat going off-line, the installation of a passive treatment barrier, etc.).

Picatinny's pump and treat remedy for VOC-contaminated groundwater (Area D) was replaced by an in-situ zero-valent iron barrier to protect surface water (Green Pond Brook). Area D groundwater consists of a large VOC plume which is believed to have originated from de-greasing activities at Building 24. Cleanup of soils from the lagoon associated with Building 24 were addressed under RCRA. The final ROD for Area D groundwater was signed September 22, 2004 (EPA 2004; EPA 2006). The pump and treat system began operation in October 1992 but was shut down when the passive treatment (zero-valent iron) barrier was installed in Spring 2007. The barrier was installed to further prevent VOC-contaminated groundwater from discharging into Green

Pond Brook (EPA 2007a). The remedy also includes monitored natural attenuation and land use controls. The effectiveness of the groundwater remedy should be evaluated based on at least a years worth of data so that seasonal water table changes etc. can be considered. After appropriate data collection, EPA and USACE will determine the effectiveness of the remedy.

3. If warranted or if requested to do so, ATSDR will review new information that may be generated from remedial investigation activities, such as contamination found in fish tissue, and investigations of past well closure practices to evaluate impacts on public health.

A fishing advisory is in effect for Picatinny Lake, Lake Denmark and smaller ponds/reservoirs located on Picatinny Arsenal. In addition, fishing is restricted in Green Pond Brook (per CERCLA ROD) [email correspondence with EPA Remedial Project Manager B. Roach 7/26/2007].

There are regulations for recreational hunting, trapping, fishing, and boating at Picatinny Arsenal in accordance with Picatinny Garrison Regulation No. 200-3 (US Army 2006). Per the regulation, swimming or sail-boarding is prohibited in all waters. Fishing requirements are listed under paragraph 13 of the Regulation. Annual briefings are mandated for hunters and trappers but not for fishermen. State and Federal laws governing the taking of game animals and fish are applicable at Picatinny and installation rules are likely to be even more restrictive.

No additional fish tissue or whole body contaminant data were available for review. The installation plans to display seven “no fishing” signs: four on Green Pond Brook and three on Bear Swamp Brook. The signs are scheduled to be displayed in 2007 (email correspondence with T. Gabel, Project Manager for Environmental Restoration Environmental Affair Division, Picatinny Arsenal 7/26/2007).

A ROD was signed July 18, 2005 for Green Pond and Bear Swamp Brooks, the primary surface water transport bodies within Picatinny. The remedial design was completed and the remedy is expected to be implemented in 2008. Activities at Picatinny have led to the contamination of sediments, and to a lesser extent, surface water of these brooks. The selected remedy for Green Pond Brook and Bear Swamp Brook is excavation of an oil/water separator located on Bear Swamp Brook, chemical and biological monitoring at various locations along the brooks, and land use controls.

No new information on past well closure practices could be found for review.

Review of Issues

Open Burning of Explosives and other Wastes at Site 34 in Area A

Based on EPA's revised particulate matter standards for 2006 and the continued open burning at Picatinny Arsenal, ATSDR revisited the open burning issue for this 2007 Site Follow-up and Update. ATSDR believes that air emissions data for particulate matter (particularly metals) should be collected to determine how open burning of explosives and other wastes is affecting local air quality. Local meteorological data should be collected concurrently to determine its influence on air emissions and exposure. Sampling should occur under as worst case conditions as possible while still being timely. ATSDR should use these data to evaluate health implications to residents near the Arsenal as well as on-site workers.

Particulate Matter

Particulate matter (PM) is a complex mixture of extremely small particles and liquid droplets in the air. PM_{2.5} is the fine particle category in which the particles are 2.5 micrometers in diameter or smaller. PM_{2.5} is primarily emitted by combustion sources such as boilers, industrial furnaces, motor vehicles, etc. and is a subset of PM₁₀ (respirable coarse particles smaller than 10 micrometers and larger than 2.5 micrometers).

