



---

## Uploaded to the VFC Website

▶▶▶ February 2015 ◀◀◀

---

This Document has been provided to you courtesy of Veterans-For-Change!

Feel free to pass to any veteran who might be able to use this information!

For thousands more files like this and hundreds of links to useful information, and hundreds of "Frequently Asked Questions, please go to:

[Veterans-For-Change](#)

---

*If Veterans don't help Veterans, who will?*

---

**Note:**

VFC is not liable for source information in this document, it is merely provided as a courtesy to our members & subscribers.



## **SECTION 1**

### **INTRODUCTION**

---

The U.S. Army Corps of Engineers, Far East District (FED), has contracted with Samsung Corporation under Contract Number DACA81-00-D-0049 to perform a Site Investigation (SI) at Camp Carroll Area D and Area 41, located in the Republic of Korea. The investigation was initiated as a response to potential contamination in the subject areas.

The following sections present background information on the Camp Carroll site, including site history, a summary of previous investigations, and a description of investigation objectives.

#### **1.1 SITE HISTORY AND CONTAMINANTS**

##### **1.1.1 General Site Description**

Camp Carroll, depicted on Figure 1-1, is a U.S. Army Installation located adjacent to the village of Waegwan, in the south-central portion of the Republic of Korea (ROK). Camp Carroll is bounded by urban areas on the northwest, west, and southwest. Hilly forested areas bound the base on the north and east sides. Agricultural fields (mostly rice paddies) border the base on the northeast and to the south. The Naktonggang River flows nearby to the southwest of the base. The base is built around a discontinuous north-south trending ridgeline which splits the base into eastern and western halves. Extensive regrading has occurred throughout the base to produce level lots suitable for large warehouse buildings. In the two valleys located in the central and western portions of the base, the original terraced terrain has been leveled by the addition of up to 20 feet of fill material.

The present investigation comprises two study areas at Camp Carroll, Area 41 and Area D. Area 41 is located near the southwest boundary of the base, to the south of Building 620, and between the Wash Rack and Building 674. This study area includes approximately 39,375 square feet (3,658 square meters) of flat-lying, gravel-covered area in a triangular shape. Area D is located near the southeast boundary of the base, northeast of the Dog Training Area and due south of the Fire Shed. Area D is comprised of

approximately 125,000 square feet (11,613 square meters) of a (currently) paved and gravel-covered area (WWC 1992a).

### **1.1.2 Site History**

Camp Carroll serves as the Headquarters, U.S. Army Material Support Center, Korea, and functions as a staging ground for U.S. military operations on the Korean peninsula and in the Far East. The primary mission of the base is to serve as a staging facility and a storage and maintenance depot.

Various transport vehicles including trucks, trailers, jeeps, tanks, personnel carriers, and other military vehicles are stored and maintained at the base. Supplies and materials, including but not limited to, armaments, vehicle engines and parts, electronic equipment and components, generators, electrical equipment, fuels, chemicals, and medical items, are received and stored at the base. Hazardous materials and wastes, including solvents, petroleum oils and lubricants (POL), pesticides, herbicides, and other industrial chemicals have been used and stored onsite for over 40 years. A number of potential sources of soil and groundwater contamination exist at the base, and the presence of contaminated groundwater has been documented (WWC 1992a).

A baseline groundwater investigation conducted by Woodward Clyde Consultants (WWC 1992b) reported relatively widespread contamination of the aquifer throughout the base. The most common contaminants identified were the chlorinated solvents trichloroethylene, tetrachloroethylene, and 1,2-dichloroethylene. These contaminants were detected in 15 of 18 groundwater monitoring wells sampled and in 8 of 10 water supply wells sampled during the survey in April 1992.

Cultural activities practiced in an area may result in increased background concentrations of some compounds. The common practice of incinerating wastes in Korea may result in elevated background concentrations of dioxins in surface soils though air transport and deposition. The widespread surface application of pesticides may result in increased background levels of these compounds.

Area 41 has been identified as a former drum storage area. According to numerous personnel reports, drummed (or otherwise containerized) hazardous materials were stored in Area 41. The drums contained a variety of chemicals including pesticides (including

DDT), herbicides, solvents, vehicle fluids (battery acid and antifreeze), POLs, other hydrocarbons, and other chemicals. Numerous spill events reportedly occurred in this area between 1976 and 1981. Eye-witness accounts describing soil discoloration and localized ponding of liquids indicate that a significant amount of leakage and spillage of listed materials had apparently occurred in the vicinity of stored containers.

Area D has been identified as a former hazardous waste landfill. Numerous hazardous materials were disposed in this landfill between the years of 1977 and 1982. Personnel interviews indicated that many drummed hazardous materials were transported to Area D from Area 41. The drums contained a variety of chemicals including pesticides (including DDT), herbicides, solvents, and over 100 other detected chemicals. The landfill dimensions were approximately 500 feet by 250 feet in area; and 20 to 30 feet deep. Reportedly, much of the landfill material and surrounding soil was excavated between 1982 and 1983 and placed into 55-gallon drums. The fate of the excavated drums is unknown. Despite the removal activity, residual amounts of contaminated material may have remained. No visual evidence of landfilling, such as soil discoloration, dead vegetation, or hummocky terrain, was observed during a 1992 site inspection performed by a Woodward-Clyde Consultants (WWC) field team.

