

CSWAB

Citizens for Safe Water Around Badger
E12629 Weigand's Bay South - Merrimac, WI 53561
Phone (608) 643-3124 - Fax (608) 643-0005
Email: info@cswab.org - Website: www.cswab.org

Joan Kenney, Installation Director
U.S. Department of Army
Badger Army Ammunition Plant
2 Badger Road, U.S. Hwy 12
Baraboo, WI 53913

February 11, 2008

SENT BY ELECTRONIC MAIL

RE: FOSTs for Badger Army Ammunition Plant Parcels O2, O6, M3, K, K1, K2, K3, L, M, N, and W

Dear Ms. Kenney,

Thank you for the opportunity to provide public comment on the draft Findings of Suitability to Transfer (FOSTs) for the Badger Army Ammunition Plant.

Citizens for Safe Water Around Badger (CSWAB) was organized in 1990 when rural families near the 7,400-acre Badger Army Ammunition Plant learned that private drinking water wells were polluted with high levels of cancer-causing chemicals. Our goal is to ensure a healthy sustainable future for our children and the earth by reducing risks to human health and natural systems, strengthening community-based work for environmental justice, and creating opportunities for the community and tribal members to have a voice in the debate around the protection of human health and the environment.

Executive Summary:

In deciding the approved and anticipated level of cleanup at the majority of contaminated sites at Badger, the U.S. Army and the Wisconsin DNR are not assessing potential risks to wildlife and terrestrial ecosystems or risks to humans through the human food chain. Certain contaminants such as DDT, PCBs, and mercury are persistent bioaccumulative toxins that may have long term implications for the local ecology and environmental health. Additional steps are also needed to eliminate certain contaminant sources, such as wood preservatives, paints, pesticides, and road oil, as potential ecological and environmental health concerns. Our understanding of the potential harm caused by exposure to residual toxins present at Badger is much different than when the plant was first operating – now we know better. By accomplishing the best possible cleanup now, we assure that future generations enjoy a safe, healthy, and productive future.

General Comments:

Based on environmental investigations conducted by the U.S. Army at Badger Army Ammunition Plant (Badger), the Wisconsin Department of Natural Resources issued an In-Field Conditions Report in September 1987. A subsequent RCRA permit was jointly issued by the U.S. Environmental Protection Agency and the WDNR. Both documents outline and identify the affected media, the contaminants of concern, the required level of cleanup, and the basis for the required level of cleanup (such as risk to human health or risk to ecological receptors and systems). The sites covered under these permits are often referred to as Solid Waste Management Units (SWMUs). In all cases, the Army evaluated the potential routes of exposure (such as inhalation, ingestion, or direct contact) to multiple receptors (both animals and humans).

Through this process, a level of cleanup was established which would be protective of the most susceptible receptors. For example, the required cleanup level for surface soil at the Propellant Burning Grounds, a major hazardous waste disposal site at Badger, is based on risks to human health. At the Rocket Paste Area and Settling Ponds, the required cleanup level is based primarily on protection of terrestrial receptors. At the Settling Ponds, contractors working for the Army are currently evaluating risks to small mammals (meadow vole, masked shrew, and field mouse), large mammals (coyote and mink), and birds (tree swallow and song sparrow). This is an example of how animals may be considered more susceptible to harm from exposure to certain contaminants than are humans. In these cases, the cleanup “driver” is potential risks to animals rather than humans.

Neither the In-Field Conditions Report nor the RCRA permit, however, address the majority of contaminated sites at Badger. The non-SWMU sites at Badger are numerous and include the River Pump House, Sewer Lines and Water Mains, the Automotive Shop, the Ball Powder Pilot Plant, the Decontamination Oven, the Fire Training Area, the Historic Shops Area, Laboratories, the Lead Burning House, the Locomotive Shop, the Magazine Office, the Salvage Yard, Steam Traps (organic additives were used for treating the steam condensate water; testing for SVOCs is recommended) and many more.¹ Some of these sites are referred to as “non-ER,A” sites as they are ineligible for funding under the Environmental Restoration, Army (ER,A) account.² These sites were not included in the WDNR’s In-Field Conditions Approval and RCRA permit because they were still considered active sites at the time the permits were issued. Instead, non-SWMU sites are being addressed primarily through a site closure process administered by the Wisconsin Department of Natural Resources.

The WDNR’s project manager for Badger has confirmed that unlike the SWMUs, the level of cleanup is based on risks to human health and consideration is normally not given to certain receptors (wildlife) and routes of exposures (the human food chain). In the same way, the Army’s requests for case closure cite only comparative risk-based remediation goals associated with direct exposure to humans (such as residential PRGs) and not those associated with risks to wildlife, groundwater, terrestrial ecosystems, ecological receptors, and/or the human food chain.

¹ Olin Corporation, Executive Summary, *Follow-up Remedial Investigation of Non-ER,A Eligible Sites*, January 5, 2004.

² The BRAC Division of the Department of Army Assistant Chief of Staff for Installation Management (ACSIM) office is the Program Manager responsible for BRAC installations cleanup and for non-ER,A eligible cleanup at Army Excess installations. Source: *Army Environmental Cleanup Strategic Plan*, March 2007. <http://aec.army.mil/usaec/cleanup/07stratplan.pdf>

As a result of this policy, the public has no way of knowing if the level of cleanup at Badger's non-SWMU sites is protective of all receptors and all routes of exposure. Moreover, some sites at Badger will have a much better (or worse) level of cleanup than others.

We believe that this procedure is inconsistent with current Administrative Code. Pursuant to NR 720.19³, if selected, residual contaminant levels specific to a site or facility shall be established that are protective of public health, safety and welfare and the environment and **restore the environment to the lowest concentration practicable**. In addition to protection of groundwater and protection of human health from direct contact (inhalation, dermal, and incidental ingestion), responsible parties **“shall consider human food chain, surface water quality and terrestrial ecosystem pathways of exposure, when those pathways of exposure are of concern at a site or facility”**.

Both the WDNR and the Army have the authority and obligation to require and enforce the best possible cleanup of contaminated sites at Badger Army Ammunition Plant. We believe that this may be achieved through requiring and achieving a level of cleanup that is protective of all receptors and through all routes of exposure stipulated in NR 720 and other pertinent Wisconsin Administrative Code and EPA regulations (especially TSCA and RCRA).

We also believe that in addition to direct contact pathways to humans, indirect pathways of exposure such as the human food chain and groundwater and other receptors (wildlife) identified in NR 720 are clearly applicable and “of concern” at Badger.

The Final Report of the Badger Reuse Committee recommends that future land use include educational and support facilities, agricultural research, managed grazing, and increased bison habitat.⁴ The Bison Project is a vital part of the Ho-Chunk Nation's strategy to combat diabetes. Bison meat provides a highly nutritious, low-fat alternative to commercially processed, chemically altered meats. The Nation uses bison meat at its Elder meal sites, special events, pow-wows, and distribution to diabetic households.⁵

The Nature Conservancy, under a federal contract with the Department of Defense, conducted a biological inventory at Badger in 1993 and found a wide variety of natural community or habitat types, including remnants of prairie and savanna. Many rare or uncommon plant, animal, and insect species were also found, including a large number of grassland bird species of special concern in Wisconsin.

Badger is also one of the most important habitats for native grassland birds in Wisconsin and even the entire Midwest. A recent survey has shown that Badger is home to 16 species of birds considered to be endangered, threatened, or of special concern in Wisconsin, as well as 6 species under "watch" status due to steep population declines. The extensive high-quality, mature pastures at Badger provide habitat for meadowlarks, dickcissels, bobolinks, upland sandpipers,

³ NR 720.19, Procedure for Determining Soil Cleanup Standards Specific to a Site or Facility, <http://www.legis.state.wi.us/rsb/code/nr/nr720.pdf>

⁴ WDNR, Analysis and Preliminary Determination and Draft Plan, Explosive Decontamination and Demolition at Badger Army Ammunition Plant, Page 18, February 25, 2003.

