

Site OE-49

Former Rifle Grenade Range

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SITE OE-49 – FORMER RIFLE GRENADE RANGE

3.49 Site OE-49 (Former Rifle Grenade Range)

A summary report for Site OE-49 is provided below. This report consists of two parts. The first part, contained in Sections 3.49.1 through 3.49.5, includes a presentation and assessment of archival data. Specific elements include a review of site history and development, evaluation of potential ordnance at the site, a summary of previous ordnance and explosives (OE) investigations, and a conceptual site model. The above-mentioned information was used to support the second part of this report, which is the Site Evaluation (Section 3.49.6). The Site Evaluation was conducted in accordance with the procedures described in the *Final Plan for Evaluation of Previous Work (Harding Lawson Associates [HLA], 2000)* and may restate some information presented previously. The Site Evaluation discusses the evaluation of the literature review process (Section 3.49.6.1) and evaluation of sampling process(es) (Section 3.49.6.2). These discussions are based upon information from standardized literature review and sampling review checklists (Attachment 49-A). Section 3.49.7 provides conclusions and recommendations for the site. References are provided in Section 3.49.8.

3.49.1 Site Description

Site OE-49 encompasses 28 acres and is located in the west-central portion of the former Fort Ord, south of the Main Garrison and just north of the Fitch Park military housing complex (Plate 49-1). Site OE-49 was identified on the basis of an interview with former Fort Ord Fire Chief Fred Stephani, as recorded in the Fort Ord Archives Search Report (ASR; *U.S. Army Engineer Division, Huntsville [USAEDH], 1997*). Mr. Stephani stated the Site OE-49 area was used as a rifle grenade range in the 1940s and 1950s and that use ended when the Officers' Club (which is now called Chartwell School) was built in 1971.

3.49.2 Site History and Development

The following presents a summary of the site history and development that is based on archival research and review of historical training maps and aerial photographs. Plates have been prepared that present pertinent features digitized from historical training maps and scanned aerial photographs reviewed by Harding ESE. It should be noted that minor discrepancies between source maps, combined with the natural degradation of older source maps and photographs, has resulted in misalignment of some map features. In addition, camera angle and lens distortion introduced into older aerial photographs, combined with changes in vegetation and site features over time may contribute to the misalignment of some map features with respect to the aerial photographs.

Pre-1940s Era

Site OE-49 lies within a tract of land purchased from private landowners by the government in 1917 (*Arthur D. Little, Inc.[ADL], 1994*). Documentation for use of this area by the Army for training prior to 1940 is limited to topographic maps. Topographic maps of the area from 1918 (*Department of Interior [DOI], 1918*) and 1933 (*Army, 1933*) were reviewed. Welch Ridge, Parker Flats, and Eucalyptus Road are shown on the 1933 topographic map; general features appear consistent with present day maps. No further identifiable features or labels were associated with this area.

1940s Era

Review of 1940s era documentation including historical maps and aerial photographs indicates no specific training sites were in use in the area. Mr. Stephani stated that this area was a rifle grenade range in the 1940s and 1950s, and that firing was from the northwest into the south face of the canyon and up the canyon to the east. The ridge located north of this canyon is referred to as Welch Ridge. The results of the historical map and aerial photograph review for the 1940s are summarized as follows:

- An aerial photograph from 1941 shows no features or disturbed areas within the site boundary.
- The 1945 and 1946 training maps show no features or training sites within Site OE-49 (*Army, 1945 and 1946*).
- Three rifle grenade training areas are identified on the 1945 and 1946 training maps. Two of the areas, Site OE-24A and Site OE-24E, were located approximately 2,000 feet to the south and approximately 600 feet southeast, respectively, of Site OE-49. The third rifle grenade training area was located on the eastern side of Fort Ord, south of the East Garrison (*Army, 1945 and 1946*). Site OE-24E is labeled as “practice rifle grenade.” The site boundaries for the three rifle grenade training areas are delineated on the training maps as either rectangles or squares.
- The Site OE-24B Practice Hand Grenade Range training area is shown on 1945 and 1946 training maps (*Army, 1945 and 1946*) in the vicinity south of Site OE-49.

1950s Era

Review of 1950s era documentation, which included training maps and aerial photographs, indicated no specific training sites were in use. The 1950s-era aerial photographs show the first building in the vicinity, the Officers’ Quarters, which is located just outside of the northeast border of Site OE-49. The results of the historical map and aerial photograph review for the 1950s are summarized as follows:

- Clearings and areas of disturbed ground are evident on 1951 and 1956 aerial photographs (Plate 49-2).
- The Practice Hand Grenade Area (Site OE-24B) shown on 1940s-era maps in the vicinity of Site OE-49 is not shown on the 1954 map or on post-1954 maps (*Army, 1954*).
- The 1953 and 1956 training maps show the “Welch Ridge Bleachers” outside Site OE-49 to the southeast when in fact Welch Ridge is located within Site OE-49. The bleachers are not evident on the aerial photos and their mapped location appears to be outside of Site OE-49 (*Army, 1956*).
- A Field Battalion Training Area is located east of Site OE-49 (*Army, 1956*).
- The 1956 aerial photograph shows that four Officers’ Quarters buildings have been constructed just outside of the northeast border of Site OE-49. An area east of the Officers’ Club appears to have been graded for construction.
- Rifle grenade ranges are identified on 1950s training maps within the Multi-Range Area (MRA). These ranges are shown with range fans.

