

FY2006

**Sunflower Army Ammunition Plant
Kansas
INSTALLATION ACTION PLAN**

Statement of Purpose

The purpose of the Installation Action Plan (IAP) is to outline the total multi-year Installation Restoration Program (IRP) for Sunflower Army Ammunition Plant (SFAAP). The plan will define all IRP requirements and propose a comprehensive approach and associated costs to conduct future investigations and remedial actions at each IRP site at the installation.

In an effort to document planning information for the IRP manager, installations, executing agencies, regulatory agencies, and the public, an IAP has been completed for SFAAP. The IAP is used to track requirements, schedules, and tentative budgets for all major Army installation restoration programs.

All site specific funding and schedule information has been prepared according to projected overall Army funding levels and is therefore subject to change. The goal is to have all remedies in place at SFAAP by the end of 2009. Long-term monitoring and remedial action operations will be conducted beyond 2009.

The following people contributed to the formation of the FY06 Sunflower Army Ammunition Plant IAP.

Ken Axetol	Shaw Environmental, Inc.
Micheline Burger	RAB
Christina Cope	Engineering and Environment, Inc.
Tim Davis	Sunflower Army Ammunition Plant - SpecPro, Inc.
Tiffany Gates-Tull	Engineering and Environment, Inc.
Ken Herstowski	Environmental Protection Agency, Region VII
Mark Keast	Army Corps of Engineers, Kansas City District
Cindy Kemper	JOCO Environmental
Lisa Larsen	RAB
Kevin Neal	Shaw Environmental, Inc.
Pete Rissell	U.S. Army Environmental Center
Phil Rosewicz	Army Corps of Engineers, Kansas City District
Tony Spaar	Sunflower Army Ammunition Plant
Rob Weber	Kansas Department of Health and Environment

Sunflower Army Ammunition Plant
FY06 Installation Action Plan

APPROVAL

_____ TONY SPAAR Comanders Representative Sunflower Army Ammunition Plant	Date

CONCURRENCE

_____ ROBERT A. SNYDER Chief, Oversight North Branch US Army Environmental Center	Date

_____ JAMES D. DANIEL Chief, Cleanup Division US Army Environmental Center	Date

<i>Statement of Purpose</i>	1
<i>Approval/Concurrence</i>	2
<i>Table of Contents</i>	3
<i>Acronyms & Abbreviations</i>	6
INSTALLATION INFORMATION	8
CLEANUP PROGRAM SUMMARY	9
INSTALLATION RESTORATION PROGRAM	
<i>IRP Summary</i>	11
<i>IRP Contamination Assessment</i>	12
<i>Installation Location Map</i>	12-1
<i>Previous IRP Studies</i>	12-2
AEDB-R ERA SITE DESCRIPTIONS	
<i>SAAP-001 Classification Yard</i>	14
<i>SAAP-002 River Water Treatment Plant Lagoons</i>	15
<i>SAAP-003 Main Sewage Treatment Plant Drying Beds</i>	16
<i>SAAP-004 Pond A and Sludge Disposal Area</i>	17
<i>SAAP-005 Acid Sewage Disposal Plant</i>	18
<i>SAAP-006 Pond B and Sludge Disposal Area</i>	19
<i>SAAP-007 North Acid Area-Chromate Area</i>	20
<i>SAAP-008 North Acid Area-Chromate Concentration Pond</i>	21
<i>SAAP-009 North Acid Area-Wastewater Treatment Lagoon</i>	22
<i>SAAP-010 F-Line Area Ditches</i>	23
<i>SAAP-011 F-Line Area Settling Ponds</i>	24
<i>SAAP-012 Pyotts Pond and Sludge Disposal Area</i>	25
<i>SAAP-013 South Acid Area LWTP and Evaporative Lagoons</i>	26
<i>SAAP-014 Rocket Static Test Area</i>	27
<i>SAAP-015 Waste Storage Magazines</i>	28
<i>SAAP-016 Temporary Waste Storage Magazines</i>	29
<i>SAAP-017 G-Line Area Ditches</i>	30
<i>SAAP-018 Old/New Sanitary Landfills</i>	31
<i>SAAP-019 Ash Landfills</i>	32
<i>SAAP-020 Ash Lagoons and Sludge Disposal Area</i>	33
<i>SAAP-021 Contaminated Materials Burning Ground</i>	34
<i>SAAP-022 Old Explosive Waste Burning Ground</i>	36
<i>SAAP-023 New Explosive Waste Burning Ground</i>	37
<i>SAAP-024 Nitroglycerine And Paste Mix Area</i>	38
<i>SAAP-025 Nitrocellulose Area Ditches</i>	39
<i>SAAP-026 Single Base Propellant Area Waste Water Settling Sumps</i>	40
<i>SAAP-027 NQ Area SAC & LWTP Evaporative Lagoons</i>	41
<i>SAAP-028 Waste Calcium Carbide Treatment Area</i>	42
<i>SAAP-029 Industrial Wastewater Treatment Lagoons</i>	43
<i>SAAP-030 Pesticide Handling Area</i>	44
<i>SAAP-031 Contaminated Waste Processor/Evaporative Lagoon</i>	45
<i>SAAP-032 Lead Decontamination and Recovery Unit</i>	46

Table of Contents

SAAP-033 Paste Area Half Tanks and Ditches	47
SAAP-034 Five Corners Settling Ponds.	48
SAAP-035 Nitroglycerin Area Settling Ponds	49
SAAP-036 N-Line Area.	50
SAAP-037 Sandblast Areas	51
SAAP-038 Oil Water Separator	52
SAAP-039 South Acid Area Ditches	53
SAAP-040 Calcium Cyanamide Disposal Area.	54
SAAP-041 Calcium Carbonate Cake Landfill	55
SAAP-042 Temporary Sanitary Landfill.	56
SAAP-043 Tunnel Dryers (CCC Storage)	57
SAAP-044 Tank T784.	58
SAAP-045 Building 9040 and Calcium Cyanamide Conveyors/Bins.	59
SAAP-046 Decontamination Oven	60
SAAP-047 Nitroguanidine Production Area (25) Sumps	61
SAAP-048 Nitroguanidine Support Area.	62
SAAP-049 Road Just Southeast of the Sanitary Landfill.	63
SAAP-050 Disposal Site East of the Classification Yard	64
SAAP-051 New Reclamation Yard	65
SAAP-052 Paint Bay Building 542.	66
SAAP-053 Burn and Debris Area North of STP	67
SAAP-054 Fluorescent Tube Wells.	68
SAAP-055 Old Administrative Buildings.....	69
SAAP-056 Monitoring Well South of Facility 211	70
SAAP-057 Chemical Preparation House	71
SAAP-058 Combined Shops Area.....	72
SAAP-059 Laundry Facility	73
SAAP-060 Old Photographic Laboratory	74
SAAP-061 Environmental Laboratory (Facility 232)	75
SAAP-062 Transformer Storage Warehouse (Facility 566-5)	76
SAAP-063 Water Towers	77
SAAP-064 Paper Burning Ground.	78
SAAP-065 Tank Farm.....	79
SAAP-066 Installation-Wide Stream Study	80
SAAP-067 South Acid Area.	81
SAAP-101 Monitoring Well West of Old Admin Area.....	82
SAAP-102 Main Electrical Switch Yard.....	83
SAAP-103 New Photographic Laboratory (Facility 227-18)	84
SAAP-104 Disposal Area Southwest of STP	85
SAAP-105 Cannon Range Tunnels (Facility 303)	86
SAAP-106 (35) Process Facilities Within F-Line Area.....	87
SAAP-107-109	88
SAAP-110 Storage Magazines Not Part of SWMU 15 & 16.....	89
SAAP-111 Forced Air Dryers (and Rest, Screen and Can Pack Houses)	90
SAAP-112 Paste Air Dry Facilities	91
SAAP-113 General Warehouses (8037 Series)	92

Table of Contents

<i>SAAP-114 Robert's Lake</i>	93
<i>SAAP-115 Hazardous Analysis Testing Lab</i>	94
<i>SAAP-116 Nitrocellulose Production Lines</i>	95
<i>SAAP-117 NQ Production Buildings</i>	96
<i>SAAP-118 Trench Disposal Area A3</i>	97
<i>SAAP-119 Trench Disposal Area A4</i>	98
<i>SAAP-120 Trench Disposal Area A5</i>	99
<i>SAAP-121 Trench Disposal Area A6</i>	100
<i>SAAP-122 Old Reclamation Yard</i>	101
<i>SAAP-123 Cleanup Under Explosive Foundations</i>	102
<i>SAAP-124 Cleanup Under Explosive Sewers</i>	103

SCHEDULE

<i>Past/Projected Milestones</i>	104
<i>Schedule Chart</i>	104-1

COST

<i>Prior/Current Year Funding</i>	105
<i>Unconstrained (Required) Cost-to-Complete Chart</i>	106A-1
<i>Constrained (Programmed) Cost-to-Complete Chart</i>	106B-1

