UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VII
726 MINNESOTA AVENUE
KANSAS CITY, KANSAS 66101

MAR 29 1991

Ms. Janet Wade
Directorate of Engineering and Housing
Building 408
Fort Riley, Kansas 66442-6000

Dear Ms. Wade:

As per your request, enclosed is a copy of the Fort Riley NPL scoring information. The information provided includes the NPL scoring package for Fort Riley and the list of comments submitted during the public comment period with their responses.

Should you have any question, please contact me at (913) 551-7787.

Sincerely yours,

for Diana L. Newman
Site Assessment and
Federal Facility Section
Superfund Branch
Waste Management Division

Enclosure

7.10 FORT RILEY, JUNCTION CITY, KANSAS

7.10.1 List of Commenters

NPL-U9-3-22-R7 Correspondence dated 9/5/89 from Colonel Steven Whitfield, U.S. Army Corps of Engineers, Directorate of Engineering and Housing, Headquarters, 1st Infantry Division (Mech) and Fort Riley, Fort Riley, Kansas.

7.10.2 Summary of Comments and Response

Steven Whitfield of the U.S. Army Corps of Engineers, on behalf of Fort Riley, provided several comments on the aggregation of the landfill and the pesticide areas stating that the two should be scored individually. Colonel Whitfield also stated that listing the entire site, rather than specific waste areas, is inappropriate. The Colonel questioned the observed release and targets under the ground water route. Finally, he mentioned his concern that listing might delay planned remedial activities. The commenter provided scoresheets that incorporated his contentions and scored individual waste areas below the 28.50 cutoff for listing.

7.10.2.1 Aggregation

Colonel Whitfield asserted that the site aggregation rationale provided in the HRS documentation record "does not adequately justify the site aggregation that was applied." The commenter argued that "[while] the primary reason given for the aggregation scheme is that both contaminant sources affect the same aquifer and target populations," there is "no evidence that indicates that the pesticide site affects the aquifer at all" and "target populations are also different." He stated that the 3-mile radius from the Southwest Funston landfill "includes the Ogden wells but not the Fort Riley wells" while the 3-mile radius from the pesticide area "includes the Fort Riley wells but not the Ogden wells." He further stated that, "[t]he five points used in the HRS aggregation scheme justification are addressed

individually" in an attachment to his letter. The Colonel stated that if evaluated separately, the "sites score below the 28.5 cutoff for inclusion on the NPL."

In response, the Agency first notes that the attachment which the Colonel provided did not include any discussion of aggregation.

The Agency also notes that, while the HRS documentation record relies on data from the pesticide area and two landfills to score the site (the "Southwest Funston" and "Main Post" landfills), the aggregation rationale attached to the documentation record mentions only the pesticide area and the Southwest Funston landfill. The aggregation rationale has been amended to correct this oversight.

With regard to the aggregation of these waste areas, EPA has previously explained the possibility of listing or addressing noncontiguous facilities in a coordinated manner under CERCLA (47 FR 40663, September 8, 1983). For noncontiguous facilities, "[s]ection 104 (d)(4) of CERCLA authorizes the Federal government to treat two or more noncontiguous facilities as one for the purposes of response, if such facilities are reasonably related on the basis of geography or on the basis of their potential threat to public health, welfare, or the environment." The Agency has concluded that Fort Riley is such a case.

In combining noncontiguous waste areas at Fort Riley, the Agency considered several relevant factors.

- The areas were part of the same operation, the substances deposited in the landfills are likely to be similar, and a single cleanup strategy may be appropriate.
- The Army is the potentially responsible party for all areas at Fort Riley.
- Contamination from the areas is threatening the same ground water and surface water resources.
- The distance between the noncontiguous areas is such that the target populations are substantially overlapping.

Listing two or more noncontiguous areas as one combined site may serve as a guide for subsequent response actions, or the Agency may decide that response efforts should be distinct and separate at the different locations.

With regard to the commenter's contention that the pesticide area does not impact the aquifer, the phrase "affect the same . . . aquifer" in the aggregation rationale is not meant to imply that contaminants from the pesticide area have been found in the aquifer. Rather, contaminants deposited at a waste area need only be available to migrate to the aquifer for that waste area to be considered a threat and therefore part of the site for HRS scoring purposes. Contaminants located in the soil indirectly affect, or threaten, the aquifer because they are in a position to move downward into the aquifer with infiltrating water. As described in Reference 2 of the HRS documentation record at the time of proposal, a variety of pesticides -- including chlordane at concentrations as high as 423 ppm -- have been detected in soils at the pesticide area. Thus, the area was appropriately determined to be a potential threat to the underlying aquifer --the same aquifer that is threatened by the landfills.

Regarding target populations, the Agency agrees that the 3-mile radius around each waste area does not include both well clusters. However, each area threatens the same ground water resource (the alluvial aquifer), and target populations served by the wells are substantially overlapping for all waste areas and are essentially identical for the pesticide area and the Main Post landfill. The Agency concludes that it is appropriate to aggregate these areas for HRS and NPL purposes.

