STATEMENT OF BASIS/FINAL DECISION AND RESPONSE TO COMMENTS SUMMARY

REGION VII
ID#0878

SUNFLOWER ARMY AMMUNITION PLANT

Desoto, Kansas
(Signed September 28, 1999)

Facility/Unit Type:	**Manufacturer of smokeless powder and other propellants**
Contaminants:	**Nitroglycerin, bis(2-ethylhexyl)phthalate, Arsenic, Lead, Dioxins/Furans, Nitrocellulose**
Media:	**Surface and Subsurface Soil**
Remedy:	**Ex-Situ Stabilization, Institutional Controls, Monitoring of Ground Water**

FACILITY DESCRIPTION

This Statement of Basis Summary describes the corrective measures considered for Solid Waste Management Units (SWMUs) 10, 11, 22, and 32 at the Sunflower Army Ammunition Plant (SFAAP). SFAAP is located near Desoto, Kansas, in the northwest corner of Johnson County. It is approximately 30 miles southwest of Kansas City, Kansas, and 16 miles east of Lawrence, Kansas. The U.S. Army owns the facility, which has been declared excess property by Industrial Operations Command (IOC) and is therefore subject to transfer or lease. The plant encompasses about 9,065 acres and is primarily surrounded by agricultural land. It is bound on the east by Spoon and Kill Creeks and on the west by Captain Creek. The plant consists of production, administrative, and storage facilities, powerhouses, landfills, lagoons, ditches, burning grounds, sumps, projectile ranges, and waste treatment facilities.

SFAAP was commissioned in March 1942 to produce smokeless powder and other propellants. The propellants produced consisted of the base explosives nitrocellulose (NC), nitroglycerine (NG), and nitroguanidine (NQ). In addition to these explosives, SFAAP also manufactured nitric acid, sulfuric acid and calcium cyanamide that were used to make the explosives. NC and NG powder production began in March 1943, and was carried out at various times between the 1940s and early 1970s. Whenever the plant was not producing propellant, it remained in stand-by maintenance.

During the 1960s many of the outdated plant facilities were modernized or replaced. This included replacing the nitric acid concentrator facilities and the sulfuric acid recovery unit. In the late 1970s NQ production began and remained in operation until plant shutdown in September 1992. Since then, the NQ area has been in "stand-by" status and the remainder of the plant has been in "caretaker" status. The only production currently taking place within the facility boundary is at a property leased to a private company that produces sulfuric acid. Another private company has leased and operates the facility's industrial wastewater treatment facility.

In August 1980, SFAAP submitted notification of hazardous waste activity to obtain interim status for the treatment and storage of hazardous wastes under the Resource Conservation and Recovery Act (RCRA). In December 1991, SFAAP was issued a RCRA hazardous waste management permit. Part 1 of the permit was issued by the Kansas Department of Health and Environment (KDHE); it authorizes the storage of hazardous wastes. Part 2 of the permit was issued by EPA; it requires the investigation of releases from

49 solid waste management units (SWMUs).

The Army has completed several site-specific studies investigating the potential for releases of hazardous wastes or hazardous constituents. Subsequently, five additional SWMUs and a number of areas of concern (AOCs) have been identified. An AOC is an area where hazardous wastes or hazardous constituents have been identified but are not linked to a specific solid waste management practice. The SFAAP is closing the area of the facility which has interim status for the open burning of reactive hazardous waste.

SWMU 10 consists of 21 unlined ditches. The ditches run eastward from the F-line production facilities and end either in the settling ponds (SWMU 11) or lowlands. The ditches collected double-base propellant waste water from the manufacturing operations. Ditches were used from the early 1950s to 1971. Soils are contaminated with propellant components and pieces of propellant can be found in the ditches.

SWMU 11 consists of six unlined settling ponds (1A, 1B, 2A, 2B, 3A, and 3B) and two unlined blender ponds (4A and 4B). These ponds operated from 1943 to 1971. Ponds 1A, 1B, 2A, and 2B received wastewater from the manufacturing operations and storm water drained from the F-line area. Their effluent discharges into Spoon Creek. Ponds 3A and 3B received wastewater from the manufacturing operations and storm water drained from the F-line area. Their effluent discharges into Kill Creek. Ponds 4A and 4B received wastewater from the F-Line Blender House and storm water drainage. Their effluent discharges into a tributary of Pyott's Pond. Sediments in the settling ponds were allowed to dry, collected, and burned at the old explosive waste burning ground (SWMU 22). Soils are contaminated with propellant components and pieces of propellant can be found in the ponds.

