

**Explanation of Significant Difference  
For Pesticide Storage Facility  
Operable Unit 002  
Fort Riley, Kansas  
April 2010**



**PSF\_14\_001**

Explanation of Significant Difference for the Record of Decision  
for the Pesticide Storage Facility Operable Unit 002  
Fort Riley, Kansas

## 1. Introduction

This Explanation of Significant Difference (ESD) applies to the remedial actions and institutional controls performed and implemented under the No Further Action (NFA) Record of Decision (ROD) for the Pesticide Storage Facility (PSF) Operable Unit 002 (OU 002) at Fort Riley, Kansas signed September 29, 1997. The Department of Army-Fort Riley (hereinafter Fort Riley) is the lead agency with the U.S. Environmental Protection Agency, Region VII (EPA VII) and the Kansas Department of Health and Environment (KDHE) as support agencies.

This ESD is prepared in accordance with Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) 40 Code of Federal Regulations (CFR) Part 300.435(c)(2)(i) and documents a significant change to the remedy selected for the site in the ROD. The remedy change involves the following:

- Constituent levels in the residual soil do not pose a potential for risk under a future residential setting, thus, institutional controls as part of the NFA ROD are no longer required.
- The potential for significant risk in a future residential land-use setting, regardless of how remote that land-use change might be, required the implementation of institutional controls for the NFA ROD. For this ESD, all residual soil data were evaluated collectively, including the post-removal dataset and the datasets from the 2006 and 2009 sampling events. The 2006 data were to confirm extent of surface concentrations and the 2009 data were to test decline in concentrations at exact historical locations of samples with elevated detections. The evaluation of all data provides evidence that the remedial action goals for industrial land use, and more relevant to this ESD, that currently published state and federal risk-based levels for residential land use, have been met. For the re-sampled locations, all surface soil data met industrial and residential risk-based levels. Only one discrete subsurface soil sample of dieldrin did not. However, one exceedance does not indicate potentially significant risk since reasonable maximum exposure (RME) for any receptor is based on the overall exposure unit concentration (i.e., the 95 per cent upper confidence limit [95% UCL] of the constituent dataset). The 95% UCL for dieldrin is 0.0184 mg/Kg and is below the removal action goal (0.127 mg/Kg) for an industrial worker and below the most conservative risk-based level for residential land use (0.03 mg/Kg). Therefore, the significant difference in residual levels of constituent contamination justifies the site status no longer requiring institutional controls to be protective. Thus, the site is available for unlimited use/unrestricted exposure (UU/UE).

This ESD will become part of the Fort Riley administrative record. The Fort Riley administrative record or public comment documents are available to the public at the following locations:

Directorate of Public Works  
Environmental Division  
404 Holbrook Avenue  
Fort Riley, Kansas 66442

Manhattan Public Library  
629 Poyntz Avenue  
Manhattan, Kansas 66502

Dorothy Bramlage Public Library  
230 West Seventh Street  
Junction City, Kansas 66441

## **2. Summary of Site History, Contamination, and Selected Remedy**

### **2.1 Summary of Site History**

The Pesticide Storage Facility (PSF) site is situated on an abandoned terrace on the north side of the Kansas River valley, approximately 2,000-feet north and west of the Kansas River, and about 100-feet north of the Union Pacific Railroad's main line. The PSF site covers about 2/3 of an acre around former building 348. It is located in the Main Post cantonment of the installation. The site includes a portion of the Public Works yard, which is an industrial area that is surrounded by a fence with limited access.

Former building 348 was constructed in 1941 as a general purpose warehouse. Fort Riley records do not indicate when pesticides were first stored in the former building 348. However, interviews with Fort Riley personnel reveal that former building 348 had been used for pesticide storage since at least 1973. Prior to the late 1970s, the maintenance/storage yard east of and adjacent to former building 348 was used to wash down vehicles and spray equipment used for pesticide applications. Since about 1976, the majority of pesticide applications at Fort Riley have been performed by outside contractors who were not allowed to use the PSF site. During 1988, several polychlorinated biphenyl (PCB) - containing electrical transformers were stored in containers outside the southeast corner of former building 348. Other items previously stored at the PSF site include paint, pesticides/herbicides, pressure-treated lumber, and various general improvement materials and equipment.