7.10.2.2 Application of the HRS

Colonel Whitfield stated that if the aggregation is maintained, "another concern is that the rating factors were not accurately applied." The Colonel suggested that "rather than measuring the

distance to ground water wells from the pesticide site, a measurement from the [Southwest Funston] landfill seems more relevant" since "there is no evidence of a release to ground water from the pesticide area." He suggested that this approach be used for determining target population and waste characteristics as well. He also stated that "the pesticide site seems to be the most relevant site for determining the surface water score." Colonel Whitfield submitted scoresheets that applied the above comments, and he suggested that the overall score be derived by combining the ground water score based on the Southwest Funston landfill with the surface water score based on the pesticide area.

In response, the Agency believes that the commenter is implying that because there was no analytical evidence of a release to ground water from the pesticide area, it should not be used to evaluate factors for the ground water route. As discussed previously, however, the pesticide area was appropriately included in the site aggregation as potentially affecting ground water resources. Similarly, the landfills have been identified as potentially affecting surface water inasmuch as both are located approximately 300 feet or less from the Kansas River (References 2 and 12). Each of these areas is appropriately evaluated when scoring HRS factors.

Regarding the distance to nearest well, Section 3.5 of the HRS Users Manual (47 FR 31231, July 16, 1982) states that the distance to nearest well is measured from the hazardous substance to the nearest well that draws water from the aquifer of concern. The fact that a hazardous substance from which the distance is measured was not detected in ground water is not germane. It is only necessary that the distance be measured from the furthest point of documented contamination available to migrate to ground water. As described on page 5 of the HRS documentation record, the distance to nearest well was measured from soil samples taken from the pesticide area (References 10 and 12).

Because contamination from the pesticide area is available to migrate to ground water (Reference 2), this factor was correctly evaluated and no scoring change is necessary.

With respect to comments on the remaining HRS factors for the ground water route, population served and waste characteristics, the reasoning given above applies as well. Section 3.5 of the HRS Users Manual (47 FR 31233, July 16, 1982) states that, in evaluating the population served by ground water, "[t]he well or wells of concern must be within three miles of the hazardous substances," while Section 3.4 (47 FR 31229) states that "[i]n determining a waste characteristics score, evaluate the most hazardous substances at the facility that could migrate to ground water." Nothing in these instructions states or implies that an observed release is a prerequisite to evaluation of these factors. Indeed, Section 3.4 explicitly states that "the substances that may have been observed in the release category can differ from the substances used in rating waste characteristics." These factors were appropriately evaluated at the time of proposal and the scoresheets submitted by the commenter require no further response.

7.10.2.3 Site Name

Colonel Whitfield stated that "if a site scores above 28.5, it would seem most appropriate to list only the actual site on the NPL rather than the entire 101,000 acre installation."

In response, the Agency wishes to point out that a "site," for NPL purposes, is not defined by geographic boundaries but is defined by (and is coextensive with) a release (or multiple aggregated releases). The "site" is thus neither equal to nor confined by the boundaries of any specific property that may give the site its name, and the name itself should not be read to imply that the site is coextensive with the entire installation. Until the site investigation process has been completed and a remedial action (if any) is selected, EPA can neither estimate the extent of contamination nor describe the ultimate dimensions of the

site. Although the threat posed by the landfills and the pesticide area was sufficient for proposal of the facility to the NPL, other potentially contaminated areas also exist at Fort Riley. References 3 and 4 list among other areas, burn pits, fire training areas, and dry cleaner operations as potential sources of contaminants. The site name "Fort Riley," therefore, is appropriate for listing purposes.

7.10.2.4 Ground Water Observed Release

Colonel Whitfield stated that "the wells themselves may be sources of the volatile organics observed" in the release to ground water since they are "cased with PVC [polyvinyl chloride] pipe with glued joints." He stated that the volatile organic analyses were inconsistent in both quantity and location of contaminants, mentioning that "only well number two showed vinyl chloride in all three tests." He further stated that background well #1, associated with the observed release, showed contamination in January 1987, and that between January and October of 1987, concentrations of vinyl chloride in all three monitoring wells had dropped significantly. He stated that "there was also a change in the locations of contamination" and suggested that "[t]hese inconsistencies may be due to varying purging and sampling procedures with observed contamination being due to sources other than the [Southwest Funston] landfill."

In response, the observed release was based on the detection of vinyl chloride in monitoring wells 1, 3 and 4 in 1984 at levels significantly above background, and in monitoring wells 2 and 3 in January 1987 at levels significantly above background (References 2, 13, and 14). The results of the sampling episode in October 1987, to which the commenter referred, have not been made available to EPA. Section 3.1 of the HRS Users Manual (47 FR 31244, July 16, 1982) states that an observed release to ground water is scored whenever contaminants are detected at concentrations significantly higher than background levels, "regardless of frequency"; a trend need not be established (49 FR 37078,

February 21, 1984). Thus, data that are inconsistent with prior results do not necessarily refute the earlier data used to assign a value for an observed release, because many releases vary in concentration through time and space. The courts have upheld EPA's interpretation on this point (see City of Stoughton v. EPA, 858 F.2d 747, 756 (D.C. Cir. 1988)).

Regarding the assertion that the source of contamination may be the wells themselves, the Agency notes that vinyl chloride is a known degradation product of tetrachloroethylene and trichloroethylene (Reference 15, added to the HRS documentation record at the time of promulgation), both of which have been disposed in the Southwest Funston landfill (Reference 2). Although it may not be definitively known that the observed release of vinyl chloride is due to a release from Fort Riley waste areas rather than from the wells themselves, it is at least as likely that the presence of vinyl chloride is due to migration as to well construction. A definitive conclusion as to the source of contamination is beyond the scope of the HRS and is more appropriately reached as a result of the RI that typically follows listing. The fact that some evidence of contaminant migration has been found is the essential issue for HRS purposes.