### **1.1.3 Existing Conditions**

#### Area 41

Area 41 is currently comprised of a relatively flat-lying, graded lot. The lot is presently vacant with the exception of some stored metal plates in the north-western portion that were previously used to cover the surface soils at the site. The ground surface is unpaved and composed of decomposed granitic bedrock and fill soils derived from the same type of materials. The site appears to have been a former hill that was flattened for use by scrape and fill methods. Area 41 is slightly higher than the adjoining lots to the north and is separated from them by a drainage ditch. Mature locust and willow trees exist to the west of the graded area. The southern and western portions of the site descend in a steep vegetated hillside that abuts a concrete-lined drainage ditch. The asphalt-paved Oregon Avenue is located to the south of the drainage ditch. One groundwater monitoring well (MW14) was previously installed within the paved lot adjacent to the southwest portion of Area 41 by WWC in 1992. The well extends to a depth of approximately 29 feet below

the existing ground surface (bgs). Groundwater samples obtained from this well in April 1992 contained tetrachloroethylene (PCE) at a concentration of 7 parts per billion (ppb), 1,2-dichloroethylene (1,2-DCE) at a concentration of 7 ppb, lead at a concentration of 4 ppb, and nitrate at a concentration of 90 ppb. This well was accessed again during the current investigation to measure groundwater levels. The elevation of the wellhead is approximately 10 feet below that of the graded portion of Area 41. The well was noted to be located near a current hazardous materials storage area.

### Area D

Area D is comprised of a predominantly flat-laying graded lot. Portions of the lot are paved with asphalt. The ground surface in unpaved portions is composed of fill soils derived from decomposed granite. The southern and western edges of the level portion of the site are bounded by concrete-lined drainage ditches. Beyond the ditches, grass-covered slopes extend down to the grade level of the adjacent lot. The graded area is currently used to store materials and equipment in large metal containers. A number of the containers were temporarily moved to facilitate this investigation. One groundwater monitoring well (MW23) was previously installed adjacent to the southwest portion of Area D by WWC in 1992. The well extends to a depth of approximately 50 feet below the existing ground surface (bgs). Groundwater samples obtained from this well in April 1992 contained nitrate at a concentration of 90 ppb and barium at a concentration of 150 ppb. This well was accessed again during the current investigation to measure groundwater levels and obtain a groundwater sample for analysis.

#### **1.1.4 Contaminants of Concern**

The contaminants of concern (COCs) are comprised of listed chemicals that have been known to have been stored or landfilled at the site or have been detected in soil or groundwater samples collected during previous environmental investigations. These COCs include volatile organic compounds, semivolatile organic compounds, organochlorine pesticides, polychlorinated biphenyls (PCBs), chlorinated herbicides, petroleum hydrocarbons, and metals.

It should be noted that widespread contamination of the aquifer by chlorinated solvents has been documented at the base (WWC 1992b). Detected levels of these compounds may reflect the overall base-wide contamination rather than a location specific problem.

### **1.1.5 Potential Contaminant Sources**

The potential contaminant sources identified for Area 41 are comprised of containers of hazardous materials previously stored at the site. Leaks and spills of the stored materials reportedly occurred in the past. Currently, all such containers have been removed from the site and any source materials remaining are likely to consist of residual contaminants in the soil and groundwater underlying the site.

The potential contaminant sources identified for Area D are comprised of containers of materials previously buried at the site. One origin of the buried containers may have been the materials previously stored at Area 41. Reportedly, the buried containers were later excavated and removed from the site to an unknown destination. Source materials remaining at Area D are likely to consist primarily of residual contaminants in the soil and groundwater underlying the site, however, some of the buried containers may still be present in the previous landfill area.

The approximate locations of these potential sources are depicted on Figure 1-2. The evaluation processes regarding these potential sources are presented in Section 2-2.

### **1.1.6 Summary of Existing Site Data**

One groundwater monitoring well (MW14) was installed adjacent to the southwest portion of Area 41 by WWC in 1992. The well extends to a depth of approximately 29 feet below the existing ground surface (bgs). Groundwater samples obtained from this well in April 1992 contained tetrachloroethylene (PCE) at a concentration of 7 parts per billion (ppb), 1,2-dichloroethylene (1,2-DCE) at a concentration of 7 ppb, lead at a concentration of 4 ppb and nitrate at a concentration of 90 ppb.

One groundwater monitoring well (MW23) was installed adjacent to the southwest portion of Area D by WWC in 1992. The well extends to a depth of approximately 50 feet below the existing ground surface (bgs). Groundwater samples obtained from this well in April 1992 contained nitrate at a concentration of 90 ppb and barium at a concentration of 150 ppb.