⁵ Ho-Chunk Nation, HoChunkgra Wazijaci, Bison Prairie I, http://muscodabison.com/Bison/bison_a.htm

and many other species that were once common across the state, but have declined precipitously with the conversion of pasture agriculture to mowed forage crops and row crops. With over half of Wisconsin's grassland bird species in decline, the Badger lands are critical to their survival and eventual recovery.⁶

Following are examples of specific sites where the level of cleanup has not been shown to be protective of ecological receptors and indirect routes of exposure to humans:

- At the NC Lines – DBP Storage area (Phthalate Storage Tanks), levels of Di-n-butyl phthalate were detected at 0.12, 3.13, and 1.84 mg/kg. Contaminant levels in two of the three samples greatly exceed the USEPA Region 5 Ecological Screening Level of 0.150 mg/kg. No reference to the human food chain or ecological receptors was found in Army submittals or WDNR case closure documents for this site. A “no further action” letter was issued by the WDNR on February 1, 2006.
- At the Ballistics Ditches, two soil samples had mercury concentrations at 2,160 ug/kg and 2,350 ug/kg, exceeding the EPA Region 5 Ecological Screening Level of 100 ug/kg for mercury. The WDNR-approved site closure was based on the direct contact concentration of 23,500 ug/kg for humans, as proposed by the Army. Had the WDNR included wildlife receptors in its decision-making process, cleanup of at least a portion of the site would have been indicated. A “no further action” letter was issued by the WDNR on January 31, 2005.

The River Pump House is an example of a land parcel with residual soil contamination exceeding both human health and ecological risk values. The River Pump House was painted several times since the 1940's. The painting operation involved sand blasting to remove the old paint prior to repainting which deposited paint chips and dust on nearby soils. Army records indicate the building was sandblasted and painted in 1956 and 1996. The 1996 operations released sandblasting debris that was carried by the wind to adjacent private properties and “coated” parked cars. On August 26, 2002, shallow soil samples were collected on all sides of the building except near the river.⁷ Soil samples were analyzed for barium, cadmium, chromium, and lead. A single sample was also analyzed for PCBs.

Lead results from two of the samples (57,200 and 234,000 µg/kg) were greater than both the Wisconsin Administrative Code Chapter NR 720 Residential Direct Contact Value and the EPA Region 5 Ecological Screening Level of 100 ug/kg. The PCB soil sample analyzed at this site detected Aroclor-1260 (0.36 mg/kg) greater than the USEPA Region 9 Residential Direct Contact Value.⁸ This concentration is more than 1,000 times the EPA Region 5 Ecological Risk Screening Level of 0.000332 mg/kg for total PCBs in soil.

Residual PCB concentrations at the River Pump House also greatly exceed health-based target soil concentrations for pasture land for beef and dairy cattle. According to the Wisconsin

⁶ Aldo Leopold Chapter of the Society for Conservation Biology, *Biological Inventory and Investigations Conducted at the Badger Army Ammunition Plant*, 1998.

⁷ Plexus Scientific, Environmental Site Assessment, FINAL, Badger Army Ammunition Plant, Baraboo, Sauk County, Wisconsin, Attachments, Page 5-114, December 2004.

⁸ Plexus Scientific, Environmental Site Assessment, FINAL, Badger Army Ammunition Plant, Baraboo, Sauk County, Wisconsin, Attachments, Page 5-114, December 2004.

Division of Public Health, if PCB soil concentrations exceed 0.0027 mg/kg, grazing is not allowed based on cancer risk to humans.⁹ PCB contaminant levels in soils at the River Pump House are more than 130 times higher than recommended health-based thresholds for grazing.

The Army's submittal to the WDNR also did not address potential impacts to sediments and surface water at the River Pump House, located on Lake Wisconsin.

Nonetheless, the WDNR approved the Case Closure (no further action required) request from the Army on September 3, 2004.

On September 13, 2004, the following members of the Badger Restoration Advisory signed a resolution expressing concern about the levels of lead contamination detected at the Wisconsin River Pumping Station (Parcel N):

- Bart Olson, Village of Merrimac
- William T. Stehling, At Large Member
- Lance Delaney, At Large Member
- Mary Carol Solum, At Large Member
- Richard Anderson, At Large Member
- Richard Pfaff, Former BOW Council Representative
- Judy Ashford, Sauk County Board
- Mary Jane Koch, At Large Member
- Ken Lins, At Large Member
- Laura Olah, CSWAB
- Ron Lins, Town of Prairie du Sac (RAB co-chair)
- William F. Wenzel, Village of Prairie du Sac
- Kathy Brabender, At Large Member

In an October 6, 2004 letter to CSWAB concerning the organization's appeal of the Closure Decision at the River Pump House, the WDNR wrote that the completed Phase 2 assessment by the Army was "not the same as a buyer completing a due diligence process for researching past activities at the property. Sellers should disclose possible defects to a property, but buyers need to complete due diligence in researching a properties past activities. As a potential future landowner of this and other Badger property, the DNR lands Program will be requesting information regarding the potential release of hazardous substances from Army operations."

CSWAB subsequently petitioned and formally appealed the 2004 "no further action required" decision. WDNR ultimately reaffirmed its initial decision and residual contamination in soil associated with waste paint is still present at the River Pump House.

⁹ Wisconsin Department of Health and Family Services, Division of Public Health, Bureau of Environmental Health, Human Health Impact of the Land Application of PCB-Contaminated Materials, Draft, November 27, 2001.

Comments by Section:

Section 4.1 Environmental Remediation Sites. The list of sites should be expanded to include non-SWMU sites. Examples of non-SWMU sites include the Automotive Shop, the Ball Powder Pilot Plan, the Decontamination Oven, the Fire Training Area, the Historic Shops Area, Laboratories, the Lead Burning House, the Locomotive Shop, the Magazine Office, the Salvage Yard, and many others.¹⁰

Section 4.3.2 Petroleum Products. This section should be expanded to include spills.

Section 4.7 Radiological Materials. The FOSTs should describe the results of previous radiochemistry investigations. In 1983, for example, the Department of Army reported that “the NIPDWR (National Interim Primary Drinking Water Regulations) standard for gross alpha was exceeded in the Burning Ground monitoring well PBN2A”.¹¹

In addition to storage and use, the FOSTs should also address disposal and investigations of radiological materials on the Property.

Historical Levels of Radionuclides in Groundwater at Badger Army Ammunition Plant				
Prepared by Citizens for Safe Water Around Badger				
<u>Sauk County Groundwater: Historical Data for Comparison</u> Data provided by Kenneth Bradbury, Wisconsin Geological and Natural History Survey, 2002.				
Gross alpha Number samples: 155 Min:0 PCL Max:13.5 PCL Mean:1.2 PCL				
Gross Beta Number of samples: 55 Min: 0 PCL Max: 11.8 PCL Mean: 2.5 PCL				
Radium-226 Number of samples: 22 Min: 0 PCL Max: 2 PCL Mean: 0.4 PCL				
<i>NOTE: The following is a partial listing. PCL = Picocuries per liter, a measure of radioactivity in water.</i>				
PARAMETER	RESULT	DATE	SITE REFERENCE NUMBER	AREA
Gross Alpha	1.40 PCL	27 APR 83	S1117	Burning Ground
	13.40 PCL	27 APR 83	MW6	Burning Ground
	49.00 PCL	28 JAN 83	PBM5	Burning Ground

¹⁰ Olin Corporation, Executive Summary, *Follow-up Remedial Investigation of Non-ER, A Eligible Sites*, January 5, 2004.