In response to the contention that inconsistencies may be due to procedural variations during sampling, the commenter provided no specific data or analyses to support the comment. The Agency's ability to provide a more explicit response is extremely limited when the commenter fails to provide specific supporting information. Therefore, the Agency can only view this comment as unsubstantiated speculation which does not impact the Agency's original interpretation of the data that formed the basis for scoring an observed release to ground water.

7.10.2.5 Ground Water Flow Gradient

Colonel Whitfield asserted that the "HRS has several flaws" among which is the target radius concept which "does not include enough

parameters to actually identify an affected environment/population." In support of his comment, Colonel Whitfield stated that "the Fort Riley wells are 1.7 to 3.8 miles upgradient of the contamination sites, making the threat of contamination from the sites small," adding that the HRS "has no mechanism to take this [i.e., upgradient locations of wells] into account." The commenter stated that this "demonstrate[s] qualitatively that the relative threat due to the Fort Riley sites is much lower than that of other sites with similar scores."

In response, the HRS does not specifically take into account such level of detail as ground water flow gradients in order to evaluate the affected environment and population under the HRS. In responding to public comments on the proposed HRS on July 16, 1982 (47 FR 31190), EPA explained that it is generally not practicable to use ground water flow information to determine the environment and population actually exposed or threatened. In many instances, the information is not available, and in others flow direction varies with time. Even where there is extensive knowledge of geohydrology, interpretation is nearly always subject to dispute. Requiring a precise measure of the affected environment and population would add inordinately to the time and expense of applying the HRS. EPA decided not to use ground water flow information, even when available, because of the need to develop a nationally uniform system for scoring a large number of sites expeditiously with commonly available data. Instead, the HRS uses a radius of 3 miles around a site when determining the distance to nearest well in the threatened aquifer and the population at risk due to actual or potential contamination, provided there is no discontinuity that completely transects the aquifer of concern between the site and the well that is scored for HRS purposes. As there is no discontinuity and the Fort Riley wells are all with 2 miles of the pesticide area, and 2.5 miles of the Main Post landfill (Reference 12), they are eligible for HRS evaluation.

With respect to the commenter's claim that Fort Riley is less of a threat than other similarly scored sites, the Agency recognizes that this may be true in some cases. As explained previously, the need to score sites consistently, the lack of flow data at most sites, and the variability of flow data even when available, are all factors which mandate that the HRS disregard flow gradients in evaluating ground water targets. In making this determination, the Agency recognized that some site scores may be affected. However, the need for a system that would be universally applicable and require a reasonable expenditure of resources outweighs the impact on the relatively small number of sites whose scores might be adversely affected.

7.10.2.6 Planned Remedial Activities

Colonel Whitfield stated that "Fort Riley has been in the process of addressing the sites considered in the HRS package for some time," citing biannual ground water monitoring at the Southwest Funston landfill, submission of projects for work at the landfill and pesticide areas, and involvement of the Kansas City District of the Corps of Engineers and the Army Environmental Hygiene Agency.

In response, EPA acknowledges the general message expressed by the commenter. However, on September 21, 1984 (49 FR 37075, 37078), the Agency addressed the question of whether response activities should affect site scoring and listing. Because the HRS score is intended to be an objective reflection of certain characteristics of the site prior to any steps taken to change those characteristics, the Agency concluded that response actions should not affect the original score. The factors the Agency considered in developing this policy include the purpose of the NPL as stated in the CERCLA legislative history, the objectives of protecting public health and the environment, and the need to administer the program consistently. The Agency decided against scoring sites based on current conditions as a result of three concerns:

- That using current conditions could encourage some parties to take partial response actions simply to lower the HRS score below the 28.50 cutoff.

- That public agencies might be reluctant to perform removals that could lower the score and thereby prevent a site's listing.

- That the risks posed by a site might not be fully reflected if the site is scored after a "partial" response action.

The Agency does take into account such steps as remedial response activities when it considers what CERCLA action, if any, is warranted at a site. The Agency's decision not to consider the effects of remedial measures in HRS scoring has been upheld by the courts (Eagle-Picher Industries Inc., v. EPA, 822 F.2d 132 at 149 (D.C. Cir. 1987)). The courts concluded that even if most remedial measures would likely reduce scores, the Agency's decision to disregard these response actions for HRS purposes was reasonable.

7.10.2.7 Impacts of Listing on Remedial Activities

Colonel Whitfield concluded that "the addition of Fort Riley to the NPL does not seem to be appropriate," and maintained that listing "could result in a delay of actual investigative and remedial actions as well as a misdirection of human and monetary resources."

In response, the Agency first points out that CERCLA, as amended by SARA Section 120(a)(2), directs that "all guidelines, rules, regulations, and criteria which are applicable to . . . inclusion on the National Priorities List . . . shall also be applicable to facilities which are owned or operated by a department, agency or instrumentality of the United States in the same manner and to the extent as such guidelines, rules, regulations, and criteria are applicable to other facilities." The Agency is thus compelled to evaluate Federal facilities, such as Fort Riley, and to list those facilities that qualify.