COMMUNITY INVOLVEMENT

<i>Restoration Advisory Board Status</i>	107
--	-----

Acronyms & Abbreviations

AEDB-CC	Army Environmental Database- Compliance-Related Cleanup
AEDB-R	Army Environmental Database - Restoration
AOC	Area of Concern
ATSDR	Public Health Assessment
bgs	below ground surface
BRAC	Base Realignment and Closure Action
CCC	Calcium Carbonate Cake
CMI (C)	Corrective Measures Implementation (Construction)
CMI(O)	Corrective Measures Implementation (Operation)
CMS	Corrective Measures Study
CS	Confirmatory Sampling
CTC	Cost to Complete
CWP	Contaminated Waste Processor
cy	Cubic Yards
DD	Decision Document
DES	Design
DNT	Dinitrotoluene
DSERTS	Defense Site Environmental Restoration Tracking System (Now AEDB-R)
EBS	Environmental Baseline Survey
ER,A	Environmental Restoration, Army (formally called DERA)
FS	Feasibility Study
FY	Fiscal Year
GN	Guanidine Nitrate
GSA	General Services Administration
GW	Groundwater
IAP	Installation Action Plan
IRA	Interim Removal Action
IRP	Installation Restoration Program
KDHE	Kansas Department of Health and Environment
LTM	Long Term Management
LWTP	Liquid Waste Treatment Plant
MMRP	Military Munitions Response Program
NC	Nitrocellulose
NE	Not Evaluated
NFA	No Further Action
NG	Nitroglycerine
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NQ	Nitroguanidine
NSE	Nitroguanidine Support Equipment
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbons
PBC	Performace Based Contracting
PCB	Polychlorinated Biphenyls
PCE	Perchloroethylene or tetrachloroethylene
POL	Petroleum, Oil & Lubricants

Acronyms & Abbreviations

PRG	Preliminary Remediation Goal
RA	Remedial Action
RA(C)	Remedial Action - Construction
RA(O)	Remedial Action - Operation
RAB	Restoration Advisory Board
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
REM	Removal
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RI	Remedial Investigation
RIP	Remedy in Place
ROD	Record of Decision
RRSE	Relative Risk Site Evaluation
RSK	Risk-based Standards for Kansas
RWTP	River Water Treatment Plant
SFAAP	Sunflower Army Ammunition Plant
SAAP	Sunflower Army Ammunition Plant AEDB-R Site Code
SAC	Sulfuric Acid Concentrator
SI	Site Inspection
STP	Sewage Treatment Plant
SVOC	Semi-Volatile Organic Compounds
SWMU	Solid Waste Management Unit
TAPP	Technical Assistance for Public Participation
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbons
TPH-DRO	Total Petroleum Hydrocarbons-Diesel Range Organics
USACE	United States Army Corps of Engineers
USACHPPM	United States Army Center for Health Promotion and Preventive Medicine
USAEC	United States Army Environmental Center
USAEHA	United States Army Environmental Hygiene Agency (changed to USACHPPM)
USEPA	United States Environmental Protection Agency
USATHMA	United States Army Toxic and Hazardous Materials Agency (changed to USAEC)
UST	Underground Storage Tank
UXO	Unexploded Ordnance
VOC	Volatile Organic Compounds
WWII	World War II

INSTALLATION LOCALE: The Sunflower Army Ammunition Plant is located on 9,065 acres in rural northwestern Johnson County, Kansas. It is approximately 3 miles southwest of DeSoto, Kansas and 28 miles southwest of Kansas City. It is roughly rectangular and about 6 miles long by 3 miles wide, with the long axis oriented in a north- south direction.

Sunflower Army Ammunition Plant, originally known as the Sunflower Ordnance Works, was established in 1941 on 10,747 acres as the world's largest powder and propellant plant. Production of propellant began in 1943 and played a significant role in U.S. history by providing munitions for three major military conflicts - WWII, the Korean Conflict and the Vietnam Conflict. The installation has been determined to be in excess of Army needs, and GSA has begun the process of disposing of all Sunflower property.

INSTALLATION MISSION: Decontaminate explosive facilities, clean up environmental contamination, and transfer installation to other Government agencies or the private sector.

COMMAND ORGANIZATION:

SUBCOMMAND: BRAC

INSTALLATION: Sunflower Army Ammunition Plant

LEAD EXECUTOR: U.S. Army Corps of Engineers, Kansas City District

REGULATOR PARTICIPATION:

Federal: U.S. Environmental Protection Agency, Region VII, RCRA Branch

State: Kansas Department of Health and Environment, Bureau of Environmental Remediation

NPL STATUS: Proposed for NPL in February 1995. Remains on proposed list.

RAB/TRC/TAPP STATUS: There is an active RAB at SFAAP that meets every two months and will continue as long as interest warrants.

PROGRAM SUMMARIES:

IRP

Contaminants of Concern: Nitrocellulose, Nitroglycerine, Nitroguanidine, Propellant constituents, Nitrates,

Pesticides, Heavy Metals

Media of Concern: Groundwater, Soil, Surface Water, Sediment

Estimated date for RIP/RC: 2009

Funding to Date: (FY89-FY05): \$33,866,900

CTC (FY06-FY36): \$67,282,000

MMRP: The two MMRP sites listed in AEDB-R are considered Response Complete.

Cleanup Program Summary

HISTORIC ACTIVITY: Sunflower Army Ammunition Plant, originally known as the Sunflower Ordnance Works, was established in 1941 on 10,747 acres as the world's largest powder and propellant plant. Production of propellant began in 1943 and played a significant role in U.S. history by providing munitions for three major military conflicts - WWII, the Korean Conflict and the Vietnam Conflict. The installation has been determined to be in excess of Army needs, and GSA has begun the process of disposing of all Sunflower property.

Additional installation operations included the manufacture and regeneration of nitric and sulfuric acids, and munitions proving.

During the course of its 50-plus years of operation, various hazardous substances were released both inadvertently and intentionally to the environment. These releases, which are not uncommon at major industrial facilities, were from production line areas and 54 RCRA solid waste management units (SWMUs). The USEPA proposed listing the installation on the National Priorities List (NPL) in 1995.

Preliminary investigations have been conducted on all SWMUs. In addition to studying each SWMU, four SWMUs have received final closure. Studies show that seven SWMUs will not require any remedial action. Special work performed on the plant includes a community relations plan, groundwater investigation, a benthic macroinvertebrate study, grazing study, ecological risk assessment, public health assessment (ATSDR), an off-site well survey, and an installation-wide stream study.

The plant has an active RAB that represents a broad range of community views. An active Technical Review Committee consisting of installation personnel, USEPA, KDHE, the U.S. Army Corps of Engineers, and contractors meets monthly to discuss restoration activities and devise ways to accelerate the cleanup program.

Thirteen new SWMUs and 22 AOCs were identified in the 1998 installation-wide Environmental Baseline Survey. USACHPPM performed relative risk site evaluations on those sites that are eligible for ER,A funding.

CURRENT ACTIVITY:

IRP: Investigations have been conducted at SAAP-001-053. Several of these sites have been remediated, or require no further action. The remaining sites between SAAP-001 and 053 that require further action will have additional investigations to fill data gaps and will be remediated if required. SAAP-054 thru 124 will be investigated and remediated if required.

Sunflower Army Ammunition Plant

INSTALLATION RESTORATION PROGRAM

AEDB-R ER,A SITES/SITES RC: 87/16

AEDB-R ER,A SITE TYPES:

3 Above Ground Storage Tank	2 Disposal Pit/Dry Well
5 Burn Area	6 Drainage Ditch
1 Chemical Disposal Area	1 Firing Range
4 Contaminated Building	1 Incinerator
1 Contaminated Fill	5 Landfill
3 Contaminated Groundwater	2 Maintenance Yard
3 Contaminated Sediment	1 Oil Water Separator
5 Contaminated Soil Piles	2 POL
1 Pesticide Shop	1 Sewage Treatment Plant
4 Spill Site Area	7 Storage Area
10 Surface Disposal Area	15 Surface Impoundment Lagoon
2 UXO	2 Waste Treatment Plant

CONTAMINANTS OF CONCERN: Nitrocellulose, Nitroglycerine, Nitroguanidine, Propellant constituents, Nitrates, Pesticides, Heavy Metals

MEDIA OF CONCERN: Soil, Groundwater, Sediment, Surface Water

COMPLETED REM/IRA/RA:

- Interim Remedial Action performed at SWMU 50 in FY97 (Total Construction Cost: \$236,000).
- Lagoon Closure performed as Remedial Action in FY97 (Total Construction Cost: \$558,000)
- Completed RA for SWMU 10 & 11 in FY01 (Total contract cost: \$5,869,111)
- Completed IRA for SWMU 18, 32, 33, 34, 35 in FY02 (Total construction cost: \$1,208,332)
- Completed RA for SWMU 22 in FY05 (Total construction cost: \$2,205,103)
- Completed RA for SWMU 10 (including AOC 6) in FY05 (Total construction cost: \$525,336)

TOTAL ER,A FUNDING:

PRIOR YEAR (FY89-FY04):	\$ 29,427,900
CURRENT (FY05):	\$ 4,439,000
FUTURE (FY06-FY15+):	\$ 67,282,000

DURATION OF IRP:

Year of IRP Inception:	1979
Year of RA Completion:	2009
Year of IRP Completion:	Indefinite

IRP Contamination Assessment

Sunflower Army Ammunition Plant no longer has a military mission. The property is in the process of being disposed of by GSA. Past sampling has revealed that hazardous substances are in the soil, sediment and groundwater beneath the plant. Sunflower is continuing concentrated efforts to decontaminate explosive buildings/foundations/sewers and cleanup all production sites contaminated with hazardous substances.