¹¹ Colonel Nelson H. Lund, Director, Environmental Quality, Department of Army, U.S. Army Environmental Hygiene Agency, Correspondence (with enclosures) to Commander U.S. Army Armament, Munitions and Chemical Command, Rock Island, August 23, 1983.

	16.90 PCL	28 JAN 83	PBN1A	Burning Ground`
	2.10 PCL	28 JAN 83	S1117	Burning Ground
	11.60 PCL	28 JAN 83	MW6	Burning Ground
	15.30 PCL	28 JAN 83	PBM2	Burning Ground
	2.50 PCL	22 APR 83	PBM1	Burning Ground
	5.20 PCL	22 APR 83	PBM2	Burning Ground
	4.10 PCL	22 APR 83	PBM3	Burning Ground
Gross Beta	2.90 PCL	22 APR 83	S1118	Rocket Area
	31.50 PCL	21 SEP 82	PBM2	Burning Ground
	4.50 PCL	28 JAN 83	MW6	Burning Ground
	5.40 PCL	27 APR 83	MW6	Burning Ground
	18.90 PCL	28 JAN 83	PBM2	Burning Ground
	1.81 PCL	22 SEP 82	PBM1	Burning Ground
	12.50 PCL	26 JAN 83	PBM3	Burning Ground
	18.50 PCL	26 JAN 83	PBM4	Burning Ground
	1.80 PCL	26 JAN 83	PBM1	Burning Ground
	2.03 PCL	21 SEP 82	PBN2A	Burning Ground
	2.54 PCL	27 SEP 82	PBM5	Burning Ground
	7.40 PCL	28 JAN 83	PBN2A	Burning Ground
Uranium	7.70 PCL	28 JAN 83	B - PBN1A	Burning Ground
	5.60 PCL	28 JAN 83	PBM2	Burning Ground
	11.90 PCL	28 JAN 83	PBN2A	Burning Ground
Radium-226				
	0.50 PCL	28 JAN 83	PBN2A	Burning Ground
	1.90 PCL	28 JAN 83	PBN1A	Burning Ground
	2.30 PCL	28 JAN 83	MW6	Burning Ground
	0.30 PCL	27 APR 83	MW6	Burning Ground
	0.60 PCL	28 JAN 83	PBM2	Burning Ground

Section 4.8 Radon. The Environmental Baseline Study and 2004 Environmental Site Assessment indicate that radon surveys were conducted in certain buildings at Badger Army Ammunition Plant. While these buildings may be outside the scope of these FOSTs, the document should be clarified in this regard.

Section 4.9 Munitions and Explosives of Concern (MEC). In addition to the physical (explosive) hazards of residual MEC on the Property, the FOSTs should be expanded to address the potential ecological, environmental, and human health risks. Army consultants confirm that

residual propellant contamination under the slabs of the former production areas pose “potential environmental and safety concerns”.¹²

The FOSTs recognize that cracks in building foundations may allow releases of MEC to the environment. The FOSTs further states that the only means to sample sub-slab soils is to remove cement floor slabs. Therefore it follows that slabs should be removed by the Army to allow an investigation of residual contamination and spills.

In a 2003 proposal to the WDNR, the Army explains that during the dismantling of explosive manufacturing facilities, “significant quantities of explosives” have been found under foundations. Standard practices at explosive manufacturing plants such as Badger have been to “utilize copious amounts of warm water to wash down the work areas; however, in addition to removing a majority of the explosives residue from these areas, this also resulted in washing explosives residues into cracks and other void spaces.”¹³

The FOSTs suggest that the Army should be relieved of its responsibility to investigate and remediate residual MEC that is difficult to access. It is possible that this could result in a significant financial burden to future land owners. According to J. M. Laird, GIS Manager at Badger Army Ammunition Plant: “It is most cost-effective for the army to have only the contaminated soils removed. Where concrete foundations exist within the contaminated areas, the concrete must also be removed, which is more expensive than soil removal. Some concrete foundations were as much as eight feet deep, which complicated the process of ascertaining an approximate cost for excavation”.¹⁴

Exposure to TNT, which is cited in the FOSTs as an example of a pertinent MEC, occurs through eating, drinking, touching, or inhaling contaminated soil, water, food, or air. Health effects reported in people exposed to 2,4,6-trinitrotoluene include anemia, abnormal liver function, skin irritation, and cataracts.¹⁵

Exposure to high levels of 2,4-DNT or technical grade DNT (Tg-DNT) in animals regularly causes lowered numbers of sperm and reduced fertility. Studies of animals have also shown that nervous system disorders, liver damage, and kidney damage can occur, as well as a reduction in the numbers of red blood cells. Both 2,4- and 2,6-DNT can cause liver cancer in laboratory rats and may produce the same effect in humans.¹⁶

Enclosure 7 Land Use Restrictions (1) Residential Use Restriction. The FOSTs state a restriction precluding “any type of educational purpose for children/young adults in grades kindergarten through 12” for certain buildings. This section should be amended and clarified.

¹² Plexus Scientific, Environmental Site Assessment, FINAL, Badger Army Ammunition Plant, Baraboo, Sauk County, Wisconsin, Executive Summary, Page 1, December 2004.

¹³ WDNR, Analysis and Preliminary Determination and Draft Plan, Explosive Decontamination and Demolition at Badger Army Ammunition Plant, Page 4, February 25, 2003.

¹⁴ Jeffery M. Laird, GIS Manager, Badger Army Ammunition Plant, *Decommissioned Army Ammunition Plant Modeled with GIS: Defining Soil Remediation Scope and Budget*, as published in ArcNews, Winter 2007.

¹⁵ U.S. Agency for Toxic Substances and Disease Registry, ToxFAQs™ for 2,4,6-Trinitrotoluene (TNT), Summary, September 1996.

¹⁶ U.S. Agency for Toxic Substances and Disease Registry, Public Health Statement for 2,4- and 2,6-Dinitrotoluene, December 1998. <http://www.atsdr.cdc.gov/toxprofiles/phs109.html>

First, the FOSTs should be expanded to include restrictions to other populations at risk such as women of child-bearing age, the human fetus, and to children from birth to age 7. Other susceptible populations include persons with compromised immune systems.

Again, the FOSTs appears to relieve the Army of its responsibilities to investigate and remediate environmental hazards that are present on the property that pose a measurable risk to human health and the environment.

Land Use Restrictions should reference agreements with Native American tribes and relevant laws to protect cultural sites from physical disturbance.

Enclosure 7 Land Use Restrictions (3) Groundwater Restriction. The FOSTs should clarify that solvents and DNT are the “primary” contaminants of concern. Sulfates are an example of a substance of public welfare concern that is elevated in groundwater and is attributed to the Existing Landfill/Deterrent Burning Grounds. DNTs have been detected above the Preventive Action Limit or, for unregulated isomers, the Health Advisory Level. Spills, leaks, and tank overflows at the Oleum Plant would be expected to contribute sulfate and nitrate to the groundwater, as well as metals (chromium, mercury, nickel) dissolved from the soil, pipes, and tanks.¹⁷ [Additional comments on groundwater are provided later in this document.]

Enclosure 7 Land Use Restrictions (4) C. Modifying Restrictions. The FOSTs state that certain areas must not be dug, excavated, or disturbed “for the protection of human health” but does not describe how members of the public, including children, will kept from entering these areas. The FOSTs should indicate which party will be responsible for the installation and maintenance of fences or other means to accomplish this restriction now and in the future.