In September 2006, EPA revised its 1997 National Ambient Air Quality Standards (NAAQS). The 2006 standards tighten the 24-hour fine particle standard from 65 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) to 35 $\mu\text{g}/\text{m}^3$ and retain the current annual fine particle standard at 15 $\mu\text{g}/\text{m}^3$. EPA retained its 24-hour average PM₁₀ concentration standard of less than 150 $\mu\text{g}/\text{m}^3$ (EPA 2007b). The annual average PM₁₀ Standard of 50 $\mu\text{g}/\text{m}^3$ was revoked.

Many health studies have shown that size of airborne particles is closely related to potential health effects among exposed populations. Exposure to PM is linked to a variety of health conditions, ranging from aggravated asthma and heart disease to premature death in people with heart and lung disease (EPA 2007). Fine (PM_{2.5}) rather than coarse (PM₁₀) particles are believed to pose the largest health risks. EPA and public health agencies focus on the size of airborne particles when evaluating air pollution. Sensitive populations include older adults, people with heart and lung disease, and children.

Picatinny Airborne Particulate Matter Data

The incinerator, originally scheduled for completion in 2001, is not yet operational due to permitting problems (B. Roach personnel communication 7/26/2007). It has been constructed elsewhere on Picatinny and is expected to come on-line in 2008 (EPA 2007a). Once the incinerator is activated, the Burning Grounds will be closed and the remedy will be implemented. The remedy will consist of a cap for contaminated soils with a proprietary asphalt pavement, monitoring groundwater, and land use controls. The ROD for site 34 was signed September 8, 2005. Soil and to a lesser extent groundwater and sediment, have been impacted by a wide variety of contaminants.

Based on EPA's revised standards and the continued open burning at Picatinny, ATSDR revisited the open burning issue for this update. Even though explosives may be primarily destroyed during burning, metal particulates are not destroyed and some explosive particulates may remain during an incomplete combustion. Additionally, contaminated soil at and near the burning area can become airborne. In 1994, burning was taking place 3 times a week, weather permitting and this frequency of burning continues. ATSDR queried EPA's Toxic Release Inventory (TRI) database for self-reported releases at Picatinny Arsenal on August 24, 2007 and none were reported.

The burning grounds area encompasses approximately seven acres and is enclosed by a 6-foot high chain link fence with two gates. The Open Burning Area is located along the northeast side of the site and the burning pans are located at the northeast end of the Open Burning Area (Figures 1 and 2). Explosively-contaminated sludge and sediment from manufacturing processes are sent to the Burning Grounds to be incinerated. In 1985, burning directly on the ground was discontinued and burning in large metal pans began. No start date for burning directly on the ground is given although a powder factory and manufacture of explosives was occurring in the early 1900s. There are nine pans on concrete supports with eight pans in use: pans 1-4 used to flash materials, pans 5-7 are powder burning pans, pan 8 is used to burn solvents contaminated with explosives (Dames and Moore 1994).

An air pollution assessment was performed in 1989 to estimate the ambient air concentration of contaminated soil due to wind erosion (apparently not to characterize air pollution from burning) (Dames and Moore 1994). The assessment was performed by the US Army Environmental Hygiene Agency (USAEHA) and indicated that *the highest concentration of site contaminants was expected northeast, east, and south of the site at distances between 760 and 915 meters*. Results based on 16 receptor sampling locations established surrounding the site, determined a maximum concentration of particulate matter at $70.8 \mu\text{g}/\text{m}^3$. No size specifications were given for this particulate matter in the Dames and Moore 1994 report (USAEHA 1989 in Dames and Moore 1994). We don't know if it was PM_{10} or total suspended particulates (TSP). In any event, this sampling did not characterize airborne particulates during a burn which are likely to be significantly higher than fugitive dust inhalation.