Sixty-seven Solid Waste Management Units (SWMUs) and twenty-four Areas of Concern (AOCs) are included in the RCRA investigations. During preparation of RFI work plans (1993), the SWMUs were subdivided into six groups based on industrial activities, treatment processes and disposal methods. These categories are: N-5 Propellant Production Sites, Nitroguanidine Production Site, Landfill Sites, Waste Treatment Sites, Support Area Sites, and a Single Base Propellant Area.

As site specific sample data becomes available from the initial RFI studies, discussions are held at regular intervals with the Project team, USEPA and KDHE to ensure that the IRP program continues to address those SWMUs with the greatest potential to impact human health and the environment.

A corrective measures study (CMS) was completed for SAAP-010, 011, 022, and 032. The corrective measures implementation (CMI) for SAAP-010 and 011 was completed in FY00. A Groundwater Study and Grazing Study were completed. An IRA was completed for SWMUs 18, 32, 33, 34 and 35 in FY02. The CMI for SAAP-022 was completed in FY05. A CMS was completed for SAAP-021 in FY05.

Based on this process, the current planned responses include completing RFI reports for those SWMUs where investigations are under way, collecting data on the nature and extent of contamination at SWMUs that are yet to be characterized, beginning CMSs on the highest priority SWMUs and undertaking CMIs at SWMUs where required.

The State of Kansas' plan to acquire all plant property and transfer it to a private corporation for redevelopment is a major uncertainty which may affect the cleanup schedule and type of action for many of the SWMUs. The Kansas Department of Health and Environment is developing a consent order describing cleanup activities a third party owner must complete.

The activities detailed in this IAP will be accomplished using specifically appropriated funds for the cleanup of contamination resulting from past releases of potentially hazardous substances to the environment. In addition, the Army also separately addresses additional environmental issues, including concerns related to existing structures and equipment, and are paid for through the yearly allocation of funds.

CLEANUP EXIT STRATEGY:

In order for Sunflower to get to RIP/RC many sites require additional investigation and some sites require an initial investigation. Sites known to contain contaminants in soil/sediments above risk levels will be remediated. After soil contamination is remediated the contaminated groundwater will undergo monitored natural attenuation. Specifics can be found in Cleanup Strategies for each site.

Previous Studies

Title	Date	Author
Field Sampling and Analysis Work Plan, RCRA Facility Investigation, SWMU 53, Construction Debris Landfill	14 Jan 05	Shaw Environmental
Additional Characterization Investigation Report and Corrective Measures Work Plan, SWMU 10, F-Line Uplands Building Foundations, Old Mechanized Roll Area, and New Mechanized Roll Area	31 Dec 04	Shaw Environmental
Field Sampling and Analysis Work Plan, Groundwater Operable Unit No. 2	31 Dec 04	Shaw Environmental
Field Sampling and Analysis Work Plan, RFI Addendum, SWMU 25, Nitrocellulose Area Ditches	13 Dec 04	Shaw Environmental
Corrective Measures Study, SWMU 21	26 Nov 04	Shaw Environmental
Field Sampling and Analysis Work Plan, SWMU 18, Old/New Sanitary Landfills	22 Nov 04	Shaw Environmental
Field Sampling and Analysis Work Plan, Groundwater Operable Unit No. 2	29 Oct 04	Shaw Environmental
RFI Sites Field Sampling Work Plan, SWMUs 1, 39, 45/47	16 Sep 04	Shaw Environmental
Explosive Characterization Sampling Plan	11 Aug 04	Shaw Environmental
Field Sampling and Analysis Work Plan, SWMUs 60 and 61, and AOCs 3 and 13	4 Aug 04	Shaw Environmental
RCRA Long-Term Monitoring, Field Sampling and Analysis Work Plan, SWMU 41, Calcium Carbonate Cake Landfill	25 Jun 04	Shaw Environmental
Engineering Evaluation and Cost Analysis for On-Site and Off-Site Disposal of Non-Hazardous Contaminated Soils at SFAAP (CAMU Study)	25 Jun 04	Shaw Environmental
Sunflower Installation Restoration Program - Safety, Health and Emergency Response Plan (Global Planning Document)	21 May 04	Shaw Environmental
Fielding Sampling and Analysis Work Plan - SWMU 3, Main Sewage Treatment Plant	14 May 04	Shaw Environmental
Sunflower Installation Restoration Program - Contractor Quality Control Plan (Global Planning Document)	30 Apr 04	Shaw Environmental
Fielding Sampling and Analysis Work Plan - SWMU 14, Static Rocket Test Area	12 Apr 04	Shaw Environmental
Annual Waste Disposal Area Inspection, SWMU 50	1 Apr 04	KC Dist, Corps of Eng
Field Sampling and Analysis Work Plan, RCRA Facility Investigation, SWMU 38, Oil-Water Separator	26 Mar 04	Shaw Environmental
Treatability Study Field Sampling Plan (Site Wide)	19 Mar 04	Shaw Environmental
Site-Wide Stabilization Treatability Study Work Plan	19 Mar 04	Shaw Environmental
Corrective Measures Implementation Work Plan - SWMU 22	16 Mar 04	Shaw Environmental
Field Sampling and Analysis Work Plan, RCRA Facility Investigation, SWMU 20, Ash Lagoons and Sludge Disposal Area	30 Jan 04	Shaw Environmental
Field Sampling Analysis Work Plan RCRA Facility Investigation SWMU 10, F-Line Product Area (Upland Area)	19 Jan 04	Shaw Environmental
Field Sampling and Analysis Work Plan, SWMU 22 - Old Explosive Waste Burning Ground	16 Jan 04	Shaw Environmental
USACHPPM Relative Risk Site Evaluation (Multiple New SWMUs & AOCs)	1 Nov 03	USACHPPM
Annual Waste Disposal Area Inspection, SWMU 50	1 Oct 03	KC Dist, Corps of Eng
Interim Remedial Action Report, SWMUs 18, 32, 33, 34, and 35	26 Sep 03	Shaw Environmental

Previous Studies

Title	Date	Author
Data Summary Report, SWMUs 13, 27, and 48, May 2002 Initial Sampling Event and Fall 2002 Subsurface Investigation	1 Sep 03	Environmental Chemical Corp
Long-Term Monitoring Work Plan, SWMUs 11 and 41	1 Sep 03	Environmental Chemical Corp
Quality Control Summary Report and Subsurface Investigation - SWMUs 11, 13, 27, 41, and 48	1 Sep 03	Environmental Chemical Corp
Initial Sampling Event, May 2002 - Final Quality Control Summary	1 Aug 03	Environmental Chemical Corp
Closed, Transferring, and Transferred Range/Site Inventory Report	1 Aug 03	Engineering Environmental Mgt, Inc.
Field Sampling and Analysis Work Plan, RCRA Facility Investigation, SWMU 14, Static Rocket Test Area (Draft)	17 Jul 03	Shaw Environmental
Field Sampling and Analysis Work Plan, SWMU 52, Paint Bay, Building 542 and Tire Shop	2 Jul 03	Shaw Environmental
Site-Wide Stabilization Treatability Study Work Plan (Draft)	2 Jul 03	Shaw Environmental
Annual Waste Disposal Area Inspection - SWMU 50	1 Jul 03	Environmental Chemical Corp
Proposed Ratification of Original Finding of No Significant Impact (FONSI) for SFAAP Proposed Property Disposal	1 Jul 03	General Services Administration
Long-Term Monitoring Work Plan, SWMUs 11, 33, 34, and 35	1 Jul 03	KC Dist, Corps of Eng
Preliminary Finding of Suitability for Early Transfer of SFAAP	1 May 03	US Army
Sunflower Installation Restoration Program, Sampling and Analysis Plan (Global Planning Document)	1 Apr 03	Shaw Environmental
Sampling and Analysis Plan for Study #37-MA-00RF, Relative Risk Site Evaluation	17-18 Mar 03	USACHPPM
Work Plan for Long-Term Operations/Long-Term Monitoring, SWMUs 11, 41, and 50	1 Mar 03	Environmental Chemical Corp
Memorandum of Agreement Between GSA, Army, Advisory Council for Historic Preservation (ACHP) and the State Historic Preservation Office (SHPO), Re Disposal of SFAAP	1 Mar 03	Tetra Tech
Field Sampling and Analysis Work Plan, SWMU 21	18 Feb 03	Shaw Environmental
Subsurface Investigation Plan for SWMUs 13, 27, 41, and 48	1 Jan 03	Environmental Chemical Corp
Interim Remedial Action Work Plan, SWMUs 32, 33, 34 and 35	1 Dec 02	Shaw Environmental
Stream Study Work Plan, Final Phase I	1 Dec 02	Shaw Environmental
Site Safety and Health Plan Addendum for Long-Term Monitoring of SWMUs 11, 13, 27, 41, 48 and 50	1 Nov 02	Environmental Chemical Corp
Stream Study Work Plan	1 Oct 02	Shaw Environmental
Site Specific Work Plan Addendum, Subsurface Investigation Plan and Site Safety and Health Plan Addendum, Long-Term Monitoring Operations/LTM for SWMUs 11, 13, 27, 41, 48 and 50	1 Aug 02	Environmental Chemical Corp
Lead Analysis Project (SWMU 10)	17 May 02	IT Corporation
Initial Sampling Plan for SWMUs 13, 27 and 41	1 May 02	Environmental Chemical Corp
Supplemental RCRA Facility Investigation Report and Quality Control Summary Report Addendum for SWMU 14, the Static Rocket Test Area	1 Apr 02	Burns and McDonnell
Supplemental RCRA Facility Investigation Report and Quality Control Summary Report Addendum for SWMU 21 - The Contaminated Materials Burning Ground, Volumes I and II	1 Apr 02	Burns and McDonnell
RCRA Facility Investigation Report Addendum for SWMUs 33, 34, & 35 - Half Tanks and Settling Ponds - Volumes I and II	1-Apr-02	Burns and McDonnell
Annual Landfill Inspection Report - SWMU 50	19 Mar 02	Environmental Chemical Corp
ATSDR Public Health Assessment	4 Mar 02	ATSDR