Listing a site represents a determination that a "release" or threat of release has occurred which may need to be evaluated under CERCLA. The primary purpose of the NPL is to serve as an informational tool for use by EPA in identifying sites that appear to present a significant risk to public health or the environment. The initial identification of a site for the NPL is intended primarily to guide EPA in determining which sites may warrant further investigation, to assess the nature and extent of the public health and environmental risks associated with the site, and to determine what remedial action(s), if any, may be appropriate. Listing a facility or site does not in itself reflect a judgment of the activities of its owner or operator, nor does it assign liability to any person. Subsequent government actions or enforcement actions will be necessary in order to do so, and these actions will be attended by all appropriate procedural safeguards (52 FR 27261, July 22, 1987). Thus, the listing of Fort Riley should not impair the process of site remediation. To the contrary, EPA has long expressed the view that placing Federal facility sites on the NPL serves an important informational function and helps to set priorities and focus cleanup efforts on those Federal sites that present the most serious problems (50 FR 47931, November 20, 1985).

With regard to Colonel Whitfield's comments concerning potential delays in site remediation, the Agency believes that effective, statutorily imposed time constraints ensure that EPA and others involved will take efficient and effective action. CERCLA, as amended by SARA Section 120(e)(1), requires that "not later than 6 months after the inclusion of any facility on the NPL, the department, agency or instrumentality which owns or operates such facility shall, in consultation with the [EPA] and appropriate State authorities, commence a remedial investigation and feasibility study (RI/FS) for such facility." Section 120(e)(2) requires that EPA "shall review the results of each investigation and study," and also requires that "[w]ithin 180 days thereafter, the head of the department, agency, or

instrumentality concerned shall enter into an interagency agreement with [EPA] for the expeditious completion by such department, agency, or instrumentality of all necessary remedial action at such facility." Further, Section 120(e)(2) also requires that "substantial continuous physical onsite remedial action shall be commenced at each facility not later than 15 months after completion of the [remedial] investigation and [feasibility] study." The Agency believes that the time management constraints imposed by CERCLA will prevent potential delays in the cleanup of a facility.

Regarding the potential "misdirection" of resources as a result of listing this facility, the Agency does not agree and points out that the site was appropriately evaluated by means of the HRS and scored sufficiently high to warrant listing. As discussed above, this is in keeping with the requirements imposed by CERCLA Section 120(a)(2).

7.10.3 Conclusion

The original migration score for this facility was 33.79. Based on the above response to comments, the score remains unchanged. The final HRS scores for Fort Riley are:

Ground Water	58.16
Surface Water	5.85
Air	0.00
Total	33.79

Cross Reference of NPL-FED-2-760

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Adjusted Final NPL-UG-2-26 8/90

National Priorities List

Superfund hazardous waste site listed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended in 1986

FORT RILEY
Junction City, Kansas

Conditions at listing (July 1989): Fort Riley is near Junction City, Kansas, north of where the Republican and Smoky Hill Rivers meet to form the Kansas River. Most of the 152-square-mile Army base is in Riley County, with the remainder in Geary County. The majority of the developed areas are in the southern portion, along the Republican and Kansas Rivers. The area around the fort is predominantly rural and agricultural.

Established in 1853, Fort Riley was a major fort in this area during the Civil War. It is currently the headquarters of the U.S. Army First Infantry Division (mechanized) and host to over a dozen other units of the Department of Defense. There are six main centers of activity in Fort Riley. Camp Forsyth is on the floodplain of the Republican River, immediately north of Junction City. Camp Funston is on the floodplain of the Kansas River, immediately west of the Town of Ogden. Camp Whitside is on the Kansas River floodplain just west of Camp Funston. The Main Post is on the edge of the Kansas River floodplain across from Marshall Air Field. Custer Hill is in the upland several miles north of the Kansas River.

Operations on the facility have been varied, including seven landfills, numerous motor pools, burn and firefighting pit areas, hospitals, dry cleaning, shops, and pesticide storage and mixing areas. Vinyl chloride, pesticides, waste motor oils, degreasing solvents, tetrachloroethylene (perchloroethylene), and mercury were deposited in landfills below the water table and spilled or dumped on the ground adjacent to buildings. The most serious problems are associated with a sanitary landfill at Camp Funston, spills of dry cleaning solvents at the Main Post, and pesticide residues, also at the Main Post.

Fort Riley is participating in the Installation Restoration Program (IRP), established in 1978. Under this program, the Department of Defense seeks to identify, investigate, and clean up contamination from hazardous materials. A 1984 IRP study indicates that vinyl chloride is present in shallow (15-25 foot) monitoring wells downgradient of the Camp Funston landfill. The alluvial aquifer along the Republican and Kansas Rivers is the sole source of drinking water for Fort Riley, Ogden, and Junction City.

A Fort Riley water supply well is 0.7 mile from a former dry cleaning building. Municipal and Army wells within 3 miles of hazardous substances on the base provide drinking water to an estimated 46,800 people. Ground water is also used locally for irrigation.

The Kansas River along Fort Riley is used for fishing and other recreational activities. Bald eagles, designated by the U.S. Fish and Wildlife Service as an endangered species, are seen regularly on the base.

Status (May 1990): EPA, the Army, and the Kansas Department of Health and Environment (KDHE) are negotiating an Interagency Agreement under CERCLA Section 120. The agreement will require the Army to submit schedules for all activities and provides for EPA and KDHE oversight of these activities.