Comments on Items Not Addressed in the FOSTs:

Preservation and protection of cultural sites. The FOSTs should discuss the cultural sites and pertinent agreements with Native American tribes.

Environmental Justice. The FOSTs should discuss compliance with environmental and ecological standards designated by the U.S. Department of Interior and the Ho-Chunk Nation.

Groundwater contamination associated with known point sources. The FOSTs should discuss groundwater quality conditions and areas of non-compliance with Wisconsin’s Groundwater Preventive Action Limits, Public Welfare Standards, and Health Advisory Levels associated with known contaminant sources at Badger.

Groundwater contamination associated with unidentified sources. The FOSTs should discuss groundwater quality conditions and areas of non-compliance with Wisconsin’s Groundwater Preventive Action Limits, Public Welfare Standards, and Health Advisory Levels associated with unknown contaminant sources at Badger. For example, elevated levels of 2,6-

¹⁷ Plexus Scientific, Environmental Site Assessment, FINAL, Badger Army Ammunition Plant, Baraboo, Sauk County, Wisconsin, Page 5-7, December 2004.

DNT were detected in USDA Well #6 in 2006 and 2007 above Wisconsin Groundwater Enforcement Standard.¹⁸ The Army has not yet identified the source of this contamination.

Road oil. Road oil refers to any heavy petroleum oil that is used as a dust suppressant and surface treatment on roads and highways.¹⁹ The use of road oil has declined in recent years because of reductions in the proportion of unpaved roadways, the presence of highly toxic contaminants in used oils (PCBs, dioxins, furans), competition from other used oil end uses (re-refining), and new environmental regulations.²⁰ Used mineral-based crankcase oil (used motor oil or used engine oil) contains polycyclic aromatic hydrocarbons (PAHs) and may contain metals such as aluminum, chromium, copper, iron, lead, manganese, nickel, silicon, and tin.²¹

U.S. Army records confirm that road oil was stored at Badger – and in extremely large quantities. A July 1983 report published by the U.S. Department of Army documents that Badger had a 52,000-gallon above ground tank that was used for storing road oil.²² (A 1977 building inventory by the U.S. Army identified the same facility as “road oil storage”.)²³ By comparison, other used oil storage tanks at Badger hold only 500 to 1,000 gallons. Badger Army Ammunition Plant has an extensive network of more than 130 miles of roads.²⁴ While many of the roads in the core industrial area are paved, the majority of outlying roads at Badger are unpaved.

“During the late 1960’s and early 70’s, Wisconsin Power and Light, at the Prairie du Sac hydro plant, changed the water-cooled transformers over to air-cooled. When these transformers were scrapped, WP&L was left with thousands of gallons of insulating oil. At the same time, the State came out with a program to control certain weeds. Counties, farmers, and businesses were mandated to do spraying. The herbicides of the day were mixed with oil and sprayed along roads and fence lines. Trucks from Badger Army Ammunition Plant, along with the County, came and picked up the excess oil from the transformers at the dam. They did not realize at the time that this oil contained PCBs. The contaminated oil was sprayed along roads and fence lines through the county and inside of Badger. Badger also used it to control weeds around the Production Buildings. Some of the oil was poured on the gravel roads to keep the dust down. It wasn’t until into the 1980’s that people realized that the PCB-contaminated oil was a hazard. After that WP&L used the proper methods of disposal.”²⁵

¹⁸ Wisconsin Department of Natural Resources, Groundwater & Environmental Monitoring System Database, License 3497, Badger Army Ammunition Plant, accessed online, February 7, 2008.

¹⁹ County of Santa Barbara Planning and Development Energy Division, Oil and Gas Glossary, undated.

²⁰ United Nations Environment Programme, Secretariat of the Basel Convention, Basel Convention Technical Guidelines on Used Oil Re-Refining or Other Re-Uses of Previously Used Oil, Basel Convention on the Control of Transboundary Movements on Hazardous Wastes and Their Disposal, September 1995.

²¹ U.S. Army Toxics and Hazardous Materials Agency, Public Health Statement for Used Mineral-based Crankcase Oil, September 1997.

²² Department of the Army, Headquarter, United States Army Armament, Munitions, and Chemical Command, Environmental Assessment for Total Plant Operations, Badger AAP, July 1983.

²³ U.S. Army Toxics and Hazardous Materials Agency, Installation Assessment for Badger Army Ammunition Plant, May 1977.

²⁴ General Services Administration, Preliminary Highest and Best Use Analysis, Badger Army Ammunition Plant, May 15, 1998.

²⁵ C. Wilhelm, written submittal to CSWAB in its entirety for inclusion in comments on the Finding of Suitability for Transfer for Badger AAP, received February 5, 2008.

The FOSTs should discuss the potential ecological and environmental health implications of the historical use of road oil at Badger. This discussion should include roads at the River Pump House parcel where PCBs were found in soils.

PCBs in Paints. The FOSTs should make known and discuss the presence of PCBs in paint at Badger. Paint samples were taken by Plexus Scientific from certain surfaces at Badger in September 2002. Concentrations of PCBs were detected as high as 22,000 parts per millions, exceeding the regulatory limit of 50 parts per million.²⁶ According to Army officials at Badger, subsequent PCB paint data has been gathered and most of the database is being linked to the GIS website so it is already technically available to Army personnel.²⁷ To date, this information has not been made available to the public.

Mercury in Paints. Prior to 1992, mercury-containing fungicides were added to latex paints.²⁸ The FOSTs should make known and discuss the potential for mercury in dried applied paints at Badger.

Sites not addressed in the Environmental Baseline Study. Case Closure should be required for sites not listed in the Environmental Baseline Study. Examples include certain Water Towers, Powerhouse Fuel Storage ASTs, Solvent Area ASTs, Site A, and the Perimeter Fence Line. All are identified as areas that should be investigated.²⁹

Wastewater Lines and Water Mains and Laterals. According to the 2004 Environmental Assessment for Badger, there are certain environmental and safety concerns that may affect much of the property, stating that “propellant contamination in wastewater lines could pose a safety hazard if disturbed. Wastewater lines may have leaked and could have resulted in soil contamination.”³⁰

The Army’s 1977 Environmental Assessment for Badger states that “it must be assumed that all underground sewer lines are contaminated with industrial waste residue”. Experience at other industrial installations indicates that generally a build-up of material can be found in industrial sewer systems, and “no method of decontamination is completely thorough unless the lines are physically removed”.³¹ It is estimated that there are 85.2 miles of underground sewer lines at Badger.

²⁶ *Determination of Polychlorinated Biphenyls (PCBs) in Paint*, Badger Army Ammunition Plant, Baraboo, Wisconsin, undated.

²⁷ M. Sitton, U.S. Army, Badger Army Ammunition Plant, e-mail correspondence to L. Olah, CSWAB, October 25, 2006.

²⁸ U.S. Department of Interior, U.S. Geological Survey, *The Materials Flow of Mercury in the Economies of the United States and the World*, 2000.

²⁹ Olin Corporation for the U.S. Army, Proposal for Further Investigation of January 1999 EBS Recommendations, Section 7.0, May 1999.

³⁰ Plexus Scientific, Environmental Site Assessment, FINAL, Badger Army Ammunition Plant, Baraboo, Sauk County, Wisconsin, Executive Summary, December 2004.

³¹ Installation Assessment of Badger Army Ammunition Plant, Volume 1, page II-15, May 1977.

Ethylene glycol was used at Badger as an anti-freeze in vehicles and also as an anti-freeze in water systems. It was used in many water main lateral rises processed for long-term storage during the 1970's and 1980's.³²

Work to remove PCBs, mercury, and oil from Badger buildings that were no longer required for propellant production was funded in 1996. One aspect of the proposed work was to remove 24,000 gallons of fuel oil in water mains. Fuel oil was placed in water service laterals as part of layaway operations. The intent was to avoid water in the riser pipe from freezing and causing major damage to buildings and the water system. Army contractors found that this oil “can leak out of pipes and contaminate the groundwater”³³. The estimated cost of this project was \$320,000.