Previous Studies

Title	Date	Author
SWMU 2 Field Sampling and Analysis Work Plan	1 Mar 02	Law Environmental, Inc.
Grazing Study Report - Sunflower AAP, Volumes I and II	1-Jan-02	Burns and McDonnell
Interim Remedial Action Work Plan, SWMUs 18 and 19	1-Jan-02	IT Corporation
Site Safety and Health Plan - SWMUs 2, 18, 32, 33, 34, 35	1-Dec-01	IT Corporation
Remedial Action Summary Report, SWMUs 10 & 11	1-Oct-01	IT Corporation
Characterization of Explosively Contaminated Sewer Lines	1 Aug 01	MKM Engineers, Inc.
Remedial Action Summary Report - SWMUs 10 and 11	1-Aug-01	IT Corporation
RCRA Facility Investigation Report Addendum and Quality Control Summary Report for SWMU 26 - Single Base Area Wastewater Settling Pumps	1-Jun-01	Burns and McDonnell
RCRA Facility Investigation Report Addendum and Quality Control Summary Report for SWMU 30 - Pesticide Waste Handling Area	1-Jun-01	Burns and McDonnell
RCRA Facility Investigation Report Addendum and Quality Control Summary Report for SWMUs 7, 8, and 9 - North Acid Area	1-Jun-01	Burns and McDonnell
Project Closure Report for SWMU 50 Interim Removal, Volumes I & II	1-Mar-01	Environmental Chemical Corp
Lead Stabilization Work Plan, SWMUs 10 & 11	1-Feb-01	IT Corporation
Treatability Planning & Reporting Documents, SWMUs 10 & 11	1-Feb-01	IT Corporation
Quality Control Plan - Implementation of Corrective Measures at SWMUs 10 & 11	1-Jan-01	IT Corporation
Sampling and Analysis Plan, Volumes I & II, SWMUs 10 & 11	1-Jan-01	IT Corporation
Site Safety and Health Plan, SWMUs 10 & 11	1-Jan-01	IT Corporation
RCRA Facility Investigation Report Addendum and Quality Control Summary Report for SWMU 25 - Nitrocellulose Area Ditches	1-Nov-00	Burns and McDonnell
RCRA Facility Investigation Report Addendum and Quality Control Summary Report for SWMU 45 - Building 9040 Calcium Cyanamide Conveyors and Storage Units	1-Nov-00	Burns and McDonnell
RCRA Facility Investigation Report Addendum and Quality Control Summary Report for SWMUs 41 and 42 - Calcium Carbonate Cake and Temporary Sanitary Landfills	1-Nov-00	Burns and McDonnell
Environmental Baseline Assessment for Koch Sulfur, Inc.	11 Oct 00	Terracon
RCRA Facility Investigation Report Addendum and Quality Control Summary Report for SWMU 17 - G-Line Area Ditches	1-Oct-00	Burns and McDonnell
RCRA Facility Investigation Report Addendum and Quality Control Summary Report for SWMU 49 - Road Just Southeast of the Sanitary Landfill	1-Oct-00	Burns and McDonnell
RCRA Facility Investigation Report Addendum for SWMU 16 - Temporary Waste Storage Magazines	1-Oct-00	Burns and McDonnell
Site Specific Work Plan Addendum, Draft Geoprobe Investigation Plan and Draft Site Safety and Health Plan Addendum for SWMUs 13, 24, 41 and 50	1 Sep 00	Environmental Chemical Corp
RCRA Facility Investigation Report Addendum and Quality Control Summary Report for SWMU 44 - Tank T784	1-Jun-00	Burns and McDonnell
RCRA Facility Investigation Report; Addendum and Quality Control Summary Report for SWMU 20 (Ash Lagoons & Sludge Disposal Area)	1-May-00	Burns and McDonnell
RCRA Facility Investigation Report; Addendum and Quality Control Summary Report for SWMU 40 (Calcium Carbide Disposal Area)	1-May-00	Burns and McDonnell

Previous Studies

Title	Date	Author
RCRA Facility Investigation Report; Addendum and Quality Control Summary Report for SWMU 43 (Tunnel Dryers)	1-May-00	Burns and McDonnell
RCRA Facility Investigation Report; Addendum and Quality Control Summary Report for SWMU 15 (Waste Storage Magazine)	1-Apr-00	Burns and McDonnell
RCRA Facility Investigation Report; Addendum and Quality Control Summary Report for SWMU 39 (South Acid Area Drainage Ditch)	1-Apr-00	Burns and McDonnell
RCRA Facility Investigation Report; Addendum and Quality Control Summary Report for SWMU 46 (Decontamination Oven)	1-Apr-00	Burns and McDonnell
RCRA Facility Investigation Report Addendum and Quality Control Summary Report for SWMU 37 (Sandblast Area)	1-Mar-00	Burns and McDonnell
RCRA Facility Investigation Report Addendum and Quality Control Summary Report for SWMU 38 (Oil Separator)	1-Mar-00	Burns and McDonnell
RCRA Facility Investigation Report Addendum and Quality Control Summary Report for SWMU 52 (Paint Bay, Bldg 542 and Tire Shop)	1-Mar-00	Burns and McDonnell
Storm Water Pollution Prevention Plan, SWMUs 10 / 11	1-Feb-00	IT Corporation
Geology, Hydrogeology and Groundwater Quality Study	1 Feb 00	Burns and McDonnell
Explosives Safety Submission Ordnance, Explosives Remedial Actions - SFAAP	1 Jan 00	IT Corporation
Site Safety and Health Plan, SWMUs 10 / 11	1-Jan-00	IT Corporation
Flocculation and Clarification Treatability Study Report - SWMUs 10 / 11	1-Nov-99	IT Corporation
Stabilization Treatability Study Report, SWMUs 10 / 11	1-Nov-99	IT Corporation
Chemical Quality Management Plan, SWMU 50, Interim Removal	5-Oct-99	Environmental Chemical Corp
Contractor Workplan, Quality Control Plan Site Safety and Health Plan Addendum, SWMU 50	5-Oct-99	Environmental Chemical Corp
Finding of Suitability for Early Transfer (FOSET) - SFAAP	1 Aug 99	US Army
Off-Site Well Inventory Report	1-Aug-99	Burns and McDonnell
Geology, Hydrogeology and Groundwater Quality Study	24 Jun 99	Burns and McDonnell
Focused Corrective Measures Study Work Plan SWMU 50	1-Jun-99	Burns and McDonnell
RCRA Facility Investigation Report and Final Quality Control Summary Report and Addendum - SWMU 12	1-May-99	Law
RCRA Facility Investigation Report and Final Quality Control Summary Report and Addendum - SWMU 2	1-May-99	Law
RCRA Facility Investigation Report and Final Quality Control Summary Report and Addendum - SWMU 27	1-May-99	Law
RCRA Facility Investigation Report and Final Quality Control Summary Report and Addendum - SWMU 31	1-May-99	Law
RCRA Facility Investigation Report and Final Quality Control Summary Report and Addendum - SWMU 47	1-May-99	Law
RCRA Facility Investigation Report and Final Quality Control Summary Report and Addendum - SWMU 48	1-May-99	Law
RCRA Facility Investigation Report and Final Quality Control Summary Report and Addendum - SWMU 6	1-May-99	Law
Dioxin Background Study Report	9 Apr 99	EPA/TetraTech
RCRA Facility Investigation Report and Final Quality Control Summary Report and Addendum - SWMU 13	1-Apr-99	Law