Given the above stated expectations of the USAEHA, exposure to people in communities south of the Open Burning Area is a definite possibility because residential communities are located adjacent to southern boundary (Figure 2). ATSDR estimates from Figure 2 that there are roughly 40 to 50 homes immediately south of the Arsenal site boundary and potentially about 100-200 people that could currently be impacted by PM from open burning. The burn site is located approximately one-half mile north of the residences (Figure 1).

In ATSDR's July 20, 2001 PHA for Picatinny Arsenal, the homes identified as nearest the burning grounds are located approximately 2,700 feet to the south and southeast along Richard Mine Road and its side streets (Appendix D. Responses to Public Comments). Exposure to air emissions from open burning and exposure to particulates in-door dust (and cumulative effects) were submitted as community concerns during the public comment period for the 2001 PHA (ATSDR 2001).

Airborne particulate data for Picatinny was analyzed in 1993 in accordance with the environmental performance standards of a RCRA Part B Subpart X Permit Application (Carpenter 1993 in EPA 1994); however, it was not used for the Remedial Investigation nor verified (EPA 1994). Therefore, our use of these data will be limited to comparisons of the estimated total particulates for metals and explosives. If the metal particulates are primarily fine particles then the $80 \mu\text{g}/\text{m}^3$ estimate in the 1993 report exceeds EPA's old and new standard for 24-hour fine particles (The 2006 standards tighten the 24-hour fine particle standard from $65 \mu\text{g}/\text{m}^3$ to $35 \mu\text{g}/\text{m}^3$; EPA retained its 24-hour average PM_{10} concentration standard of less than $150 \mu\text{g}/\text{m}^3$). Additionally, total particulates for metals and explosives would exceed $150 \mu\text{g}/\text{m}^3$ assuming particles less than 10 micrometers; the estimate from the 1993 data is $502 \mu\text{g}/\text{m}^3$. The 1993 data suggest that current particulate standards could be exceeded. ATSDR should obtain data collected on open burning after the 1993 sampling, if available, and/or additional sampling for particulate matter should be conducted.

The 1993 and 1994 reports on airborne particulate matter indicate the need to have additional sampling information during a burn to evaluate inhalation of airborne particulates for residents south of Picatinny and a reevaluation of occupational exposures. Therefore, sampling of PM is recommended for metals in the residential community. Additionally, based on EPA NAAQS, we should evaluate local particulate matter by size for the evaluation of health effects. We recommend sampling for $\text{PM}_{2.5}$ and PM_{10} levels (24-hour) and recording local meteorological conditions. Even if the incinerator goes on-line in 2008 and replaces current open burning, characterizing emissions will be helpful in evaluating past exposures.

Conclusions

Our follow-up on the 2001 PHA recommendations indicates that no new data that could change our public health conclusions for Picatinny Arsenal are currently available.

ATSDR provided input on air emissions from the Burning Grounds Area, Site 34, Area A due to changes in EPA regulatory standards in 2006. Limited historical data on emissions from open burning indicates that air emissions have the potential for causing air pollution at off-site locations in excess of EPA's health-based air quality standards. The proximity of residences to the south of Picatinny Arsenal, within a half-mile of the Burning Grounds, makes it likely that when the wind blows toward the community, exposures to particulate matter from open burning have and will occur. These exposures, as well as occupational exposures to on-site workers, may be of health concern.

Recommendations

Due to the recent change in groundwater treatment of the pump and treat going off-line, ATSDR would like to receive notification if treated water at Picatinny Arsenal exceeds any State or Federal standard. We request that EPA contact us in this event.

The effectiveness of the groundwater remedy should be evaluated based on at least a years worth of data so that seasonal water table changes etc. can be considered. EPA and USACE will determine the effectiveness of the remedy for Area D. ATSDR should evaluate groundwater contamination if future updates are conducted.