The FOSTs should discuss the potential ecological and environmental health implications of residual contamination associated with wastewater lines, and water mains and laterals. Case closure documents were not found.

Case Closure for Storm Sewers. The rocket paste area is an example of an area with storm sewers that drained through historical production areas and contained hazardous wastes. Floor drains from the paste production buildings were connected directly to the storm sewer. Inspection of these sewers found “large volumes of rocket paste, particularly in the demolished west area.”³⁴ The FOSTs should discuss potential contamination issues associated with the storm sewers.

Criteria not applied as part of the site closure process, specifically the Human Food Chain and Terrestrial Ecosystems. See General Comments above.

Grazing domestic animals and consumption of grazing wildlife such as deer. A pond located near the rocket paste area is described by the Army as a “controversial issue in 1976”³⁵ due to the discovery of elevated blood lead levels in cattle that had access to a pond in the rocket paste area. A lawsuit was filed by Congressman Henry S. Reuss against Olin Corporation, the operating contractor at Badger on August 19, 1970. Among the findings, “lead contamination in ditches and ponds creates a potential hazard to livestock grazing on the installation”.³⁶ Soil contaminants such as lead are concern as cows or other animals kept over a long period of time may “accumulate dangerous levels of lead and this possibility should be investigated on a chronic or long term basis rather than on one or a few chemical analysis on a short term basis that may be entirely misleading”.³⁷ As noted earlier in our comments, this illustrates the critical importance of considering the human food chain and terrestrial ecosystems in case closure decisions by the WDNR and the Army at Badger.

³² Infrastructure Remedial Environmental Study, Badger Army Ammunition Plant, Volume I of III, Pages 15-16, December 1996.

³³ Infrastructure Remedial Environmental Study, Badger Army Ammunition Plant, Volume I of III, Page 32, December 1996.

³⁴ Infrastructure Remedial Environmental Study, Badger Army Ammunition Plant, Volume I of III, Page 33, December 1996.

³⁵ Installation Assessment of Badger Army Ammunition Plant, Volume 1, page II-15, May 1977.

³⁶ Installation Assessment of Badger Army Ammunition Plant, Volume 1, page III-2, May 1977.

³⁷ Installation Assessment of Badger Army Ammunition Plant, Volume 1, page II-29, May 1977.

USTs at the River Pump Station. According to conversations with Army staff at Badger, the original August 1998 unrevised version of the Environmental Baseline Study (EBS) indicated that there were two (2) underground storage tanks on this parcel.³⁸ The revised January 1999 version of the EBS was changed to indicate only 1 tank was present. The rationale for this change is not provided in the text.

Water Supply Line Connecting the Pumping Station and Badger Army Ammunition Plant. The FOSTs should discuss large diameter pipeline(s) and other infrastructure connecting these properties.

Land Use Restrictions near the Gate Valve “T” connection for the effluent water force main. The FOSTs should reference Condition 23 (c) of the March 17, 1995 Plan Modification Approval by the WDNR of the September 14, 1987 In-Field Conditions Approval which prohibits the installation of pipe lines of any size that are being installed for the purpose of transporting treated and industrial/sanitary waste streams within 100 feet of the “T” connection.

Spills. Spills should also be discussed in the FOSTs. For example, Badger records 56 spills during the 13-year period from 1979 to 1992. The largest quantities released were from 18 spills which involved sulfuric and/or nitric acids and sludges.³⁹ In 1982, 6.5 tons of sulfuric acid were spilled. In 1984, a pipe failure resulted in the release of 185 tons of mixed acids. While attempts were made to chemically “neutralize” these spills, the vast majority were never recovered. Oil and gasoline releases made up the largest number of spills during this period.⁴⁰ The New Acid area was the site of multiple spills greater than 1,000 pounds.

In addition to manufacturing facilities, the U.S. Army Environmental Hygiene Agency describes loading and unloading facilities such as railroad and truck unloading areas as a potential source of spills.⁴¹

Spills of PCBs are regulated under the Toxics Substances Control Act. An example of a major PCB spill occurred at the East Rocket Production Area. Inspectors found oil leaking out of the large hydraulic presses and into the sewers. Approximately 9,500 gallons of PCB-contaminated oil was removed from 51 buildings. The work was completed in 1995.⁴²

The FOSTs should discuss the potential ecological and environmental health implications of spills.

Land-application of wastewater sludge, still bottoms, and other similar historical practices. The potential ecological and environmental health implications of historical land-application of wastewater system sludge, still bottoms, and other similar wastes should be

³⁸ D. Fordham, Installation Director, telephone interview with L. Olah, CSWAB, circa 1998.

³⁹ Department of the Army, Badger Army Ammunition Plant, Open letter to the public from the Commander’s Representative, February 28, 1992.

⁴⁰ Department of the Army, Badger Army Ammunition Plant, Open letter to the public from the Commander’s Representative, February 28, 1992.

⁴¹ U.S. Army Environmental Hygiene Agency, Water Pollution Aspects of Explosives Manufacturing, page 13, August 1985.

⁴² Infrastructure Remedial Environmental Study, Badger Army Ammunition Plant, Volume I of III, Pages 26, December 1996.

addressed in the FOSTs. Maintaining these systems would have required routine clean-out and disposal of residual sludge.

A land spread disposal plan for sludge from the sanitary sewage treatment plant (Imhoff tank) was proposed in 1997. Land application of sanitary sewage sludge to agricultural tracts inside Badger was proposed.⁴³

Land application of pseudo-fertilizers. The historical land-application of other non-typical materials, such as waste nitrocellulose fines (one million pounds)⁴⁴ and soils impacted from fertilizer spills at the agricultural facility on County Z, should be noted in the FOSTs. The FOSTs should indicate if the activities could prompt land use or groundwater restrictions and if residual contamination constitutes a risk to the human food chain or ecological receptors.

Abandonment Sites. The FOSTs should address so-called Abandonment Sites. One example is the New Acid Complex Neutralization/Stabilization Pond that was created by the Army to provide a holding/stabilization area for neutralized acid wastewater at the New Acid Complex.⁴⁵ On February 19, 1985, the WDNR approved a plan to abandon the lagoon sludge “in place”.

Degradation products of identified Contaminants of Concern. The FOSTs should describe potential degradation products of site contaminants that are not included in current groundwater test methods. Examples include *o*-nitrotoluene, *p*-nitrotoluene, and *m*-nitrotoluene which are degradation products of dinitrotoluenes (DNTs). CSWAB is currently pressing for improved testing of groundwater and drinking water wells for these and other additional parameters. The organization has also petitioned the WDNR for Health Advisory Levels for unregulated contaminants which have been detected in groundwater, particularly in and near the Propellant Burning Grounds. Degradation products of TNT (as compared to DNT) were also recently detected in groundwater at this site. It is expected that the Deterrent Burning Grounds/Existing Landfill could have similar wastes as disposal practices were comparable. CSWAB is currently pressing for testing of high explosives and degradation products of DNT in groundwater and nearby private drinking water wells.

Vanadium and Vandium Compounds. Vanadium Pentoxide serves as the catalyst for the conversion of SO₂ to sulfur trioxide.⁴⁶ According to Army officials at Badger, Vanadium Pentoxide was used as a catalyst in acid production at the old acid area and may have been used in the laboratory.⁴⁷

⁴³ Olin Corporation, Sanitary Sewage Treatment System Facility Evaluation and Planning Report, BAAP, page 14, June 1997.