Previous Studies

Title	Date	Author
RCRA Facility Investigation Report and Final Quality Control Summary Report and Addendum - SWMU 36	1-Apr-99	Law
Facility Investigation and Final Quality Control Summary Report Addendum - SWMUs 4 and 5	1 Mar 99	Law Environmental, Inc.
Work Plan for Supplemental RCRA Facility Investigation for SWMUs 14 and 21	1 Mar 99	Burns and McDonnell
Decision Logic Criteria for Environmental Stabilization Plan (ESP) Burns - Buildings with Asbestos-Containing Materials (ACM) - 1999	1 Mar 99	Alliant Tech Systems
RCRA Facility Investigation Report and Final Quality Control Summary Report and Addendum - SWMU 24	1-Mar-99	Law
RCRA Facility Investigation Report and Final Quality Control Summary Report and Addendum - SWMU 3	1-Mar-99	Law
Environmental Assessment Re GSA Disposal of SFAAP	1 Feb 99	For GSA by Louis Berger & Assoc and Dames & Moore
Corrective Measures Study - SWMUs 10/11 and 22/32	1 Feb 99	Burns and McDonnell
RCRA Facility Investigation Report and Final Quality Control Summary Report and Addendum - SWMU 1	1-Feb-99	Law
Work Plan for the Additional Investigation Activities at SWMUs 33, 34, and 35	1-Dec-98	Burns and McDonnell
Hazardous and Medical Waste Study No. 37-EF-9063-99, Relative Risk Site Evaluation - SWMUs 53 and 54	5-Nov-98	U.S. Army Center for Health Promotion and Preventive Medicine
Greenhouse Study - Phytoextraction of Lead from Contaminated Soils at SFAAP	1 Aug 98	For Army Env Center by Tennessee Valley Authority
Ecological Risk Assessment, RCRA Facility Investigation, Volume 1 - Text; Volume II - Tables/Figures; Volume III - Appendices	1-Aug-98	Law
Quality Control Summary Report, Ecological Risk Assessment	1-Aug-98	Law
Sunflower Army Ammunition Plant, Kansas, Environmental Baseline Survey Report	1-Aug-98	Aguirre Engineers, Inc.
Corrective Measure Study Work Plan, SWMUs 10/11 and SWMUs 23/32	1-May-98	Burns and McDonnell
Environmental Baseline Survey - Oz Entertainment Company	14 Apr 98	Hercules
Groundwater Monitoring Report for the former Underground Storage Tank Site at the N-Line Jeep and Trailer Shop, Building 6866	8-Dec-97	Hercules Aerospace Company Ordnance Group
Environmental Baseline Study - Transfer of SFAAP to US Army Corps of Engineers	3 Dec 97	US Army
Asbestos Location and OSHA Asbestos Compliance Plan, Koch Sulfur Products Company	1-Dec-97	Dalrymple Environmental, Inc.
RCRA Facility Investigation Report and Final Quality Control Summary Report Addendum - SWMUs 18 and 19	1-Jun-97	Law
RFI Report Addendum and QUALITY CONTROL SUMMARY REPORT - SWMU 51	1-Jun-97	Burns and McDonnell
RCRA Facility Investigation Report and Final Quality Control Summary Report Addendum - SWMU 21	1-May-97	Law
SFAAP, First Non-Time Critical Burn, 13 February 1997, Aerial Plume Emissions Measurement Report	15-Apr-97	Envirovisions, Inc.
RCRA Facility Investigation Report and Quality Control Summary Report Addendum for SWMU 14	1 Apr 97	Law Environmental, Inc.

Previous Studies

Title	Date	Author
Interim Measures Work Plan for SWMU 50 - Debris Removal and Stream Bank Stabilization	1 Apr 97	Bay West, Inc.
RCRA Facility Investigation Report and Quality Control Summary Report Addendum for SWMUs 10 and 11	1 Mar 97	Law Environmental, Inc.
RCRA Facility Investigation Report and Final Quality Control Summary Report Addendum - SWMUs 22 and 32	1-Mar-97	Law
RCRA Facility Investigation Report for SFAAP - General	1 Feb 97	Law Environmental, Inc.
RCRA Facility Investigation Report and Quality Control Summary Report Addendum - SWMU 50	1-Feb-97	Law
Community Relations Plan and Community Relations Plan Addendum for the Non-Time Critical Removal Action of Explosives-Contaminated Buildings, SFAAP	27-Jan-97	Burns and McDonnell
Community Relations Plan and Addenda	1-Jan-97	Burns and McDonnell
Background Investigation Report and Quality Control Summary Report Addendum for Ecological Risk Assessment, Surface Water/Sediment Sampling and De Soto Park Sampling	1 Nov 96	Law Environmental, Inc.
Addendum and Quality Control Plan for RCRA Facility Investigation of 16 SWMUs (7, 8, 9, 16, 17, 23, 25, 26, 30, 33, 34, 35, 41, 42, 45 and 49)	1 Nov 96	Burns and McDonnell
Background Investigation Report and Quality Control Summary Report Addendum	1-Nov-96	Law
Ecological Risk Assessment Work Plan	1 Apr 96	Burns and McDonnell
Site Safety and Health Plan for the Small Project Indefinite Delivery Type Contract (SPIDT) - SWMU 50	1 Oct 96	Bay West, Inc.
Groundwater Study Workplan	1-Aug-96	Burns and McDonnell
Risk Analysis and Environmental Stabilization Plan for Excess Personal Property (SFAAP)	29 Jul 96	Plexus Scientific
Layaway of Industrial Facilities (LIF) Project 5968612 - Disposal of Polychlorinated Biphenyl Contaminated Transformers SFAAP	29-May-96	US Army
Grazing Study Work Plans, Volumes I & II	1-May-96	Burns and McDonnell
Receiving Water Biological Study No. 32-24-1174-94, Environmental Sampling of Robert's Lake, SFAAP	11-Mar-96	U.S. Army Environmental Hygiene Agency
RCRA Facility Investigation Addenda for SWMUs 15, 20, 40, 43 and 44	1 Mar 96	Burns and McDonnell
RCRA Facility Investigation Report Addendum for SWMUs 37, 51, and 52	1 Feb 96	Burns and McDonnell
ATSDR Site Summary of SFAAP	1 Dec 95	ATSDR
Annual Report - Army Radon Reduction Program Implementation Progress.	31-Oct-95	Hercules Aerospace Company Ordnance Group
RCRA General RCRA Facility Investigation Quality Control Summary Report for SFAAP (Volume II)	1 Oct 95	Law Environmental, Inc.
RCRA Facility Investigation Quality Assurance Project Plan Addendum	1 Sep 95	Law Environmental, Inc.
Benthic Macroinvertebrate Survey - Final Report, RCRA Facility Investigation	1-Sep-95	Law Environmental, Inc.
Investigation Derived Waste Management (IDW) Workplan	1-Sep-95	Law Environmental, Inc.
RCRA General RCRA Facility Investigation Quality Control Summary Report for SFAAP (Volume I)	1 Aug 95	Law Environmental, Inc.

Previous Studies

Title	Date	Author
Contamination Evaluation Report for the Water Line Construction Corridor, SFAAP	1-Jun-95	Law Environmental, Inc.
RCRA Facility Investigation Addendum for Priority 2 SWMUs	1 May 95	Burns and McDonnell
Spill Prevention Control and Countermeasures Plan	1-Mar-95	Schrader, John, W.
Sub-surface Investigation of Proposed Lease Property	25-Jan-95	Koch Sulfur Products
Commander's Personal Environmental Assessment for SFAAP	12 Jan 95	US Army
Initial Public Health Assessment	1-Jan-95	U.S. Department of Health and Human Services, ATSDR
Background Investigation Workplan	1-Jan-95	Law Environmental, Inc.
Roberts Lake Receiving Water Biological Study - Environmental Sampling	15 Sep 94	US Army Environmental Hygiene Agency
General Operating Procedure - Asbestos Materials Handling/Disposal	6 Jun 94	Hercules
Field Sampling Plan - RCRA Facility Investigation	1-May-94	Law Environmental, Inc.
Work Plan, RCRA Facility Investigation	1-May-94	Law Environmental, Inc.
Analytical Data from Kansas University Medical Center Landfill Upgradient Monitoring Wells	15 Mar 94	Univ of Kansas Medical Center Safety Office
Environmental Assessment for SFAAP Operations and Maintenance Activities	3 Jan 94	Hercules
Kansas State Proposal for Development of a Horticulture Forestry Research/Education Center on Specific Lands on SFAAP	15 Aug 93	Kansas State Univ
Memorandum from J.C. Betteken, regarding the Depainting Sand Debris Found Non-Hazardous	5-Aug-93	Hercules Aerospace Company Ordnance Group
Groundwater Quality Consultation- Nitroguanidine Production	2-5 Aug 93	US Army Environmental Hygiene Agency
Preliminary Assessment of Record of Environmental Consideration for Corridor 10 Commerce Park to Connect to Government Rail Line	27 May 93	Hercules
Environmental Assessment / PAS - Kill Creek Corridor Land-Lease for Public Park	20 May 93	Hercules
Aerial Photo Analysis	1 Apr 93	US EPA
RCRA Facility Investigation Quality Assurance Project Plan for SFAAP	1 Jan 93	Law Environmental, Inc.
RCRA Facility Investigation Site Safety and Health Plan for SFAAP	1 Jan 93	Law Environmental, Inc.
Preliminary Assessment Screening, Koch Sulfur Products Company	15-Sep-92	SCS Engineers
General Operating Procedure, Maintenance Unit, "Decontaminating, Preserving and Storage of General Equipment at Sunflower Army Ammunition Plant"	27-Aug-92	Hercules Aerospace Company Ordnance Group
Environmental Assessment for Proposed Inactivation of SFAAP with 14 Aug 1992 Finding of No Significant Impact (FONSI) Cover Letter	1 Jul 92	For AMC by Huntsville AL Corps of Eng
Report of Environmental Compliance Program Review at SFAAP	7-May-92	USAMC Installation and Services Activity
Phase 2, Geohydrolic Study No. 38-26-KF69-93, Subsurface Fuel Release, Building 6866 N-Line Trailer and Jeep Shop, SFAAP	1-Jan-92	U.S. Army Environmental Hygiene Agency
Kansas Department of Health and Environment: Letter concerning the land farming results of the contaminated soils for total petroleum hydrocarbon levels	17-Dec-91	Slade, Jack