SWMU 22 operated from 1943 to 1980 and consisted of six burning cells. These cells were used for open burning of waste explosives and propellant formulations from the sumps, filters, and drains of production areas and from settling ponds. Soils are contaminated with propellant components and pieces of propellant can be found in the burning cells.

SWMU 32 is adjacent to SWMU 22. It consists of a small building and melting rack within a paved area. It operated from 1943 to 1970. Contaminated lead recovered from maintenance activities was sent here. The lead was placed on racks and suspended over a tank where it was melted by an overhead heater. The molten lead dropped into the tank and was drained into molds and made available for salvage. Soils are contaminated with propellant components and lead.

EXPOSURE PATHWAYS

A baseline risk assessment was conducted as part of the RCRA Facility Investigation (RFI) for SWMUs 10/11 and 22/32 (March 1997) to address the potential for adverse human health effects from exposure to chemicals and lead. The following exposure scenarios were evaluated in the baseline risk assessment:

- Maintenance/utility workers exposed to chemicals in surface and subsurface soils from ingestion, dermal contact, and inhalation of fugitive dust, and dermal contact with ground water.

- Commercial/industrial workers exposed to chemicals in surface soil from ingestion, dermal contact, and inhalation of fugitive dust.

- Construction workers exposed to chemicals in surface and subsurface soils from ingestion, dermal contact, and inhalation of fugitive dust, and dermal contact with ground water.

- Female workers who intend to have children and are exposed to lead in surface and subsurface soils.

- Construction workers exposed to chemicals from dermal contact with water and sediment from the settling ponds at SWMU 11.

- Residential (both child and adult) exposure to chemicals in ground water from ingestion and dermal contact.

- Recreational (both child and adult) exposure to chemicals in creek water and creek sediment from dermal contact.

Many contaminants were detected at these SWMUs and evaluated as potential contaminants of concern, including those classed as inorganic, volatile organic, semi-volatile organic, dioxan/furan and explosive.

A contaminant was included in the risk assessment if it was detected in more than five percent of samples collected in the RFI. But, if the contaminants were inorganic chemicals (arsenic for example), they were evaluated in the risk assessment only if present above naturally occurring levels. Naturally occurring levels are called "background" levels and are found in areas that have not been contaminated by activities of the facility.

The health risks from the contaminants of potential concern may be either from their potential to cause cancer or because of their toxicity. Excess cancer risks are estimated as to the probability of an individual developing cancer over a lifetime as a result of exposure to a carcinogenic contaminant. If this excess cancer risk is estimated to be less than 1 excess cancer case out of 1,000,000 people (referred to as $1x10^{-6}$ risk), exposure to the contaminants is considered to be safe, so no corrective measures would be necessary. However, estimates of excess cancer risks greater than 1 excess cancer case out of 10,000 people (referred to as $1x10^{-4}$ risk) are not considered to be safe, and corrective measures would be necessary.

The risk assessment calculates estimates of health risks from contaminant toxicity for those contaminants that are not carcinogens. This estimate is call a "hazard index" and is the ratio of estimated daily intake of a contaminant to reference dose which has no observed health effects. A hazard index of 1 is considered to be safe so no corrective measures would be necessary.

In addition to health risks from specific contaminants, pieces of propellants are visible on the ground which could pose a safety hazard due to their potential ignitability. This was not evaluated in the risk assessment. The preferred corrective measure will remove propellants to eliminate this safety risk.

An Ecological Risk Assessment was also prepared for the facility. The risk assessment showed that: middle tropic level avian species (e.g., red-tailed hawks) have a low likelihood of being impacted; lower tropic level mammals (e.g., deer mice) are impacted by lead in surface soils; middle trophic level mammals (e.g., raccoons) have potential adverse impacts from exposure to dioxin/furans in surface soils; and, the biological integrity of Kill and Spoon Creeks have not been impacted, but dioxin contamination of Captain Creek may be of concern.