Aggregation Rationale

The aggregation scheme to be followed for the Fort Riley HRS is that the two contaminant sources (Bldg. 292 and the SW Junction landfill) are to be considered as one site. The primary reason being that both contaminant sources affect the same shallow aquifer and target populations.

The rationale for aggregating the two contaminant sources into a single site is as follows:

1) Both sources affect the same shallow alluvial aquifer along the Republican and Kansas Rivers. This aquifer serves as the sole source of drinking water for Fort Riley and Geary, Kansas.

see page i

2) The target populations of both site substantially overlap

3) The "potentially responsible party" is the same for both sites (i.e. the U.S army).

RB
July 10, 1990

4) Both sources lie within the floodplain of the Kansas River and are separated by less than three miles and are thus "reasonably related on the basis of geography."

5) It is anticipated that similar remedial response actions will be required at the site to address contamination attributable to both sources

RB
July 10, 1990

Aggregation Rationale

The aggregation scheme to be followed for the Fort Riley HRS is that the pesticide area (Bldg. 292) and the Southwest Funston and Main Post landfills are to be considered as one site. The primary reason for this aggregation scheme is that these sources affect the same aquifer and target populations.

The rationale for aggregating the three contaminant sources into a single site is as follows:

1) The three sources affect the same shallow alluvial aquifer along the Republican and Kansas rivers. This aquifer serves as the sole source of drinking water for Fort Riley and Ogden, Kansas.

2) The target populations of the three sources substantially overlap.

3) The "potentially responsible party" is the same for the three sources (i.e., the U.S. Army).

4) The three sources lie within the floodplain of the Kansas River and are separated by less than three miles and are thus "reasonably related on the basis of geography."

5) It is anticipated that similar remedial response actions will be required at the site to address contamination attributable to the three sources.

RB
July 10, 1990

Facility name: Fort Riley

Location: Junction City, Geary/Riley County, Kansas

EPA Region: VII

Person(s) in charge of the facility: Major General Leonard Wishart III

Name of Reviewer: Glenn Curtis Date: January 12, 1988

General description of the facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

Ft. Riley, established in 1953, covers over 150 square miles in Riley and Geary Counties, KS. Landfill and pesticide disposal practices have resulted in a release to groundwater. Ft. Riley and Ogden, KS water supply wells located in the aquifer of concern serve greater than 30,000 persons and lie within 3 miles of the areas of waste accumulation.

Please note that the air route was not scored due to a lack of supporting documentation.

Scores: $S_M = 33.79$ ($S_{gw} = 58.16$ $S_{sw} = 5.85$ S_a = NA)

S_{FE} = Not Evaluated

S_{DC} = Not Evaluated

Revised in response to comments.
Rhonda Botteli
July 10, 1990

QA 07/09/90

FIGURE 1
HRS COVER SHEET

Ground Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 (45)	1	45	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 3	2		6	
Net Precipitation	0 1 2 3	1		3	
Permeability of the Unsaturated Zone	0 1 2 3	1		3	
Physical State	0 1 2 3	1		3	
Total Route Characteristics Score				15	
3 Containment	0 1 2 3	1		3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 (1) 2 3 4 5 6 7 8	1	1	8	
Total Waste Characteristics Score			19	26	
5 Targets					3.5
Ground Water Use	0 1 2 (3)	3	9	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 12 16 18 20 24 (30) 32 35 40	1	30	40	
Total Targets Score			39	49	
6 If line 1 is 45, multiply 1 x 4 x 5. If line 1 is 0, multiply 2 x 3 x 4 x 5			33345	57,330	
7 Divide line 6 by 57,330 and multiply by 100			S_{gw} = 58.16		

FIGURE 2
GROUND WATER ROUTE WORK SHEET

07/08/88

Surface Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	(0) 1 2 3	1	0	3	
1-yr. 24-hr. Rainfall	0 1 (2) 3	1	2	3	
Distance to Nearest Surface Water	0 1 2 (3)	2	6	6	
Physical State	0 1 2 (3)	1	3	3	
Total Route Characteristics Score			11	15	
3 Containment	0 1 2 (3)	1	3	3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 (1) 2 3 4 5 6 7 8	1	1	8	
Total Waste Characteristics Score			19	26	
5 Targets					4.5
Surface Water Use	0 1 (2) 3	(3)	6	9	
Distance to a Sensitive Environment	(0) 1 2 3	2	0	6	
Population Served/Distance to Water Intake Downstream	(0) 4 6 8 10 12 16 18 20 24 30 32 35 40	1	0	40	
Total Targets Score			6	55	
6 If line 1 is 45, multiply 1 x 4 x 5. If line 1 is 0, multiply 2 x 3 x 4 x 5			3762	64,350	
7 Divide line 6 by 64,350 and multiply by 100		S_{sw} =	5.85		

FIGURE 7
SURFACE WATER ROUTE WORK SHEET

07/08/88

Not Evaluated

Air Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
[1] Observed Release	0 45	1		45	5.1
Date and Location:					
Sampling Protocol:					
If line [1] is 0, the S_a = 0. Enter on line [5]. If line [1] is 45, then proceed to line [2].					
[2] Waste Characteristics					5.2
Reactivity and Incompatibility	0 1 2 3	1		3	
Toxicity	0 1 2 3	3		9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
Total Waste Characteristics Score				20	
[3] Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1		30	
Distance to Sensitive Environment	0 1 2 3	2		6	
Land Use	0 1 2 3	1		3	
Total Targets Score				39	
[4] Multiply [1] x [2] x [3]				35,100	
[5] Divide line [4] by 35,100 and multiply by 100	S_a =				