ATSDR should obtain data collected on open burning after the 1993 sampling, if available, and/or additional sampling for particulate matter should be conducted. If sampling occurs, air emissions data for particulate matter should include 24-hour average PM₁₀ levels, including metal-specific analyses of suspended particulate metals, to determine how open burning of explosives and other wastes is affecting local air quality. Additionally, when the open burning permit is renewed, the USACE should consider sampling for PM_{2.5}. Local meteorological data should be collected concurrently to determine its influence on air emissions and exposure. ATSDR should use these data to evaluate health implications to nearby residents and workers at or near the burning grounds.

If new data become available that alter our 2001 PHA conclusions or recommendations, ATSDR will consider reevaluating those issues.

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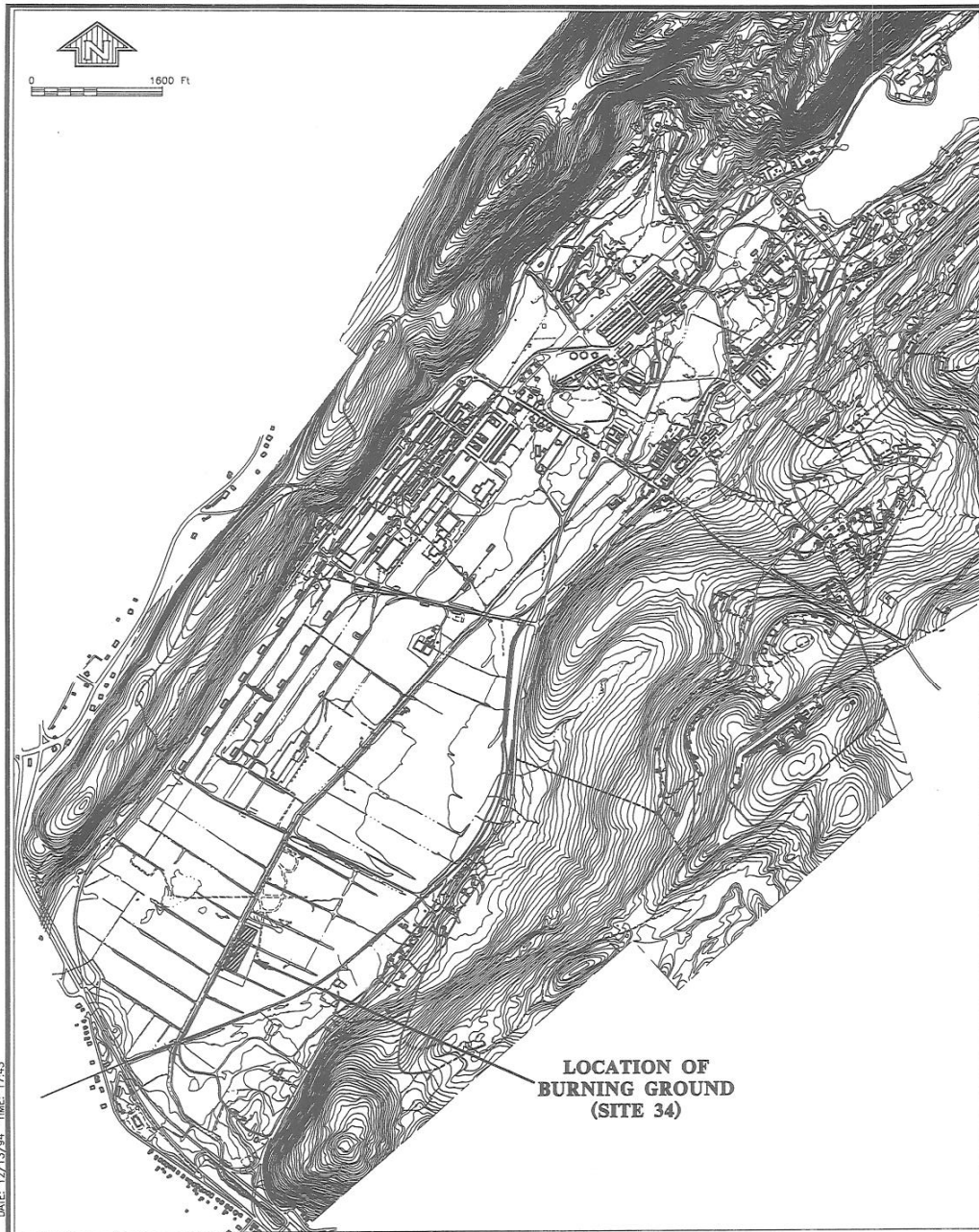
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FIGURE 1
INSTALLATION MAP
FOR BURNING GROUND AREA
PICATINNY ARSENAL, DOVER, NEW JERSEY RI DAMES & MOORE