Site contamination at the PSF site was first revealed by Army pesticide use monitoring studies conducted prior to 1990. Pursuant to Section 105 of CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), Fort Riley was proposed for inclusion on the National Priorities List (NPL) on July 14, 1989. Two sites at Fort Riley were combined by the EPA VII into one site for purposes of the Hazard Ranking System (HRS) scoring. The two sites were the PSF and the Southwest Funston Landfill (SFL). The installation was placed on the NPL as of October 1990 with a combined score of 33.79 on the HRS. The Department of the Army – Fort Riley, the EPA VII, and the KDHE negotiated a Federal Facility Agreement (FFA) for Fort Riley (Docket No. VII-90-F-0015). The FFA became effective on June 28, 1991 and specifically required that the PSF site be addressed through the Remedial Investigation/Feasibility Study (RI/FS) process. Fort Riley is the lead agency with oversight by the EPA VII and the KDHE. Fort Riley initiated planning of the RI/FS in 1990 during the development of the FFA. Field activities began in early spring of 1992.

A non-time-critical removal action to address contaminated soils was determined to be a potential course of action. An Engineering Evaluation/Cost Analysis (EE/CA) was performed to: (1) determine if a removal action was appropriate to protect human health and the environment; (2) identify, evaluate, and recommend options for a removal action that would provide a permanent solution for the site; and (3) develop a remedy

that met the occupational safety and health requirements for site workers while allowing continued site use. There was a public comment period and meeting. There were no public comments received and no members of the public attended the meeting. The EE/CA was finalized. The decision was to excavate and dispose of the contaminated soil off site at an approved landfill. Prior to excavation, the initial removal action goals developed to protect a full-time industrial worker were determined to be overly conservative by assuming 100% of the pesticides could be absorbed through the skin. Removal action goals were recalculated based on updated absorption factors that more realistically represented actual dermal exposure opportunity. The final goals are shown in the following section tables. The removal action resulted in approximately 2,700 tons of contaminated soil being excavated. The excavation of soil was completed in phases, with each phase followed by confirmation soil sampling. The confirmation soil sampling data were used to plan excavations for the subsequent phases.

## 2.2 Contamination as Defined in the Record of Decision

The contaminants defined in the ROD for the PSF site were pesticides in the soils surrounding the site. The chemicals of concerns were chlordane, DDT, DDE, DDD, dieldrin, and heptachlor. The following tables are pre-removal positive analytical results for surface and subsurface soils presented in the ROD as Table 2-1:

Pre-Removal Surface Soil Data

Constituent	Removal Action Goal (mg/Kg)	Frequency of Detection	Minimum Detected Concentration (mg/Kg)	Maximum Detected Concentration (mg/Kg)
Chlordane	1.58	56/102	0.021	5.89
DDD	1.73	16/38	0.022	0.925
DDE	1.73	19/26	0.036	1.8
DDT	1.73	74/102	0.006	2.63
Dieldrin	0.127	40/102	0.007	1.4
Heptachlor	0.05	15/102	0.001	0.129

### Pre-Removal Subsurface Soils Data

Constituent	Removal Action Goal (mg/Kg)	Frequency of Detection	Minimum Detected Concentration (mg/Kg)	Maximum Detected Concentration (mg/Kg)
Chlordane	1.58	89/189	0.005	8.71
DDD	1.73	37/155	0.001	1.34
DDE	1.73	68/155	0.008	1.16
DDT	1.73	94/189	0.011	33
Dieldrin	0.127	18/189	0.004	0.2
Heptachlor	0.05	18/189	0.001	0.3

These pre-removal data were used in the first two risk assessments conducted for the PSF site. The first of these was a baseline risk assessment (BLRA) for the Remedial Investigation (RI). The results of the BLRA indicated potentially unacceptable risks from exposures to carcinogenic and non-carcinogenic constituents at the PSF site. Those risks were predicated on an industrial full-time worker who might be exposed long term (i.e., 8 hours/day for 250 days/year for 25 years) to site contaminants through ingestion, inhalation, and dermal contact pathways. These conservatively estimated risks formed the basis for the decision to conduct the non-time-critical removal action.

The second risk assessment, a residual risk assessment (RRA), was conducted during the post-removal phase. The RRA was performed using data from areas that had not been excavated as well as data derived from the confirmation samples obtained during the removal action. These data combined represented contaminant exposure point concentrations (EPCs) to which a receptor might come into contact. Typically, the 95% Upper Confidence Level (UCL) of the sample population mean is used as the EPC in risk assessment. The RRA was based, again, on conservative assumptions about exposure opportunities and included a full-time worker scenario. None of the non-carcinogenic risk estimates exceeded a hazard index of 1. All of the carcinogenic risk estimates were less than the point of departure for carcinogenic constituents (i.e.,  $1 \times 10^{-6}$ ). The risks at the site were considered acceptable.