Potential health risks were identified in the risk assessment from nitroglycerin, bis(2-ethylhexyl)phthalate, arsenic, lead, and dioxin/furans contamination of the surface and subsurface soils. Nitrocellulose was added to the Statement of Basis as a corrective action objective during the Response to Comments period.

Corrective action objectives were determined to prevent potential health risks from industrial uses of the facility. Corrective action objectives were not established for the ground water, as no contaminants were found above EPA's drinking water standards, known as maximum contaminant levels (MCLs).

CONTAMINATION DETECTED AND CLEANUP GOALS

Media	Estimated Volume	Contaminant	Maximum Concentration	Action Level	Cleanup Goal * (mg/kg)	Point of Compliance
Surface and subsurface soil		nitroglycerin, bis(2-ethylhexyl) phthalate, arsenic, lead, dioxin/furans, nitrocellulose		Not applicable	405 3.6 100 1000 0.005 1000	

* Cleanup goals, also termed corrective action objectives, are based on a cancer risk of $1x10^{-6}$ for nitroglycerin and bis(2-ethylhexyl) phthalate. Cleanup goals for the other, non-carcinogenic contaminants are based on a hazard quotient of 1 for arsenic; on a model that predicts blood lead levels in the fetus of a pregnant worker for lead; and on EPA's interim guidelines for dioxins/furans. The goals assume the facility will be used for industrial (non-residential) purposes following cleanup.

SELECTED REMEDY

Corrective measures must meet the media cleanup standards developed from the corrective action objectives. The corrective measures proposed for SWMUs 10,11, 22, and 32 consist of:

- Removing soil and sediments with hazardous constituents above corrective action objectives;
- Stabilization of the soil and sediments removed with a suitable stabilizing agent to provide long term protection for releases of hazardous constituents at the disposal facility;
- Construction and maintenance of stockpiles of treated soil on-site until a final disposal site is chosen;
- Disposal of the stabilized soil in an on-site landfill or off-site at a commercial landfill in accordance with federal, state and local requirements;
- Maintenance of soil and vegetative cover to prevent surface migration of any remaining hazardous constituents;
- Annual monitoring of ground water for releases of hazardous constituents; and
- Institutional controls to ensure future land use is consistent with the assumptions used to develop the corrective action objectives, i.e., future industrial land uses.

The estimated cost of ex-situ stabilization followed by onsite disposal is $1,701,591; for off-site disposal it is $2,089,013.

The risk assessment showed there were potential non-carcinogenic health risks to children from exposure to ground water containing manganese at SWMUs 10/11. However, SWMUs 10/11 are not used for housing and the groundwater contamination has not migrated from the SWMUs to off-site residences. EPA believes that restrictions on future use as an industrial facility will ensure that there will be no residential exposures to ground water at

SWMUs 10/11. Long-term monitoring is necessary to show that contaminated ground water is not moving off-site toward residences.

INNOVATIVE TECHNOLOGIES CONSIDERED

None.

PUBLIC PARTICIPATION

A public notice was issued on September 29, 1999 in the Lawrence Journal World, Olathe Daily News, Johnson County Sun, and the Kansas City Kansan and broadcasted on KFKF-FM and KMBZ-AM announcing the availability of the Statement of Basis and the start of a public comment period. The public comment period ended on November 15, 1999.

A public availability session was held on October 26, 1999 at the Lexington Trails Middle School in Desoto. Representatives of EPA were present to answer questions about the Statement of Basis.

NEXT STEPS

EPA has prepared a Final Corrective Measure Decision Document that contains EPA's responses to public comments. No revisions to the proposed corrective measures were made in response to the comments.

A study will be performed to determine the proper mixture of stabilizing agents to use in performing ex situ stabilization. Long-term monitoring of ground water to ensure contaminants are not migrating from the SWMUs will be required. The Army will submit a revised permit to EPA to establish staging piles for SWMUs 10 and 11.

The Army plans to restrict uses of the SWMUs to industrial if they are transferred to another owner. If potential owners propose non-industrial uses, the cleanup objectives and/or the corrective measure may need to be changed. If those changes occur, a new public comment period would be held and the Statement of Basis revised.

KEY WORDS:
soil, groundwater; nitroglycerin, nitrocellulose, bis(2-ethylhexyl)phthalate, arsenic, lead, dioxins/furans, ex-situ stabilization, excavation and disposal

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