FIGURE 9
AIR ROUTE WORK SHEET

07/08/88

Not Evaluated

Fire and Explosion Work Sheet						
Rating Factor	Assigned Value (Circle One)		Multiplier	Score	Max. Score	Ref. (Section)
1 Containment	1	3	1		3	7.1
2 Waste Characteristics						7.2
Direct Evidence	0	3	1		3	
Ignitability	0 1 2 3		1		3	
Reactivity	0 1 2 3		1		3	
Incompatibility	0 1 2 3		1		3	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8		1		8	
Total Waste Characteristics Score					20	
3 Targets						7.3
Distance to Nearest Population	0 1 2 3 4 5		1		5	
Distance to Nearest Building	0 1 2 3		1		3	
Distance to Sensitive Environment	0 1 2 3		1		3	
Land Use	0 1 2 3		1		3	
Population Within 2-Mile Radius	0 1 2 3 4 5		1		5	
Buildings Within 2-Mile Radius	0 1 2 3 4 5		1		5	
Total Targets Score					24	
4 Multiply 1 x 2 x 3					1,440	
5 Divide line 4 by 1,440 and multiply by 100			S_{FE} =			

FIGURE 11
FIRE AND EXPLOSION WORK SHEET

07/08/88

Not Evaluated

Direct Contact Work Sheet

Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Observed Incident	0 45	1		45	8.1
If line 1 is 45, proceed to line 4 If line 1 is 0, proceed to line 2					
2 Accessibility	0 1 2 3	1		3	8.2
3 Containment	0 15	1		15	8.3
4 Waste Characteristics Toxicity	0 1 2 3	5		15	8.4
5 Targets					8.5
Population Within a 1-Mile Radius	0 1 2 3 4 5	4		20	
Distance to a Critical Habitat	0 1 2 3	4		12	
Total Targets Score				32	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5				21,600	
7 Divide line 6 by 21,600 and multiply by 100	S_{DC} =				

FIGURE 12
DIRECT CONTACT WORK SHEET

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	S	S^2
Groundwater Route Score (S_{gw})	58.16	3382.58
Surface Water Route Score (S_{sw})	5.85	34.18
Air Route Score (S_a)	-	-
$S_{gw}^2 + S_{sw}^2 + S_a^2$		3416.76
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		58.45
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M$		33.79

FIGURE 10
WORKSHEET FOR COMPUTING S_M

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DOCUMENTATION RECORDS
for
HAZARD RANKING SYSTEM

INSTRUCTION: The purpose of these records is to provide a convenient way to prepare an auditable record of the data and documentation used to apply the Hazard Ranking System to a given facility. As briefly as possible summarize the information you used to assign the score for each factor (e.g., "Waste quantity = 4,230 drums plus 800 cubic yards of sludges"). The source of information should be provided for each entry and should be a bibliographic-type reference that will make the document used for a given data point easier to find. Include the location of the document and consider appending a copy of the relevant page(s) for ease in review.

FACILITY NAME Fort Riley

LOCATION: Junction City, Kansas

8/18/87

GROUND WATER ROUTE

1. OBSERVED RELEASE

Contaminants detected (5 maximum):

The following materials have been found in monitoring wells around the southwest Funston landfill. Reference 2, pgs. 3-13, K-4; Reference 13; Reference 14.

Score = 45

Vinyl chloride

Bkgd.	MW #1	MW #2	MW #3	MW #4	
	ND	3ppb	4ppb	5ppb	– 1984 data
	5 ppb	54 ppb	11 ppb		– 1987 data

Rationale for attributing the contaminants to the facility:
Waste motor oils commingled with degreasing solvents consisting of chlorinated hydrocarbons were disposed of and burned in the SW Funston LF (Ref. 2, pg 3-12). Vinyl chloride is a known degradation product of trichloroethylene and tetrachloroethylene (Ref. 15), both of which are degreasing solvents that are known to have been disposed of in this landfill (Ref. 2, pg 3-12).

tannade

Monitoring wells #2, 3 and 4 constructed in the shallow alluvium are located in the vicinity of the SW. Funston Landfill (Ref. 2, 3-12 - 3-18). Monitoring Well #1 serves as the background well and clearly lies upgradient of the site, (Ref 2, pg 3-17).