⁴⁴ Infrastructure Remedial Environmental Study, Badger Army Ammunition Plant, Volume I of III, Page 31, December 1996.

⁴⁵ Richard G. Schuff, Wisconsin Department of Natural Resources, letter to Mr. David Fordham, Badger Army Ammunition Plant, RE: Abandonment Plan for the New Acid Complex, February 19, 1985.

⁴⁶ U.S. Army Environmental Hygiene Agency, Water Pollution Aspects of Explosives Manufacturing, page 56, August 1985.

⁴⁷ Joan M. Kenney U.S. Army, Badger Army Ammunition Plant, letter to Robert Egan, U.S. Environmental Protection Agency Region V, Subject: Wastes Generated at Badger AAP, September 21, 2006.

In 1994, 6,830 pounds of Vanadium Pentoxide wastes were generated at Badger.⁴⁸ In 1995, more than 5,000 pounds of Vanadium Pentoxide wastes were generated from Badger.⁴⁹

The August 1998 Environmental Baseline Survey for Badger notes that Vanadium Pentoxide was contained in equipment or may have been used in the manufacturing process at the New Acid Area.

While the historical use, handling, and disposal of Vanadium Pentoxide wastes is well documented at Badger, a review of environmental investigations referenced in the FOSTs did not find this inorganic compound included in selected test methods. Wisconsin's Groundwater Enforcement Standard for Vanadium is 30 micrograms per liter.

Just as mercury was later found to be a pervasive pollutant in and around Badger, follow-up investigations may be necessary to assure that Vanadium and Vanadium compounds are not a potential ecological or environmental health contaminant of concern at Badger.

Tetrahydrofuran and other hazardous wastes. Tetrahydrofuran is reported in groundwater at concentrations as high as 300 ug/l (micrograms per liter) in the 1981 Contamination Survey of Badger, exceeding Wisconsin's Groundwater Enforcement Standard of 50 ug/l. The highest concentration was detected in groundwater near the Deterrent Burning Grounds.

In reviewing subsequent environmental studies, it appears that this organic solvent and other detected contaminants were not always carried forward (pursued) in subsequent environmental investigations. Some historical accounts suggest that certain parameters were dropped, even when detected, if a clear and concise connection to historical Army operations was not found.

In the case of Tetrahydrofuran, this may be a significant oversight. When released into the soil, Tetrahydrofuran is expected to quickly evaporate⁵⁰ so its detection in groundwater at such high concentrations suggests that the source of this contamination is likely significant.

On February 13, 1996, more than 150 pounds of waste flammable liquids containing Methyl ethyl ketone and Tetrahydrofuran was generated by Badger, confirming the presence of this solvent at the facility.

Follow-up investigations may be necessary to assure that the Tetrahydrofuran is not a potential ecological or environmental health contaminant of concern at Badger.

Other hazardous wastes generated at Badger included DDT (insecticide), Dichloromethane (laboratory solvent used in soil and groundwater analysis), Diethylphthalate (used in the manufacture of rocket propellant), Ethyl Ether (used in the manufacture of single-based

⁴⁸ U.S. Army, Badger Army Ammunition Plant, Feasibility and Plan of Operation Report for Small Storage Facility, Section E – Waste Characterization, Table E-1, circa 1986-1988.

⁴⁹ Joan M. Kenney U.S. Army, Badger Army Ammunition Plant, letter to Robert Egan, U.S. Environmental Protection Agency Region V, Subject: Wastes Generated at Badger AAP, September 21, 2006.

⁵⁰ Mallinckrodt Baker, Inc., MSDS Sheet, Tetrahydrofuran, November 11, 2006.

propellants and in laboratories as an extractant), *o*-Toluidine (42 pounds in 2002), *p*-Benzoquinone (5 pounds in 1993), Potassium Cyanide (6 pounds in 1989), and Sodium Azide.⁵¹

Pentachlorophenol, Copper-Arsenate, and Impurities (Dioxins and Furans). Pre-1970's lumber used to construct Badger is presumed to contain Pentachlorophenol.⁵² Post-1980's treated reconstruction lumber at Badger is presumed to contain copper-arsenate.⁵³ Pentachlorophenol solutions consist primarily of chlorinate phenols and heavy petroleum oils. Methylene Chloride and liquid petroleum gas were historically used as solvents in pentachlorophenol solutions.

Pentachlorophenol is released to the air by evaporation from treated wood surfaces. Exposure may also result from touching wood treated with preservatives containing Pentachlorophenol⁵⁴ Many, but not all, of the harmful effects associated with exposure to Pentachlorophenol may be due to impurities present in commercial mixtures.⁵⁵ Common impurities include dichlorophenol, trichlorophenol, hexachlorobenzene, dioxins, and furans.

Pentachlorophenol has been detected in groundwater monitoring wells at Badger, particularly near and beyond the southern plant boundary. According to the May 2001 Groundwater Narrative Summary (page 154), Pentachlorophenol was detected in groundwater monitoring well PBM 9001D at 14.1 ug/l (micrograms per liter), exceeding Wisconsin's Groundwater Enforcement Standard of only 1 ug/l. The May 2003 Groundwater Narrative Summary Report notes that Pentachlorophenol was detected at 6.9 ug/l in monitoring well SWN 9104D.

The FOSTs should address the potential ecological and environmental health implications of Pentachlorophenol, copper-arsenate, and other wood preservatives at Badger.

Radioactive wastes. On January 30, 2001, a radioactive material shipment of U-238 Uranyl Acetate 1 pound and Uranyl Zinc Acetate of 500 grams is recorded by the Army from Badger.⁵⁶ A possible waste source suggested by the Army was "laboratory storage area cleanup of unused materials".⁵⁷

Uranyl Zinc Acetate is highly toxic by both inhalation and ingestion. Cumulative effects are also probable with the target organs being the liver and kidneys. It is toxic to aquatic organisms, and may cause long-term adverse effects in the aquatic environment. As with all compounds of uranium, even depleted uranium, it is radioactive to a degree that is dependent on its isotope ratios.

⁵¹ Joan M. Kenney U.S. Army, Badger Army Ammunition Plant, letter to Robert Egan, U.S. Environmental Protection Agency Region V, Subject: Wastes Generated at Badger AAP, September 21, 2006.

⁵² WDNR, Analysis and Preliminary Determination and Draft Plan, Explosive Decontamination and Demolition at Badger Army Ammunition Plant, Pages 25, February 25, 2003.

⁵³ WDNR, Analysis and Preliminary Determination and Draft Plan, Explosive Decontamination and Demolition at Badger Army Ammunition Plant, Pages 25, February 25, 2003.

⁵⁴ Gemini Group, Gemini Group Health Effects Directory, *Pentachlorophenol*, undated.

⁵⁵ Gemini Group, Gemini Group Health Effects Directory, *Pentachlorophenol*, undated.

⁵⁶ Joan M. Kenney U.S. Army, Badger Army Ammunition Plant, letter to Robert Egan, U.S. Environmental Protection Agency Region V, Subject: Wastes Generated at Badger AAP, September 21, 2006.

⁵⁷ Joan M. Kenney U.S. Army, Badger Army Ammunition Plant, letter to Robert Egan, U.S. Environmental Protection Agency Region V, Subject: Wastes Generated at Badger AAP, September 21, 2006.

“U-238 Uranyl Acetate” is not a recognized term in the scientific literature. Depleted Uranium (DU) is uranium primarily composed of the isotope uranium-238. Uranyl Acetate contains a radioactive isotope which may produce cancer and genetic mutation.⁵⁸ Primary routes of exposure are inhalation, skin absorption, and ingestion.