The following tables provide post-removal data and EPCs (i.e., 95% UCLs) used in the RRA, as well as the removal action goals for comparison. None of the exposure point concentrations exceeded the respective constituent removal action goals.

Post-Removal Surface Soil Data

Constituent	Removal Action Goal (mg/Kg)	Frequency of Detection	Minimum Detection (mg/Kg)	Maximum Detection (mg/Kg)	Exposure Point Concentration (mg/Kg)
Chlordane	1.58	17/52	0.0207	1.12	0.12
DDD	1.73	7/18	0.0237	0.454	0.45
DDE	1.73	12/18	0.0356	0.847	0.37
DDT	1.73	35/52	0.12	1.29	1.29
Dieldrin	0.127	20/52	0.007	0.158	0.04
Heptachlor	0.05	2/52	0.004	0.0093	0.0022

Post-Removal Subsurface Soils Data

Constituent	Removal Action Goal (mg/Kg)	Frequency of Detection	Minimum Detection (mg/Kg)	Maximum Detection (mg/Kg)	Exposure Point Concentration (mg/Kg)
Chlordane	1.58	46/133	0.0051	10.2	0.22
DDD	1.73	20/106	0.0013	0.925	0.017
DDE	1.73	35/106	0.0104	0.794	0.033
DDT	1.73	47/133	0.011	1.95	0.15
Dieldrin	0.127	12/133	0.007	0.077	0.0048
Heptachlor	0.05	9/133	0.0012	0.3	0.0067

There was no contamination determined to be present in the ground water as a result of ground-water monitoring conducted at the site. Concentrations of inorganic chemicals in the ground water were statistically similar to background concentrations or occurred below the federal Maximum Contaminant Levels (MCLs) for drinking water. In addition, no complete exposure pathway existed and the potential use of the ground water as a potable water supply is extremely unlikely based on the current capacity of the existing well field located approximately 2.5 miles upstream of the PSF site.

An ecological risk assessment (ERA) was conducted during the RI and re-evaluated as part of the RRA. The ERA concluded that there were no significant impacts to environmental receptors due to the limited releases to media that support receptors. The PSF site is located in a developed area and more suitable habitat and food supplies are located nearby. An area approximately 20-feet by 20-feet of stressed vegetation was noted during the RI and was excavated during the removal action. While contaminants were detected in samples of sediment and of surface water that flows intermittently in the on-site drainage way, risks from limited exposure were considered to be minimal.

## **2.3 Selected Remedy in the Record of Decision**

The remedy selected for the PSF site was No Further Action. The removal action in which contaminated soils was excavated, transported, and placed in an approved off-site landfill was completed in 1994. Based on the results of the removal action, the existing and projected land use, and the populations that may have been potentially exposed, it was determined that the site did not pose a significant threat to human health or the environment.

### **Basis of "No Further Action"**

- Current and anticipated reasonable future land use is industrial. Future residential or other land uses resulting in higher exposure levels is not anticipated.
- There is no contamination of ground water and no current or anticipated future use of ground water beneath the site exists. Therefore, no remedial action was warranted for ground water.

The contaminants left in place at the PSF site required that a review of the action is mandated no less than every five year per 40 CFR Part 300.430(f)(4)(ii) of the NCP.

## **3. Description and Basis of the Significant Difference**

The ROD selected a No Further Action alternative based on the results of the RRA conducted after the removal action that excavated 2,700 of soils contaminated with pesticides was completed in 1994. The tables in Section 2.2 detail the removal action levels and the remaining constituent levels in the surface and subsurface soils. The following sections present data from the 2006 and 2009 sampling events that, when considered collectively with the post-removal data, show a Significant Difference in residual soil levels and demonstrate that unlimited use/unrestricted exposure conditions have been met. The institutional controls are implemented with the Real Property Master Plan (RPMP). The RPMP restricts residential development at the site and prohibits digging and trenching. Ground water was excluded as there was no completed pathway based on no positive detections.

### **3.1 June 2006 Data Evaluation**

A limited sampling event was conducted in June 2006 and confirmed minimal contamination down slope of the site. Five surface soil and two sediment samples were collected and analyzed for lead, pesticides, and polychlorinated biphenyls (PCBs). Sediment results were evaluated as surface soil data since sampling locations were from the drainage way that carries water only sporadically. The analyses determined that there were limited low detections of pesticides, none of which were above the removal action goals in the ROD



These data in the following tables present a distillation of the results obtained from the work conducted.