2. ROUTE CHARACTERISTICS

Depth to Aquifer of Concern

Name/description of aquifers(s) of concern:

All of the areas of concern at Fort Riley are located on alluvium of the Republican or Kansas Rivers. The alluvium near the surface consists of silt, clay, and very fine sand; at greater depths, coarser sand and gravel are the predominant sediment types. The coarser sediment at the bottom of the alluvium may, in part, be colluvium from the weathered shale and limestones of the adjacent river valley. The maximum thickness of the alluvium on Fort Riley as determined from well logs is 91 feet (27.7 meters). The alluvium of the Republican and Kansas Rivers provides large quantities of groundwater (300 to 1,000). Recharge of the alluviul aquifer occurs through direct infiltration of rain, seepage from limestone and shales, and almost unlimited recharge by the adjacent rivers. Groundwater flow direction is variable depending on the stage of the river. In the alluvium deposits, water levels in tightly cased wells on Fort Riley generally ranged from 15 to 25 feet (4.6 to 7.6 meters) below land surface. Fort Riley potable supply wells are located in the Republican and Kansas River alluvium (Ref. 2, pp 1-24, 1-26, 1-29).

gpm

Monitoring wells (1-6) installations near the SW Funston LF have revealed a surficial clay layer of 16 to 23 feet (5 to 7 meters) underlain by 16 to 33 feet (5 to 10 meters) of sands and gravels. Underlying these alluvial deposits is grey limestone bedrock. (Ref. 2, pg. 3-15 - 3-16). Groundwater elevation in the monitoring wells at the time of sampling (April 27-28, 1984) indicate groundwater movement perpendicular to the river, in a south southeast direction (Ref. 2, pg 3-15 - 3-18) as would be expected.

the bedrock is not considered to be part of the aquifer of concern

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Depth(s), from the ground surface to the highest seasonal level of the saturated zone [water table(s)] of the aquifer of concern:

Depth from the ground surface to the lowest point of waste disposal/storage:

Net Precipitation

Mean annual or seasonal precipitation (list months for seasonal):

Mean annual lake or seasonal evaporation (list months for seasonal):

Net precipitation (subtrace the above figures):

Permeability of Unsaturated Zone

Soil type in unsaturated zone:

Permeability associated with soil type:

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Physical State

Physical state of substances at time of disposal (or at present time for generated gases):

3. CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Method with highest score:

4. WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

- Vinyl Chloride Detected in observed release wells, 2,3,4. Ref. 2, pg. 3-12 - 25 and K-4
- Perchloroethylene disposal in landfill Ref. 2, pg. 2-6, 3-3 - 3-4 and still bottoms from drycleaning shop, disposed of on ground behind the Building 109 drycleaning shop Ref. 2, pg. 3-4 - 3-5.
- Mercury from medical labs, disposal in the post landfill Ref. 2, pg. 3-6.
- Chlordane, DDT and other pesticides spilled onto the grounds behind Building 292 pesticide storage building. Ref. 2, 2-18,-22, 3-7,8. Ref. 3, pg. 9.

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Compound with highest score:

Chlordane
Persistence = 3
Toxicity = 3

Reference 11

Score = 18

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

Seven landfill operations have been located at Fort Riley since the late 1800s (Ref. 2, pg 3-12). From 1917 to about the mid 1950s a landfill was operated at the Main Post (Ref. 2, pg. 2-43, 44). From the mid 1950s to 1981 the SW Funston landfill was the principal landfill in operation. The most significant documentation on waste quantity exists for the SW Funston landfill (Ref. 2, pg 2-44-45). Many references in the Fort Riley IRP (Reference 2) indicate that similar operations and disposal practices were observed at the other earlier landfills particularly the Main Post landfill. However only those documented waste quantities (at the SW Funston Waste quantities) are discussed below.

Reference 2, pg. 3-3, estimates 200 air filters per year from paint spray booth were deposited in the landfill. However, an exact waste quantity cannot be determined.

Reference 2, pg. 3-4, estimates 240 L/year of tetrachloroethylene were used at the furniture shop and an additional 240 L/year were used at the AG print shop and subsequent wastes were deposited in the landfill. However, an exact waste quantity cannot be determined.

Reference 2, pg. 3-6, estimates less than 5 kg/year of mercury from the medical labs were deposited in the post landfill. However, an exact waste quantity cannot be determined.

Total Waste Quantity Unknown

Score = 1

Basis of estimating and/or computing waste quantity:

Total waste quantity unknown

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5. TARGETS

Ground Water Use

Use(s) of aquifer(s) of concern within a 3-mile radius of the facility:

The aquifer of concern is used as the sole source of drinking water for Fort Riley. In addition, Ogden, KS also uses ground water for drinking water (Ref. 2, pg. 1-26 through 1-29; Ref. 5, 6, 7, 8.)

score = 3

Distance to Nearest Well

Location of nearest well drawing from aquifer of concern or occupied building not served by a public water supply:

Fort Riley Well #3 (FR3) is located a) 1.4 miles from the pesticide storage building 292 and b) 1.8 miles from the Main Post Landfill. Reference 12

Distance to above well or building:

1.4 miles (Ref. 10 and Ref. 12).

Population Served by Ground Water Wells Within a 3-Mile Radius

Identified water-supply well(s) drawing from Aquifer(s) of concern within a 3-mile radius and populations served by each:

Fort Riley Wells: FR1, FR3, FR4, FR5, FR6, FR7, FOR1, FOR2 (Ref. 2, pg. 1-27). These wells supply drinking water for Fort Riley (Ref. 2, pg. 1-26 and 1-29; Ref. 5). The population served at Fort Riley is currently greater than 30,000 (Ref. 5). Historically active duty personnel and on post residents have numbered 45,500. Ref. 1, pg. 1-3.

The City of Ogden has three wells which serve 1804 persons. Reference 7.

Computation of land area irrigated by supply well(s) drawing from aquifer(s) of concern within a 3-mile radius, and conversion to population (1.5 people per acre):

Land irrigation is conducted south and west of Junction City from the Junction City water supply wells and from the Smoky River, however, specific population equivalents cannot be estimated. Reference 6.