DRAFT FINAL

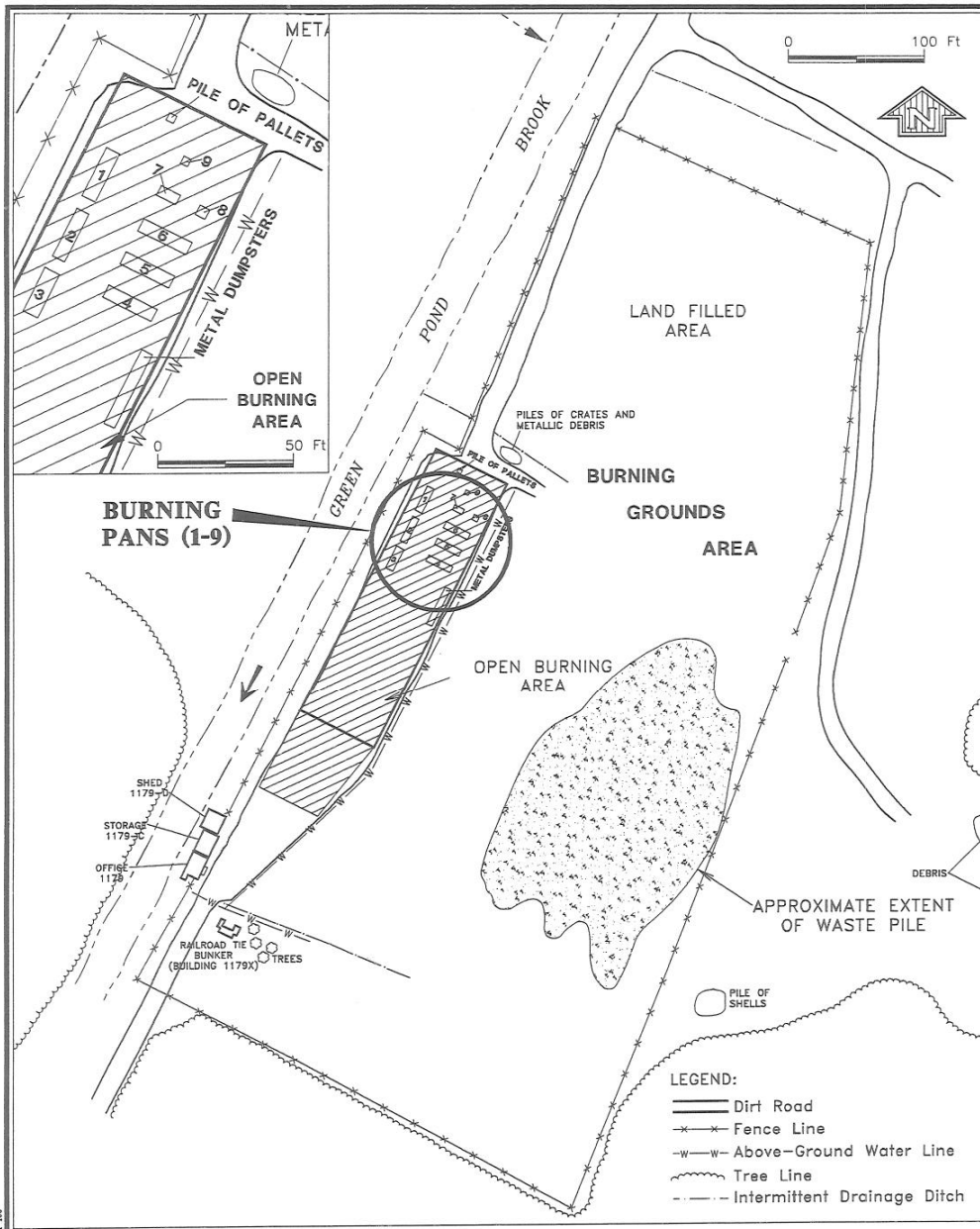


FIGURE 2
LOCATION OF BURNING PANS
AT BURNING GROUND
PICATINNY ARSENAL, NEW JERSEY
 RI

DRAFT FINAL **DAMES & MOORE**

672508A/BURN-GRD/ENG V. 1-100

APPENDIX

Site Name: Picatinny Arsenal
 Original Document: X PHA HC
 Original document date(s): 7/20/2001

Table 1. Recommendations Follow-Up			
#	Original Recommendation	Was Action taken; by whom; when	Did action change a conclusion category; if yes, explain
1	ATSDR recommends that the Army notify land developers of Picatinny groundwater contamination to provide assurance to the public that new water supplies are safe to drink.	New Jersey not allowing permits for water supply wells hydrologically downgradient of site.	No.
2	ATSDR recommends that the Army inform the agency if the groundwater treatment program is altered. ATSDR will evaluate new remedial options.	ATSDR informed of change in groundwater treatment during this review and update.	No.
3	If warranted or if requested to do so, ATSDR will review new information that may be generated from remedial investigation activities, such as contamination found in fish tissues, and investigations of past well closure practices to evaluate impacts on public health.	No new fish data are available. No new information on past well closures has been forthcoming.	No.

**Table 2. Pathways Update – New Data?
Look only at Current and Future Pathways**

Pathway	Original PHA			Your New Evaluation	
	Completed or Potential	Time: Current or Future	Conclusion Category	Are there new data?	Your new conclusion category
Fish	Completed	Current and Future	No adverse health effects are likely	No. NJ advisory still in place. Army Fishing regulations in place. Lack of subsistence fishing. “No Fishing” signs to be posted on brooks- GPB and BSB.	Not Applicable (NA)