## **1.2 SCOPE AND OBJECTIVES**

The purpose of this investigation was to assess two related, but discretely located, hazardous and toxic waste (HTW) contaminated areas at Camp Carroll. The two sites are identified as Drum Storage Yard (Area 41) and the Hazardous Waste Landfill (Area D), respectively.

The specific objectives of this remedial investigation and remedial design were to:

- Locate, map, and inventory past occurrences of contamination where HTW has been identified or is suspected to have been spilled onto the ground.
- Locate, map and inventory past and present HTW contamination sources that serve as past and/or continuing sources of groundwater contamination.
- Collect sufficient data to provide a baseline from which to assess future cleanup actions.
- Determine the sources of contamination and migration pathways.
- Map and determine the extent and amount of surface and subsurface soil contamination.



Figure 1-1 Site Location Map, Camp Carroll, Korea



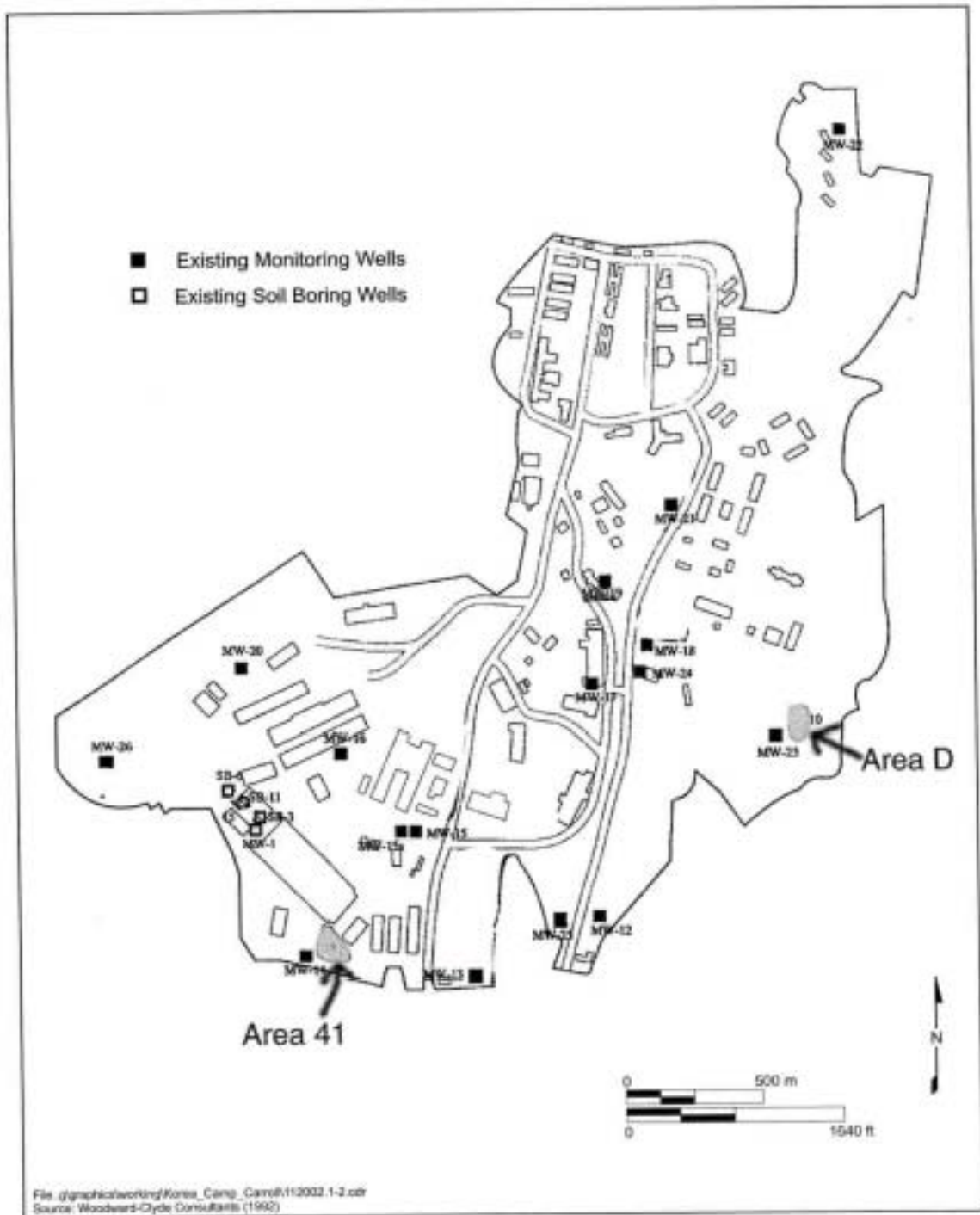


Figure 1-2 Site Plan, Camp Carroll, Korea