Previous Studies

Title	Date	Author
Geohydrologic Study No. 38-26-K952-91, Old Nitroguanidine Support Equipment Facility, Sunflower AAP, 1-9 April	1-Apr-91	U.S. Army Environmental Hygiene Agency
Environmental Assessment - Disposal Batch Nitroglycerin (NG) Building by Open Burning	20 Nov 90	US Army
RCRA Preliminary Review/Visual Site Investigation Report, SFAAP	1-Sep-90	PRC Environmental Management Inc.
Geohydrologic Study No. 38-26-8813-90, Nitroguanidine Production Area, 11-21 October 1988, 24 April - 12 May 1989, 31 May-11 June 1989, 4-7 December 1989.	3-Jul-90	U.S. Army Environmental Hygiene Agency
Koch Sulfur Products, Environmental Baseline Study, Supplement 1, Additional Soil Investigation	1-Apr-90	Wilson and Company
RCRA Preliminary Review/Visual Site Investigation Report, Sunflower AAP	1-Jan-90	B&V Waste Science and Technology Corp.
Remedial Investigation Report fro SFAAP	29-Sep-89	Dames and Moore
Investigation and Evaluation of Underground Storage Tanks, SFAAP	1-Sep-89	U.S. ACE - Omaha District
Remedial Investigation Findings for SFAAP	15 Aug 89	USATHAMA
US Army Response to Clearview City Environmental Screening by Environmental Audit Inc., Crestwood, KS	3 May 89	US Army
Preliminary Endangerment Assessment (Draft) Task Order No. 12	1-Jan-89	Dames and Moore
Project Plan, Geohydrologic Study No. 38-26-8813-89, Monitoring Well System Upgrade and Ground-Water Quality Assessment, Carbide and Power House Areas	1-Jan-89	Department of the Army
Asbestos Survey at SFAAP	1988	Foster-Wheeler
Report of an Environmental Baseline Study, Koch Sulfur Products Company	1-Nov-88	Wilson and Company
SFAAP SBR Denitrification Project (Bench Scale)	1 Jun 88	James M. Montgomery Consulting Eng, Inc.
Geohydrologic Study No. 38-26-0316-89, SAC Evaporation Lagoons and Building 9042 Area, 9-24 May and 11-21 October.	9-May-88	U.S. Army Environmental Hygiene Agency
Water Quality Engineering Study No. 32-24-0820-89, Final Report, Land Treatment System Evaluation	1-Jan-88	U.S. Army Environmental Hygiene Agency
Solid Waste Disposal Study # 38-26-0824-88, Landfill Site Selection - SFAAP (18-21 May and 15-20 Jun 87)	7 Dec 87	US Army Environmental Hygiene Agency
Ground-Water Contamination Survey No. 38-26-0856-89, Final Report, Evaluation of Solid Waste Management Units, Sunflower AAP, 21-25 September 1987.	21-Sep-87	U.S. Army Environmental Hygiene Agency
Characterization of Nitroguanidine Wastewater, Final Report	1-Jun-87	U.S. Department of the Army
Federal Facilities Compliance Agreement Final Engineering Report Between Army/SFAAP and EPA	1 Jun 87	US Army and EPA
Evaluation of the Adequacy of Existing Non-Discharging Lagoons for Current and Long-Term Uses, Sunflower AAP, September 1986, revised June, 1987.	1-Jun-87	U.S. Department of the Army
Engineering Study Report, Sunflower AAP	1-Jun-87	U.S. Department of the Army
Evaluation of the Suitability of the River Water Treatment Plant Lagoons for Treating NQ Wastewater	1-May-87	U.S. Department of the Army
Spill Containment Structures Evaluation Committee Report	29-Apr-87	U.S. Department of the Army

Previous Studies

Title	Date	Author
SFAAP Environmental Compliance Audit	1 Oct 86	For AMC by Huntsville AL Corps of Eng
Memorandum from R. M. Thompson, Rd: Treatment of Roberts Lake	27-Aug-86	Hercules Inc. - Aerospace Division
Short-Term Extension of Wastewater Lagoons Life at SFAAP	1 May 86	For USATHAMA by Arthur D. Little, Inc.
Wastewater Hazards Analysis Assessment of SFAAP Nitroguanidine Wastewater GAC/IE Pilot Plant	1 May 86	Arthur D. Little, Inc.
Environmental Risk Identification and Assessment of Nitroguanidine Manufacturing at SFAAP	1 Feb 86	US Army
Biological Treatment of SFAAP Wastewater Proposed Pilot Test Program	1 Jan 86	PolyBac Corp
Hazardous Waste Study No. 37-26-0710-86, Investigation of Possible Soil Contamination from Propellant and Explosive Production, 22 October - 8 November 1985.	22-Oct-85	U.S. Army Environmental Hygiene Agency
Hazardous Waste Study No. 37-26-0709-87, Investigation of Pond and Ditch Sediments, Sunflower AAP, 21 October - 8 November 1985.	21-Oct-85	U.S. Army Environmental Hygiene Agency
NQ Wastewater Pollution Control Engineering Study	1 Feb 85	Hercules
Archaeological Overview and Management Plan for SFAAP, Johnson County, KS	14 Jan 85	For Army and National Parks Service, US Dept of Interior by Nickens and Assoc
Exposure Information Report Powerhouse Industrial Waste Treatment Lagoon, USAEHA Project No. 37-26-1342-86.	1-Jan-85	U.S. Army Environmental Hygiene Agency
Hazardous Waste Study No. 37-26-0710-86, Investigation of Possible Soil Contamination from Propellant and Explosive Production.	1-Jan-85	U.S. Army Environmental Hygiene Agency
Land Treatment Feasibility Study No. 32-24-0419-84, Sunflower AAP, 9-13 April 1984.	9-Apr-84	U.S. Army Environmental Hygiene Agency
Alternative Methods of Fines Removal from Coal Pile Run-Off at SFAAP	1 Oct 83	Eugene A. Hickock & Assoc
Phase 2, Hazardous Waste Management Special Study No. 37-26-0147-84, DARCOM Open-Burning/Open-Detonation Grounds Evaluation, Sunflower AAP, 9-19 May 1983.	9-May-83	U.S. Army Environmental Hygiene Agency
Ground-water Quality Assessment Plan No. 38-26-0264-84, Power House/Industrial Waste Treatment Area, Sunflower AAP, 15-15 April 1983.	15-Apr-83	U.S. Army Environmental Hygiene Agency
Ground-water Quality Assessment Plan No. 38-26-0461-84, Nitroguanidine/Carbide Area, Sunflower AAP, 12-15 April 1983.	12-Apr-83	U.S. Army Environmental Hygiene Agency
Phase I Land Treatment Feasibility Study No. 32-24-0410-83, Sunflower AAP, December 1982.	1-Dec-82	U.S. Army Environmental Hygiene Agency
Potable/Recreational Water Quality Survey No. 31-66-0141-83, Sunflower AAP, 20-24 September 1982.	20-Sep-82	U.S. Army Environmental Hygiene Agency
Water Quality Engineering Consultation No. 32-24-0340-83, Sunflower AAP, 1-5 February 1982.	1-Feb-82	U.S. Army Environmental Hygiene Agency
Landfill Disposal Study # D-1473-W, SFAAP (Sep 1978 - Sep 1980)	10 Mar 81	US Army Environmental Hygiene Agency

Previous Studies

Title	Date	Author
Acoustical Engineering Noise Reduction Special Study No.51-34-0457-81, Ball Mill and Boiler House Noise, Sunflower AAP, 1-4 December 1980.	1-Dec-80	U.S. Army Environmental Hygiene Agency
Hazardous Waste Management Survey No. 39-26-0131-82, Sunflower AAP, 18-21 November 1980.	18-Nov-80	U.S. Army Environmental Hygiene Agency
Army Pollution Abatement Program Study No. D-1473-W, Landfill Disposal Study, Sunflower AAP, September 1978-September 1980.	1-Sep-80	U.S. Army Environmental Hygiene Agency
Water Quality Monitoring Consultation (WM) No. 32-66-0141-80, Sunflower AAP, 21-25 July 1980.	21-Jul-80	U.S. Army Environmental Hygiene Agency
Installation Assessment of Sunflower AAP, Report No. 163.	27-Mar-80	U.S. Army Toxic and Hazardous Materials Agency
Ambient Air Quality Impact Analysis, Nitroguanidine Facility, Sunflower AAP, June-November 1979.	1-Nov-79	U.S. Army Environmental Hygiene Agency
Water Management Study of the Nitroguanidine Production Facility - SFAAP	1 Jul 79	Aberdeen Proving Ground, MD
Army Pollution Abatement Program Feasibility Study for Acid Waste Treatment Area, SFAAP	1 May 79	Clark-Dietz Eng, Inc.
Environmental Impact Assessment Statement (Revised)	21 Dec 78	Hercules
Environmental Assessment/Master Plan for SFAAP	1 Sep 78	Hercules
Water Quality Biological Study No. 32-24-0134-79, Sunflower AAP, 10-21 July 1978.	1-Jul-78	U.S. Army Environmental Hygiene Agency
Environmental Impact Assessment of SFAAP Environmental Hazards from Activating Inactive Facilities	21 Nov 77	Hercules
Environmental Impact Assessment of NC Acid Wastewater Treatment Facility	8 Aug 77	Hercules
Source Sampling Data Summary Report, Study No. 21-0416-77, April 1977.	1-Apr-77	U.S. Army Environmental Hygiene Agency
Pollution Status Report - SFAAP	1 Jan 77	Picatunny Arsenal, NJ
Aquatic Ecological Surveys at SFAAP	1 Aug 76	US Army, Edgewood Arsenal
Preliminary Environmental Survey for SFAAP	1 Aug 74	Aberdeen Proving Ground, MD and Dugway Proving Ground, UT
Water Quality Monitoring, Consultation No. 24-044-74/75, Sunflower AAP, 11-15 February 1974	11-Feb-74	U.S. Army Environmental Hygiene Agency