Air- Open Burning, Area A	Potential	Current, possibly future— incinerator to be on-line but permitting problems persist	Fugitive dusts and open burning not expected to cause adverse health effects	No. but the particulate matter (PM) evaluation seems inadequate as <i>no data for PM were available to assess exposure during burning activities (PHA, p.26)</i> . Used NAAQS for PM10 Reevaluate/revisit PM issue.	Indeterminate for open burning without data and data presented in PHA is not adequate for evaluation.
Indoor Air in Buildings above VOC groundwater plume, Area D	Not addressed	Not addressed	Not addressed	Unevaluated Data (1997)	Not Applicable (NA)
Soil—Apple Orchard Recreational Area (AORA) PICA site 192	Potential for soil contamination throughout site p.29	Current/future	No adverse health effects are likely but indicated no residential housing nearby	AORA not specifically evaluated and base housing nearby	No adverse health effects are likely under recreational land use.
Groundwater	Potential	Future	Unlikely to result in adverse health effects	Currently, no known completed exposure pathways.	NA

Table 3. Updated Conclusions & Recommendations			
Pathway	Conclusion	Why you think that	Your recommendation
Indoor Air		Is the groundwater pump & treat lowering VOC levels in soil gas?	Possibly recheck indoor air.
Soil-AOR PICA Site 192	No apparent Public Health Hazard	Recreational Use Housing Units nearby Maximum arsenic concentration of 251ppm with chronic ingestion –above NOAEL and MRL but below LOAEL for children. Average soil arsenic even lower.	Land use control?—no digging during recreational use. Hand washing for children recommended after recreating in AORA. Groundcover? Maintenance of grounds. Direct children to other recreational areas.