June 2006 Surface Soil/Sediment Data

Constituent	Removal Action Goal (mg/Kg)	Frequency of Detection	Minimum Detection (mg/Kg)	Maximum Detection (mg/Kg)
Alpha chlordane	1.58	1/8	0.099	0.099
Gamma chlordane	1.58	1/8	0.048	0.048
DDD	1.73	4/8	0.014	0.033
DDE	1.73	5/8	0.019	0.076
DDT	1.73	5/8	0.019	0.074

While no removal action goals were set in the ROD for lead and PCBs (specifically Aroclor 1260), the maximum detections of 67.7 mg/Kg and 0.025 mg/Kg were well below the currently published, risk-based levels for an industrial worker exposure (USEPA 2009), which are 800 mg/Kg and 0.74 mg/Kg, respectively.

**3.2 July 2009 Data Evaluation**

In 2009, additional sampling was determined to be necessary to adequately ascertain the site conditions and established if residual levels in the soil had decreased. The decision was made to re-occupy those exact locations where discrete sample results were above the remediation goals for one or more of the constituents found during the post-removal sampling. A letter work plan was generated that established the locations to be re-visited and the appropriate depths to be sampled. The work plan received regulatory approval. The sampling took place in July 2009. The following tables present a distillation of the analytical results and a comparison to the removal action goals in the ROD.

July 2009 Surface Soils Data

Constituent	Removal Action Goal (mg/Kg)	Frequency of Detection	Minimum Detected Concentration (mg/Kg)	Maximum Detected Concentration (mg/Kg)
Chlordane	1.58	0/1	-	-
DDD	1.73	0/1	-	-
DDE	1.73	1/1	0.010	0.010
DDT	1.73	1/1	0.0096	0.0096
Dieldrin	0.127	1/1	0.0028	0.0028
Heptachlor	0.05	0/1	-	-

### July 2009 Subsurface Soils Data

Constituent	Removal Action Goal (mg/Kg)	Frequency of Detection	Minimum Detected Concentration (mg/Kg)	Maximum Detected Concentration (mg/Kg)
Chlordane	1.58	10/24	0.0022	0.6
DDD	1.73	4/24	0.0046	0.14
DDE	1.73	13/24	0.00072	0.24
DDT	1.73	15/24	0.0021	1.0
Dieldrin	0.127	3/24	0.0018	0.17
Heptachlor	0.05	2/24	0.016	0.023

There is only one point of exceedance, dieldrin in sample RA-23-48/54-09 (taken from 48"-54" in the subsurface). The detection is 0.170 mg/Kg. This is a single data point and is a marginal variation from the remedial goal of 0.127 mg/Kg. It represents only a minimal divergence in twenty-five samples. Additionally, it is not reasonable to assume a receptor is exposed to a single data point for the entire duration of exposure. An exposure point concentration based on the 95% UCL of the dataset is a more reasonable maximum representation of exposure. An evaluation of residual risk and calculation of the 95% UCL is provided in the next section.

Lead was detected in all samples (with a maximum of 32.0 mg/Kg) and the PCB Aroclor 1260 was detected in one sample (0.39 mg/Kg). These detections were below the levels of concern for full-time industrial workers cited in the previous section (i.e., 800 mg/Kg and 0.74 mg/Kg, respectively)

These evaluations of post-ROD data demonstrate that the remedial goals continue to be met, and where historical elevated data points were re-tested in 2009, overall concentrations of constituents have decreased over time.

### **3.3 Residual Soils Data Comparison with Risk-Based Levels for Unrestricted Use**

This section provides evidence that not only are site conditions protective of a full-time industrial worker's exposure, but that site conditions also meet unrestricted use/unlimited exposure for residential land use, however remote the possibility of land-use change. To demonstrate this, residual data are compared to the most recently published USEPA and Kansas risk-based levels for both industrial and residential use. Regional Screening Levels (RSLs) (USEPA 2009, Refer to the following link [http://www.epa.gov/reg3hwmd/risk/human/rb-concentration\\_table/Generic\\_Tables/](http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/)) and the Kansas Department of Health and Environment Risk-Based Standards for Kansas (KDHE RSKs) (KDHE 2007) are presented in the following tables along with the remedial action goals set in the ROD. These are conservatively compared to the maximum detected residual concentrations, excepting those historical sampling points

that were re-tested in 2009. The following table compares surface soil data to risk-based levels.