Total population served by ground water within a 3-mile radius:

Greater than 31804 (Ref. 2 pg. 1-3 and Ref. 5).

Total Score = 30

SURFACE WATER ROUTE

1. OBSERVED RELEASE

Contaminants detected in surface water at the facility or downhill from it (5 maximum):

Non documented

Rationale for attributing the contaminants to the facility:

Documentation (Ref. 2, pg. 2-22) indicates that potential releases have been made into the Kansas River. Pesticide wastes have been found in the unlined ditch where it flows into the Kansas River. Normal flooding would release more material to the river, but measured amounts have not been found from the river itself, so that a release cannot be scored. Reference 2, pg. 2-19-21.

Score = 0

2. ROUTE CHARACTERISTICS

Facility Slope and Intervening Terrain

Average slope of facility in percent:

2.0% for Main Post Landfill. Reference 12

10 feet change in elevation over 500 feet distance.

Score = 0

Name/description of nearest downslope surface water:

Republican and Kansas Rivers

Average slope of terrain between facility and above-cited surface water body in percent:

2.5% from Main Post LF to the Kansas River. Ref. 12.

5 feet change in elevation over 200 feet distance.

Is the facility located either totally or partially in surface water?

No. Ref. 12

Is the facility completely surrounded by areas of higher elevation?

No. Ref. 12

1-Year 24-Hour Rainfall in Inches

2.75 inches. Ref. 1, pg. 33

Score = 2

Distance to Nearest Downslope Surface Water

The Main Post LF is approximately 200 feet from the Kansas River.

The southwest Funston landfill site is roughly 300 feet from the Kansas River (Ref. 1, pg. 3-13).

Score = 3

Physical State of Waste

Physical state of substances at time of disposal:

Wastes were deposited as liquids, sludges, stillbottoms, and solids (Ref. 1, pg. 2-6, 2-19 - 2-21, 3-3,4, 3-12).

Score = 3

3. CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

The Fort operated several landfills containing hazardous materials. (Ref. 1, 2-43, 44). The SW Funston LF has been cited for inadequate cover, exposed waste material, (Ref. 1, pg. 3-14).

Pesticide wastes were deposited on the ground surface behind bldg. 292 with no apparent diversion or containment sys[illegible] Ref. 2, pgs 3-7, 3-8 (Ref. 1, pg. 2-37).

Method with highest score:

Wastes deposited on ground surface with no apparent diversion or containment.

Score = 3

4. WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

See discussion under section 4 of the Groundwater Route (with the exception of vinyl chloride)

Compound with highest score:

See discussion under section 4 of the Groundwater Route.

Score = 18

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Hazardous Waste Quantity

Total quanity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

See discussion under section 4 of the Groundwater Route.

Basis of estimating and/or computing waste quantity:

See discussion under Section 4 of the Groundwater Route.

Score = 1

5. TARGETS

Surface Water Use

Use(s) of surface water within 3 miles downstream of the hazardous substance:

The Kansas River is used for fishing and other recreational activity on Fort Riley (Ref. 5).

Score = 2

Is there tidal influence?

No

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

Score = 0

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

There are no wetlands mentioned in Ref. 2 or indicated on the topographic map (12).

Distance to critical habitat of an endangered species or national wildlife refuge, if 1 mile or less:

Several endangered species are found in the area of Fort Riley. The bald eagle does winter along the Republican and Kansas Rivers within the boundaries of the Fort although no nestings have been reported (Ref. 2, pg. 1-35). This may come within 1/2 mile of the waste-containing areas.

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Population Served by Surface Water

Location(s) of water-supply intake(s) within 3 miles (free-flowing bodies) or 1 mile (static water bodies) downstream of the hazardous substance and pppulation served by each intake:

No water-supply intakes are located along either the Kansas or Republican Rivers.

Reference 6.

Score = 0

Computation of land area irrigated by above-cited intake(s) and conversion to population (1.5 people per acre):

None documented

Total population served:

Zero.

Name/description of nearest of above water bodies:

Not applicable.

Distance to above-cited intakes, measures in stream miles.

Not applicable.

AIR ROUTE

NOT EVALUATED

1. OBSERVED RELEASE

No data available.

Contaminants detected:

Date and location of contaminants

Methods used to detect the contaminants:

Rationale for attributing the contaminants to the site:

2. WASTE CHARACTERISTICS

Reactivity and Incompatibility

Most reactive compound:

Most incompatible pair of compounds:

Toxicity

Most toxic compound:

Hazardous Waste Quantity

Total quantity of hazardous waste:

Basis of estimating and/or computing waste quantity:

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3. TARGETS

Population Within 4-Mile Radius

Circle radius used, give population, and indicate how determined:

0 to 4 mi 0 to 1 mi 0 to 1/2 mi 0 to 1/4 mi

Distance to a Sensitive Environment

Distance to 5-acre (minimum) costal wetland, if 2 miles or less:

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

Distance to critical habitat of an endangered species, if 1 mile or less:

Land Use

Distance to commercial/industrial area, if 1 mile or less:

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

Distance to residential area, if 2 miles or less:

Distance to agricultural land in production within past 5 years, if 1 mile or less:

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

Is a historic or landmark site (National Register of Hisotric Places and National Natural Landmarks) within the view of the site?

Fort Riley

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7/10/88

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RB
July 10, 1990