Additional research is recommended to identify other potential sources of radioactive wastes and the historical use, handling, and disposal at Badger. As a matter of record, it should be noted that Olin Corporation, a previous operating contractor at Badger, has been awarded numerous federal contracts to manufacture depleted uranium (DU) munitions.

PCB transformer sites. The FOSTs should contain a section on PCB transformers and the resolution of oil staining that was observed on the casings, concrete pad, and/or wood platforms associated with transformers at Badger.⁵⁹

Creosote. The FOSTs should discuss the potential ecological and environmental health implications of creosote as a wood preservative in buildings and infrastructure at Badger. Creosote is obtained from high temperature distillation of coal tar (itself a mixture of hundreds of organic substances), and over 100 components in creosote have been identified. It was used as a fungicide, insecticide, miticide, and sporicide to protect wood and is applied by pressure methods to wood products, primarily utility poles and railroad ties. EPA is currently reassessing creosote as part of its re-registration program for older pesticides.⁶⁰

According to the Army at Badger, creosote was not manufactured at Badger but was “commonly used at Badger as a wood preservative”. It was applied to barricades and poles throughout the installation.⁶¹ Creosote can cause skin cancer with prolonged contact and irritation to the lungs and throat when vapors are inhaled.⁶²

Pesticides. In 1983, a facility-wide Hazardous Materials and Pesticide Management/Control Study was recommended by the Army. In accordance with Army Regulations 200-1, the Army recommended a special study to “define sources of pollution and develop remedial measures”. The basis for the study was that “during normal operations and agricultural leasing over the past forty-plus years, many potential toxic and/or hazardous chemicals and/or pesticides have been used with Badger AAP’s boundaries”. The Army notes that “no accurate records exist as to type or quantities that may have found their way into the environment.” The Statement of Work

⁵⁸ Ted Pella, Material Safety Data Sheet, Uranyl Acetate, Dihydrate, Material Safety Data Sheet, September 4, 2002. http://www.tedpella.com/msds_html/19481msd.htm

⁵⁹ Plexus Scientific, Environmental Site Assessment, FINAL, Badger Army Ammunition Plant, Baraboo, Sauk County, Wisconsin, Attachments, Page 303, December 2004. (Plexus Scientific, Memo RE: Follow-up to October 2003 Site Reconnaissance and Review of Supplemental File Information for the Badger Army Ammunition Plant (BAAAP), Baraboo, Wisconsin, October 30, 2003.)

⁶⁰ U.S. Environmental Protection Agency, Pesticides: Topical & Chemical Fact Sheets, Creosote And Its Use As A Wood Preservative, August 2007. http://www.epa.gov/opp00001/factsheets/chemicals/creosote_main.htm

⁶¹ Joan M. Kenney U.S. Army, Badger Army Ammunition Plant, letter to Robert Egan, U.S. Environmental Protection Agency Region V, Subject: Wastes Generated at Badger AAP, September 21, 2006.

⁶² Infrastructure Remedial Environmental Study, Badger Army Ammunition Plant, Volume I of III, Page 17, December 1996.

recommends a “systematic soil sampling and analysis study” for “all areas at Badger AAP”.⁶³ The responsibility for the use, control, and disposal of pesticides at Badger, including but not limited to insecticides, herbicides, and rodenticides, is the responsibility of the U.S. Army Armament Material Readiness Command.⁶⁴

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) regulates the registration and use of pesticides. Pesticide management activities are subject to federal regulations in 40 CFR 162, 165, 166, 170, and 171. Enacted in October 1972, the Federal Environmental Pesticide Control Act regulates the manufacture and sale of pesticides. Soils contaminated by the storage, mixing, or handling (but not application) of pesticides and herbicides are a special waste and may be a RCRA hazardous waste because of the characteristic of toxicity.⁶⁵

The November 1992 Site Screening Inspection Report for Badger (page 4-14), identifies Area I as Fertilizer/Herbicide Spill Areas; a corresponding map was not provided in this report.

Both the operating contractor and the agricultural lessees have used pesticides at Badger. The pesticides Monuron, Atrazine, Sevin, Solvit, Lasso, 2,4-Dichlorophenoxyacetic Acid (2,4-D), Bladex, Thimet, Dalaphon, Furadan, and Simazine were used and stored at Badger between 1974 and 1976 (USATHAMA, 1977). Pallets of Monuron and Simazine were stored in Badger Account 507-3 (USAML, 1974). Monuron was used as a soil sterilant for all vegetation on transformer banks, tank farms, railroad sidings, and ballast along tracks. Solvit was used for control of mice and rats, and 2,4-D was used for Canadian and musk thistle (Olin Corporation, 1977a). Chlordane was present in Badger Accounts 214 (Section 1006) and 235 (Section 1006A) (Olin Corporation, 1996a, b, c); however, no mention of chlordane was made in the 1977 U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) study (USATHAMA, 1977a, b) and thus it may not have been used to a great extent at the facility. Since 1987, an outside contractor conducts pesticide application mainly for tenant activities (PRC Engineering, 1987; Olin Corporation, 2004a).⁶⁶

According to an USAEHA (1982) Pest Management Program Review, general pest control operations (which at the time of the review were limited to rodent control) were limited to one employee of Olin Corporation who received DoD training in pest management. Rodent control consisted of placing anticoagulant rodenticide bait stations (e.g., Warfarin, 0.025%) in buildings where rodents were reported. A certified subcontractor conducted weed control at Badger. The weed control contractor and local farmers who leased land at Badger stored all pesticides off-site. Herbicides used at Badger include 2,4-D, dicamba, glyphosate, oryzalin, simazine, tebuthiuron, and a combination of sodium metaborate tetrahydrate and bromacil (USAEHA, 1982a).⁶⁷

⁶³ Department of Army, Headquarters, United States Army Armament, Munitions, and Chemical Command, Environmental Assessment for Total Plant Operations, BAAP, Exhibit II-R, July 1983.

⁶⁴ Department of Army, Headquarters, United States Army Armament, Munitions, and Chemical Command, Environmental Assessment for Total Plant Operations, BAAP, Introduction, Mission and Operations, page 6, July 1983.

⁶⁵ U.S. Army Base Realignment & Closure Office, Environmental Site Assessment, Badger Army Ammunition Plant, Section 4, Investigation Reports, pages 4-2 and 4-3, December 2004.

⁶⁶ U.S. Army Base Realignment & Closure Office, Environmental Site Assessment, Badger Army Ammunition Plant, Section 4, Investigation Reports, pages 4-2 and 4-3, December 2004.

⁶⁷ U.S. Army Base Realignment & Closure Office, Environmental Site Assessment, Badger Army Ammunition Plant, Section 4, Investigation Reports, pages 4-2 and 4-3, December 2004.

Pesticide mixing operations were limited to formulation of herbicides.⁶⁸ The pesticides were brought to the site and mixed onsite using water from five fire hydrants (USAEHA, 1984). The 1990 USAEHA Pest Management Survey indicated that two dedicated fire hydrants were used for pesticide mixing (USAEHA, 1990c), whereas, the USAEHA 1980 survey indicates the presence of “three roadside pesticide mixing sites” (USAEHA, 1980). Following the 1978 USAEHA Pest Management Program Review, the fire hydrants were equipped with backflow prevention devices. Herbicide formulations were reportedly mixed on the gravel surface near Badger Account 512. Pest control dispersal equipment was improperly rinsed on the gravel surface. USAEHA (1978) recommended that an outdoor mixing facility be constructed.⁶⁹

A 1971 Industrial Hygiene Survey reported that two workers (for up to eight hours per day) conducted the mixing and dispersing of herbicides (USAEHA, 1971c).⁷⁰

Pest control activities at Badger are handled in accordance with a formal Pest Management Plan. The last major revision was in 1998 and the plan was last updated in August 2004. The plan encourages the use of non-chemical methods for pest control and requires that all pesticides be mixed prior to being brought on to the installation. Pesticides are only stored on the installation by exception (CHPPM, 1998). The types of herbicides used at Badger include: Amine-2,4-D, Banvel, Bladex, Butyl-2,4-D, Genep, Lasso, Princep-90, Prowl, Roundup, and Surflan (BAAAP, 1998d).