Sunflower Army Ammunition Plant

INSTALLATION RESTORATION PROGRAM

ER, A Active AEDB-R Sites

SAAP-001

CLASSIFICATION YARD

SITE DESCRIPTION

The Classification Yard is a 64 acre railroad switchyard in the northeastern portion of SFAAP. Incoming raw materials were sorted in this area for diversion to the appropriate receiving facility within SFAAP. The area operated from 1942-1991. Rail operations through the area stopped in 2001.

This area produced no hazardous wastes; however, as a result of handling incoming raw materials which may be classified as hazardous, the area had the potential for contamination. Although no spills were reported, the Classification Yard was identified as an area of potential contamination in the 1980 Installation Assessment because of the materials handled and the length of time the area had been in use. A RFI was submitted and indicated no contamination above industrial land use standards.

KDHE requested additional groundwater data downgradient of this site. Surface soil sampling was conducted at the bare spots and other locations to characterize the areas.

CLEANUP STRATEGY

Approximately 7500 cy of contaminated soil will be removed and disposed of off-site. Confirmatory samples will be taken and a closure report will be completed. Finalize the no further action closure report.



STATUS

Regulatory: RCRA
RRSE: Medium
CONTAMINANTS: Solvents, Metals
MEDIA OF CONCERN:
 Soil, Groundwater

PHASES	Start	End
RFA.....	199307	.....199311
CS.....	199408	.....199805
RFI/CMS.....	199510	.....200510
DES.....	200710	.....200712
CMI(C).....	200801	.....200809

RC Expected: 200809

RIVER WATER TREATMENT PLANT LAGOONS

SITE DESCRIPTION

The River Water Treatment Plant (RWTP) (~19 acres), located in the northern portion of SFAAP near the Kansas River, was constructed and started operations in 1943. Water from the Kansas River was treated by lime addition, sedimentation, carbon filtration and chlorination. Sludge from the RWTP was partially used to construct two unlined lagoons south of the plant (upper lagoon 1,269,000 ft³, lower lagoon 1,952,000 ft³). Lime sludge was flushed from the RWTP flocculation basins into the lagoons (USAEHA, 1978). Water treatment operations at the RWTP ceased in 1971, thus eliminating the effluent of lime sludge from the RWTP into the lagoons. In the late 1970s, because of the start up of NQ production, the lagoons received about 200,000 gallons per day of discharge from the NQ Area. This included wastewater from tank T784 (SWMU 44) which stored noncontact cooling water, steam condensate, cooling tower blowdown, and ammonia stripper discharge from the NQ production process. The RWTP was leased to a private firm for commercial aquaculture purposes (terminated in Sep 2001).

Both lagoons support a variety of aquatic life. Beaver, muskrat, turtles, sunfish and bass, along with aquatic vascular plants and summer algal blooms are commonly observed.

Initial RFI results indicated the need for additional GW and sediment sampling. Additional RFI data indicated elevated levels of arsenic in deep subsurface soils and the bedrock interface.

CLEANUP STRATEGY

Remove accumulated sludge and backfill/regrade (12,500 cy). Revise risk assessment to incorporate arsenic-related concerns. This site was included in an installation-wide stream study. Long-term monitoring and pond closure report will follow.



STATUS

REGULATORY: RCRA
RRSE: Medium
CONTAMINANTS: Metals
MEDIA OF CONCERN: Soil, Groundwater Surface Water, Sediment

PHASES	Start	End
RFA.....	197907	199009
CS.....	199408	199805
RFI/CMS.....	199611	200803
DES.....	200804	200809
CMI(C).....	200810	200909
LTM.....	200910	201409

RC Expected: 200909

SAAP-003

MAIN SEWAGE TREATMENT PLANT DRYING BEDS

SITE DESCRIPTION

The main Sewage Treatment Plant (STP) is located on ~10 acres in the northeastern portion of SFAAP. Operations began in 1942. The STP stopped receiving human waste in 2002. The plant treated sanitary wastewater from the installation. Following treatment, water from the plant was discharged into Kill Creek. During the 1950s and 1960s, solids (sludge) from the STP were placed in drying beds east of the Imhoff tank. The digester was last emptied in 1974. Wastewater from various production facilities and laboratories, including a photographic laboratory, processed at the plant may have contained hazardous constituents. According to a 1974 report, no chlorination was provided.

This site consists of the drying beds east of the Imhoff Tank. Small areas of contamination were found during the initial RFI activities; however, further soil investigation was conducted to fully delineate the site. The RFI is expected to be final in late FY05.

CLEANUP STRATEGY

Sediment removal (~500 cy) with off-site disposal is required.



STATUS

REGULATORY: RCRA
RRSE: High
CONTAMINANTS: Pesticides, Metals
MEDIA OF CONCERN: Soil, Sediment

PHASES	Start	End
RFA.....	197907	.....199009
CS.....	199408	.....199805
RFI/CMS.....	199511	.....200509
DES.....	200510	.....200512
CMI(C).....	200601	.....200609
RC Expected: 200609		

POND A AND SLUDGE DISPOSAL AREA

SITE DESCRIPTION

Pond A (~2.5 acres) is an unlined pond located in the north central portion of SFAAP encompassing ~86,200 ft². Pond A was constructed in 1942 and received wastewater from NC production during periods 1943-1960 and 1965-1971, and water discharged from the NQ Pilot Plant from 1980-1984. Pond A was used for the sedimentation of solids and equalization of wastewater from the NC area prior to lime treatment and subsequent discharge to Pond B (SWMU 6). In addition, Pond A received wastes from many other areas of SFAAP, including the NQ Pilot Plant. The pond now functions as part of the natural drainage system receiving storm sewer outfall from various parts of SFAAP, including drainage from the Industrial Wastewater Treatment Facility Area.

STATUS

REGULATORY: RCRA
RRSE: Medium
CONTAMINANTS: Nitrocellulose, Metals
MEDIA OF CONCERN: Soil, Groundwater

PHASES	Start	End
RFA.....	197907	.....199009
CS.....	199408	.....199805
RFI/CMS.....	199610	.....200807
DES	200808	.....200809
CMI(C).....	200810	.....200909
RC Expected: 200909		

An unknown quantity of sludge dredged from Pond A was landfilled at the Sludge Disposal Area, located north of, and adjacent to, the pond. Initial RFI (March 2000) results indicated elevated levels of nitrocellulose.

CLEANUP STRATEGY

All underground piping that is associated with the neutralization basin will be handled under SAAP-005.

Install bedrock well to ensure no contamination has reached a lower aquifer. Investigate sediment and surface water contamination in ditch between Ponds A and B. Approximately 4,000 cy of soil may be removed. A pond closure plan will be developed and the pond will be closed. LTM is not anticipated due to insolubility of NC.



SAAP-005

ACID SEWAGE DISPOSAL PLANT

SITE DESCRIPTION

The Acid Sewage Disposal Plant is located on ~1 acre on the southeast edge of Pond A. It was constructed in 1942 to treat the acidic wastewater flowing into Pond A from the NC area and had two periods of operation: 1943-1960 and 1965-1971. The pH of Pond A effluent was adjusted in the neutralization unit before draining into Pond B (SWMU 6). Neutralized wastes and unsettled flocculent were discharged to an open drainage ditch leading to Pond B. During a visual inspection in 1990, a white sludge identified as “pebble lime” was piled up along the southeast edge of the plant.

Initial RFI data indicates elevated levels of nitrocellulose in soil.

The underground piping and the initial portion of the connecting ditch to Pond B will be remediated under this site.

CLEANUP STRATEGY

Further investigation (neutralization basins) and a Corrective Measures Study will be completed. Approximately 5,000 cy of soil will be removed.