Maximum Detections in Surface Soil Compared to RGs, RSKs, and RSLs

Constituent	Removal Action Goal (RG) (mg/Kg)	KDHE RSK Residential (mg/Kg)	KDHE RSK Non-Residential (mg/Kg)	EPA RSL Residential (mg/Kg)	EPA RSL Industrial (mg/Kg)	Maximum Detection (mg/Kg)
Chlordane	1.58	24	55	1.6	6.5	0.025
DDD	1.73	35	79	2.0	7.2	0.017
DDE	1.73	25	56	1.4	5.1	0.061
DDT	1.73	25	56	1.7	7.0	0.056
Dieldrin	0.127	0.53	1.2	0.03	0.11	0.017
Heptachlor	0.05	1.9	4.2	0.11	0.38	0.0022

The maximum detections in residual surface soil data meet all risk-based levels including the Residential RSKs and the Residential RSLs. This clearly supports the unrestricted use/unlimited exposure for surface soils at the PSF site.

The following table compares the subsurface soil data of the August 2009 event to the risk-based values given in the RSK Appendix A and to the remedial goals.

Maximum Detections in Subsurface Soil Compare to RGs, RSKs, and RSLs

Constituent	Removal Action Goal (RG) (mg/Kg)	KDHE RSK Residential (mg/Kg)	KDHE RSK Non-Residential (mg/Kg)	EPA RSL Residential (mg/Kg)	EPA RSL Industrial (mg/Kg)	Maximum Detection (mg/Kg)
Chlordane	1.58	24	55	1.6	6.5	0.6
DDD	1.73	35	79	2.0	7.2	0.14
DDE	1.73	25	56	1.4	5.1	0.24
DDT	1.73	25	56	1.7	7.0	1.0
Dieldrin	0.127	0.53	1.2	0.03	0.11	0.17
Heptachlor	0.05	1.9	4.2	0.11	0.38	0.023

*Dieldrin EPC is 0.0184 mg/Kg determined from a non-parametric 95% Chebyshev UCL.*

The maximum detections of residual data in the subsurface are below all risk-based levels with the exception of the one discrete sample of dieldrin collected at 48-54-inches. However, one exceedance does not indicate potentially significant risk since a reasonable maximum exposure for any receptor is based on the overall exposure unit concentration (i.e., 95% UCL). The residual dataset for dieldrin consisted of approximately 200 samples from across the PSF site. The 95% UCL was calculated

using the USEPA software ProUCL Version 4.00.4. The result was 0.0184 mg/Kg, which is below the risk-based levels for industrial and residential exposures.

### **3.4 Summary of Basis**

In summary, the RPMP's PSF site industrial controls were to restrict residential development and digging and trenching based on the presence of contamination remaining above the remedial action goals. The PSF site is within an industrial yard for the installation's Public Works and there is no likelihood that this area will undergo a change in land use in the foreseeable future. The site is also within 100-feet of a very busy railroad line, that further precludes it being considered as a potential residential setting. Regardless of the unlikelihood of the land-use change, close evaluation of all residual soil data shows only one subsurface sample result for dieldrin (in a population of over 200 samples) that is above a remedial action goal or risk-based screening level for residential exposure. When the exposure point concentration is considered (i.e., 95% UCL), the site concentration of dieldrin meets its respective remedial action goal and risk-based levels for residential protection. Since unlimited use/unrestricted exposure (UU/UE) status is met, there is no longer a need for institutional controls.

The PSF site should be considered closed out in its entirety and requires no additional study, actions, or inclusion in five-year review efforts as it is available for unlimited use/unrestricted exposure per the requirements of 40 CFR Part 300.430(f)(4)(ii). That states the following: "If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial". Based on the analyses of sampling data, there are no hazardous substances, pollutants, or contaminants above actionable levels. Therefore by regulation, the site has attained UU/UE status and is eligible for close out under CERCLA.

### **4. Agency Comments**

The support agencies of the EPA, Region VII and the KDHE support the conclusions of the ESD.

### **5. Public Participation**

The Department of the Army – Fort Riley will publish public notices in the following local newspapers: the Manhattan Mercury, the Junction City Daily Union, and the 1<sup>st</sup> Infantry Division Post in accordance with the requirements set out in the NCP Section 300.435(c)(2)(i).

## 6. Affirmation of Statutory Determinations

The Department of the Army – Fort Riley believes the remedy is complete and the removal of the institutional controls for the Pesticide Storage Facility - Operable Unit 002, as given in the conclusions of this ESD, meets the criteria of CERCLA Section 121. There are no hazardous substances, pollutants, or contaminants above any actionable levels and thus, there are no impacts to human health or the environment posed by the site and it complies with federal and state requirements as identified in the ROD. Therefore, it is appropriate to close the site out under CERCLA.



Kevin P. Brown  
Colonel, US Army  
Garrison Commander

16 APR 2010  
Date



Cecilia Tapia  
Superfund Division Director  
U.S. EPA, Region VII

4/21/10  
Date