A 1981 Contaminant Survey at Badger reports Endrin and Delta-BCH were detected in water in the drainageway leading into the settling ponds (Final Creek). The concentrations were 0.066 ug/l and 0.14 ug/l. The predominant source of water in this drainageway is wastewater discharge from the sanitary and industrial wastewater.

Initial data submitted by the Army in its 1996 WPDES permit application indicated levels of the following parameters were elevated in the influent (Bluffview, Badger sanitary, boiler blowdown and landfill leachate, combined) to Badger’s sanitary wastewater treatment facility: Chromium - total and hexavalent, Iron, Barium, Manganese, Arsenic, Methylene Chloride, Lindane (reported as Gamma-BHC, also known as Gamma-HCH), and Xylene (reported as M/P-xylene). Not confirmed or inadequate data: Phenols, Ethyl Benzene, Toluene, and Delta-BHC (also known as Delta-HCH). The outfall from this wastewater treatment system is Final Creek and Settling Pond #1.

The 1981 Envirodyne Contamination Survey of Badger recommended follow-up testing for PCBs and/or pesticides for wells S1102, S1104, and S1107 located downgradient from the settling ponds along Badger’s southern boundary, well S1123 located on the western boundary of Badger near U.S. Highway 12, and production well #4.⁷¹

⁶⁸ U.S. Army Base Realignment & Closure Office, Environmental Site Assessment, Badger Army Ammunition Plant, Section 4, Investigation Reports, pages 4-2 and 4-3, December 2004.

⁶⁹ U.S. Army Base Realignment & Closure Office, Environmental Site Assessment, Badger Army Ammunition Plant, Section 4, Investigation Reports, pages 4-2 and 4-3, December 2004.

⁷⁰ U.S. Army Base Realignment & Closure Office, Environmental Site Assessment, Badger Army Ammunition Plant, Section 4, Investigation Reports, pages 4-2 and 4-3, December 2004.

⁷¹ Envirodyne Engineers, Badger Army Ammunition Plant Contamination Survey, March 1981.

The 2004 Environmental Assessment for Badger notes that in Section 1011, Buffer Zone - Wooded Land/Partially Completed TNT Manufacturing Area a release of herbicide occurred; the date of the release is listed as unknown and the quantity is not cited.

Badger's sanitary sewage collection system includes about 207,000 feet of mains and 530 manholes. There are also four lift stations. The June 1997 facility evaluation and planning report for the system describes significant surface water (clear water) inflow problems that are characterized as "severe" during spring snow melt periods and very heavy rainfalls. Sewage flows have been recorded that jumped from 50,000 gallons per day to 220,000 gallons per day during a one day event.⁷²

Post-Demolition Sampling Reports and other Site Investigations. According to a conversation with Army officials at Badger earlier this month, certain environmental investigations have been conducted at the facility but have not been submitted to and/or requested by regulators.

This appears to be inconsistent with Condition 22 of the March 17, 1995 Plan Modification Approval by the WDNR of the September 14, 1987 In-Field Conditions Approval. This condition stipulates that Badger shall report to the Department any and all unscheduled investigations and testing that are performed at the facility prior to those investigations being performed and that such reports shall be submitted to the Department for its approval.

The Post Demolition Sampling Report (Parcel K) is an example of a report that has not been submitted to the WDNR. CSWAB was recently granted permission to view this report at the Administration Building at Badger. Reported soil contaminant levels for Arsenic, Barium, Chromium, Silver, Napthalene, and Cadmium exceed the U.S. EPA Region 5 Ecological Screening Levels.

Formerly Used Defense Sites (FUDS). In the early 1990's, the U.S. Army Corps of Engineers performed a contamination evaluation of surplus property (approximately 3,000 acres) to determine if there was residual soil or groundwater contamination resulting from activities at this formerly used portion of Badger. The FUDS study area was bordered by Badger Road on the North and Gruber's Grove on the south. The eastern limit was State Highway 78 (from Badger Road to Weigand's Bay) and Lake Wisconsin.⁷³

In a January 29, 1992 letter to the U.S. Army Corps of Engineers, the WDNR criticized the quality of several aspects of the initial FUDS investigation. The WDNR described data for VOCs (1,2-dichloroethane, benzene, carbon tetrachloride, and trichloroethylene) as "unacceptable".⁷⁴ Initial soil samples were found to indicate "some type of metal

⁷² Olin Corporation, Sanitary Sewage Treatment System Facility Evaluation and Planning Report, BAAP, pages 10-11, June 1997.

⁷³ Department of Army, Buffalo District, Corps of Engineers, Contamination Investigation of the Formerly Used Defense Site at Badger Army Ammunition Plant near Baraboo, Wisconsin, Draft (per handwritten note Robert Dempsey, U.S. Army Corps of Engineers on December 9, 1993) Report, pages 8-9, November 1993.

⁷⁴ Michael J. Netzer, Wisconsin DNR, correspondence to Bob Dempsey, U.S. Army Corps of Engineers, January 29, 1992.

contamination”, prompting the WDNR to recommend additional sampling for copper, nickel, chromium, arsenic, and mercury.⁷⁵

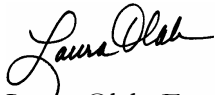
The subsequent September 1994 Draft FUDS Contamination Investigation was never finalized due to quality assurance issues that were never resolved. The Corps of Engineers reported that there were both “major and minor data discrepancies” throughout the report.⁷⁶ Though never finalized, the 1994 draft report concluded that the assessment of the threat to human health through exposure to soil contaminants (arsenic, cadmium, lead, manganese, and mercury) “may be in order”.⁷⁷ In June 1992, certain residential wells, such as the Spear and Curley wells, had low levels of trichloroethylene (TCE). These concentrations were approximate as the level of detection was relatively high, i.e. 5 micrograms per liter or the equivalent of Wisconsin’s Groundwater Enforcement Standard.⁷⁸

It should be noted here that recent testing by the Army in 2007 detected low levels of TCE in private drinking water wells in the FUDS area. TCE is a suspected human carcinogen.

Dinitrotoluene (DNT) and other munitions compounds were not included in the FUDS investigation.

Thank you in advance for your careful consideration of our comments and your support of the best possible cleanup and the brightest future for these lands and our community.

Sincerely,



Laura Olah, Executive Director

⁷⁵ Michael J. Netzer, Wisconsin DNR, correspondence to Bob Dempsey, U.S. Army Corps of Engineers, January 29, 1992.

⁷⁶ U.S. Army Corps of Engineers, Buffalo District, BAAP Formerly Used Defense Site, Sauk County Wisconsin, Contamination Investigation, Draft (per handwritten note by U.S. Army officials at Badger) Report, pages 61-66, September 1994.

⁷⁷ U.S. Army Corps of Engineers, Buffalo District, BAAP Formerly Used Defense Site, Sauk County Wisconsin, Contamination Investigation, Draft (per handwritten note by U.S. Army officials at Badger) Report, page 60, September 1994.

⁷⁸ U.S. Army Corps of Engineers, Buffalo District, BAAP Formerly Used Defense Site, Sauk County Wisconsin, Contamination Investigation, Draft (per handwritten note by Army officials) Report, page 93, September 1994.