STATUS

REGULATORY: RCRA
RRSE: Medium
CONTAMINANTS: Metals, Nitrocellulose
MEDIA OF CONCERN: Soil, Sediment

PHASES	Start	End
RFA.....	197907	.....199009
CS.....	199408	.....199805
RFI/CMS.....	199610	.....200807
DES	200808	.....200809
CMI(C).....	200810	.....200909
RC Expected: 200909		

POND B AND SLUDGE DISPOSAL AREA

SITE DESCRIPTION

SAAP-006 (~38 acres) is located in the east-central portion of SFAAP, downstream of Pond A. Pond B is an unlined impoundment situated upon limestone bedrock with a surface area of ~9 acres and a capacity of ~2.2 million ft³ (16.5 million gal). The pond was constructed in the 1940s for sedimentation of solids from the neutralized wastewater discharged from the Acid Sewage Disposal Plant (SWMU 5). Unknown quantities of sludge were occasionally dredged from pond B and landfilled west of the pond. Pond B discharges into Kill Creek.

The pond supports a variety of aquatic life. Large fish were observed in the pond during a site visit in 2002.

Initial RFI results indicated elevated levels of manganese in groundwater.

STATUS

REGULATORY: RCRA

RRSE: Medium

CONTAMINANTS: Solvents, Nitrocellulose, Nitroglycerin, Metals,

MEDIA OF CONCERN: Soil, Groundwater, Surface Water, Sediment

PHASES	Start	End
RFA.....	197907	199009
CS	199405	199805
RFI/CMS.....	199611	200807
DES	200808	200809
CMI(C)	200810	200909
LTM.....	200910	201409

RC Expected: 200909

CLEANUP STRATEGY

Drain and dredge the pond. Dewater and dispose of sludge from the pond and associated disposal areas as special waste.

Additional investigation, including installing monitoring wells, is planned. Approximately 42,000 cy of soil will be removed, treated and disposed of off-site. A pond closure plan will be developed.

Five years of LTM will be conducted.



NORTH ACID AREA- CHROMATE AREA

SITE DESCRIPTION

The North Acid Area is located in the north-central portion of SFAAP. The North Acid Area manufactured ammonium nitrate liquor from 1947 to 1948 and was dismantled in 1958. The North Acid Area contains 3 SWMUs: the Chromate Area (SAAP-007), the Chromate Concentration Pond (SAAP-008) and the Wastewater Treatment Lagoon (SAAP-009).

The Chromate Area consists of ~0.5 acre within the North Acid Area. The Chromate Area is the location of the former cooling water treatment unit, including a cooling tower in which chromium-contaminated wastewater was reportedly generated through the use of corrosion inhibitors on the tower. Chromate liquid may have been disposed of in pipes subsequently left buried in the area and the potential is present for heavy metal contamination. When the site was dismantled in 1958, the 2 wastewater collection basins were left in place. In 1982 and 1983, chromium-contaminated water was removed from the basins. Water continues to accumulate in the basins.

A geophysical survey was conducted and several subsurface anomalies were identified, potentially indicating buried process pipelines. Initial RFI activities indicate the need for additional soil and surface water delineation due to heavy metal and PAH contamination.

Initial sample data were found to be unreliable; therefore, the site must be re-sampled.

CLEANUP STRATEGY

Additional RFI activities will be performed to complete nature and extent determination and to confirm source areas. Approximately 7,200 gal of liquid waste will be removed and disposed of off-site as hazwaste. The removal action will include excavation of debris (subsurface anomalies).

Approximately 550 cy of soil will be excavated, treated, and disposed off-site. Any existing surface water in the basins will be removed. Five years of LTM will be conducted.

STATUS

REGULATORY: RCRA
RRSE: High
CONTAMINANTS: PAHs, Metals
MEDIA OF CONCERN: Soil, Groundwater, Surface Water

PHASES	Start	End
RFA.....	197907	199201
CS.....	199610	199805
RFI/CMS.....	199807	200609
DES.....	200610	200612
CMI(C).....	200701	200709
LTM.....	200710	201209
RC Expected: 200709		

SAAP-008

NORTH ACID AREA- CHROMATE CONCENTRATION POND

SITE DESCRIPTION

The North Acid Area is located in the north-central portion of SFAAP. The North Acid Area manufactured ammonium nitrate liquor from 1947 to 1948 and was dismantled in 1958. The North Acid Area contains 3 SWMUs: the Chromate Area (SAAP-007), the Chromate Concentration Pond (SAAP-008) and the Wastewater Treatment Lagoon (SAAP-009).

The Chromate Concentration Pond is known to have been located within the North Acid Area, but because the pond has been drained, its location remains uncertain. Reportedly, chromate was used as a corrosion inhibitor on the cooling towers at the Nitrogen Fixation Plant.

Chromate salts from the neutralization process used to treat chromium sludge were reportedly stored in drums located in the magazine area. These salts proved non-hazardous and SFAAP received state approval to dispose of the salts in an on-site landfill.

The risk assessment found that the primary risk drivers were hexavalent chromium in surface water and PAHs in surface soil.

Initial sample data were found to be unreliable, therefore, the site must be re-sampled.

CLEANUP STRATEGY

Additional RFI activities will be performed. Approximately 3,600 gal of liquid waste will be removed and disposed of off-site as hazwaste. Approximately 550 cy of soil will be excavated, treated, and disposed off-site. Five years of LTM will be conducted.



STATUS

REGULATORY: RCRA
RRSE: High
CONTAMINANTS: Metals, PAHs
MEDIA OF CONCERN: Soil, Groundwater, Surface Water

PHASES	Start	End
RFA.....	197907	199009
CS.....	199608	199805
RFI/CMS.....	200001	200609
DES.....	200610	200612
CMI(C).....	200701	200709
LTM.....	200710	201209

RC Expected: 200709

SAAP-009

NORTH ACID AREA- WASTEWATER TREATMENT LAGOON

SITE DESCRIPTION

The North Acid Area is located in the north-central portion of SFAAP. The North Acid Area manufactured ammonium nitrateliquor from 1947 to 1948 and was dismantled in 1958. The North Acid Area contains 3 SWMUs: the Chromate Area (SAAP-007), the Chromate Concentration Pond (SAAP-008) and the Wastewater Treatment Lagoon (SAAP-009).

Wastewater treatment practices for the North Acid Area were not documented. It is believed the processes practiced were similar to the traditional wastewater treatment operations practiced in the South Acid Area. This treatment involved lime addition to the wastewater, followed by discharge to a holding pond or lagoon.

The South Acid Area produced calcium sulfate sludges. Similar sludges are believed to have been produced in the North Acid Area. In addition, there is a possibility that chromate-contaminated water may have been released as waste to this lagoon.

The risk assessment found that primary risk drivers were hexavalent chromium in surface water and PAHs in surface soil.

Initial sample data were found to be unreliable; therefore, the site must be re-sampled.

CLEANUP STRATEGY

Additional RFI activities will be performed. Approximately 7,200 gal of liquid waste will be removed and disposed of off-site as hazwaste. Approximately 550 cy of soil will be excavated, treated, and disposed off-site. Five years of LTM will be conducted.



STATUS

REGULATORY: RCRA
RRSE: High
CONTAMINANTS: PAHs, Metals,
MEDIA OF CONCERN: Soil,
 Groundwater, Surface Water

PHASES	Start	End
RFA.....	197907	199009
CS.....	199610	199805
RFI/CMS.....	200001	200609
DES.....	200610	200612
CMI(C).....	200701	200709
LTM.....	200710	201209

RC Expected: 200709

SAAP-010

F-LINE AREA DITCHES

SITE DESCRIPTION

The F-Line Area is located in the east-central portion of SFAAP. This site consisted of sumps, troughs, pipes and other conveyances and ditches used for the management of wastewater from operations in the F-Line Area. F-Line included a blender house where explosive propellant was received and blended with lead salicylate; rolled into sheets; slit and wound into carpet rolls; and extruded by large hydraulic presses into solid propellant grains. Any propellant that was on the floor was washed into the drain with the wastewater. Most of the effluents were then discharged, via unlined ditches, to settling ponds and eventually to Spoon and Kill Creeks; however, one group of the ditches discharged directly to a field adjacent to Spoon Creek. The F-line ditches were located on the east side of the F-Line press houses.

Occasionally, propellant solids settled in these ditches before reaching the ponds. The ditches were used periodically from 1943 to 1971. Several ditches served as discharge points for runoff from storm drains along the streets in the area.

The draft RFI indicated nitroglycerin in soil at concentrations that exceed USEPA's target risk range for carcinogenic risk. Lead was found at concentrations exceeding USEPA and KDHE guidance values. The Statement of Basis was completed and recommended soil remediation by excavation, stabilization and disposal. A surface soil (~24,000 cy) removal was completed in 2001. In 2001, the size of this site was expanded by ~25 acres to a total area of ~128 acres and includes 56 additional building foundations. Approximately 10 acres around the building foundations required additional investigation.

AOC-6 is being handled under this site. Completed site investigation of 10 additional acres of the site in FY04. Soil removal was completed in March 2005, and the report is expected to be completed by the end of FY05.

CLEANUP STRATEGY

Five years of LTM will be conducted.



STATUS

REGULATORY: RCRA
RRSE: High
CONTAMINANTS: Solvents, Ordnance Compounds, Nitrates
MEDIA OF CONCERN: Soil, Groundwater, Surface Water, Sediment

PHASES	Start	End
RFA.....	197907	199009
CS.....	199408	199805
RFI/CMS.....	199806	200410
DES	200410	200501
CMI(C).....	200410	200509
LTM.....	200510	201009

RC Expected: 200509