1960s Era to Present

The Fitch Park military housing south of Site OE-49 was completed in the late 1950s and early 1960s and was occupied from then to the present. The housing development first appears on the 1964 training map as the East Officer's Housing Area (Army, 1964). The closest training areas are south of Site OE-49 inside the MRA. The results of the aerial photograph review are summarized as follows:

- The 1966 aerial photograph shows that the Officers' Quarters have expanded, with three more buildings constructed to the east. Disturbed ground extends from the Officers' Quarters into Site OE-49. The photograph also shows that George C. Marshall Elementary School has been built just northwest of the site. There numerous small roads and trails are evident on both sides of the canyon within Site OE-49, just south of Welch Ridge. The disturbed areas evident on the 1951 aerial photograph are now covered by vegetation (Plate 49-3).
- The 1992 and 1999 aerial photos show that the site is almost completely covered with vegetation (Plate 49-4). A cleared area associated with the George C. Marshall Elementary School is evident northwest of Site OE-49. The cleared area appears to be the school's ball field. The roads seen on the 1966 photo are no longer evident, although remnants of the canyon trails are visible. The Officer's Club (now Chartwell School), has been built north of the site near the elementary school. Records state that the Club was built in 1971.

Proposed Future Land Use

Site OE-49 is proposed for development.

3.49.3 Potential Ordnance Based on Historical Use of the Area

In the interview with Former Fire Chief Fred Stephani, he indicated that the site was used for rifle grenade training. Practice hand and rifle grenade training areas are identified on 1945 and 1946 training maps approximately 400 and 600 feet to the south, respectively, of Site OE-49 (Plate 49-2). Information concerning the types of rifle grenades that could have been used during training was obtained from *Technical Manual, Army Ammunition Data Sheets For Grenades (Army, 1977b)*, *Technical Manual, Pyrotechnic, Screening, Marking, and Countermeasure Devices (Navy, 1982)*, *Technical Manual, Army Ammunition Data Sheets: Military Pyrotechnics (Federal Supply Class 1370) (Army, 1977a)*, and *The American Arsenal (Hogg, 2001)* and is summarized below.

Practice Rifle Grenades

Rifle grenades are designed to be fired from U.S. rifles and carbines by a launcher that is attached to the gun muzzle. A special blank cartridge, issued with the grenade, is required to complete the launching. The M11A2 antitank practice rifle grenade was available for use during the 1940s and 1950s. The M11A2 was designed for training in marksmanship. This item was an inert loaded dummy rifle grenade similar in shape and weight to the high explosive antitank (HEAT M9A1) rifle grenade. No explosive charge was associated with this training item. The M11A2 differed from the M9A1 in that the fins could be replaced on the M11A2 if they were damaged or wore out.

Rifle Grenades, Smoke

Rifle fired smoke grenades were designed to be fired from a grenade launcher or a rifle fitted with a launcher for signaling or laying smokescreens by ground units. The models that were available for use in

the 1940s, 1950s, and 1960s include the M20, M22, and M23 Series, and M62, M64, M65, and M66 smoke grenades. The use of rifle fired illumination signals is not expected to have occurred at this site. It is believed that if rifle grenades were fired at Site OE-49, firing would have involved the use of practice rifle grenades and possibly smoke producing rifle grenades (*Smith, 2003*). It is not known whether training with smoke-producing rifle grenades occurred at Site OE-49. However, an M62 smoke signal was found while conducting a site walk of Site OE-49 (Section 3.49.4). Additionally, as reported in an Explosive Ordnance Disposal (EOD) report and as discussed in the following section a smoke rifle grenade (M23A1) and small arms ammunition were found approximately 300 feet southeast of Site OE-49 in 1993 (Plate 49-4). The M23 series of rifle grenades (M23 and M23A1) were used for signaling purposes. The grenades were fired from a rifle equipped with a grenade launcher and function on firing, emitting a stream of colored smoke over the entire trajectory (*Army, 1977b*). The M62, also used for signaling purposes, was fired from a M76 grenade launcher (*Army, 1977a*). Additional information on some of the models of smoke signals potentially used at Site OE-49 is provided in Attachments 49-A2 and 24E-A2.

The potential use of high explosive rifle grenades in this area was considered during the evaluation of Site OE-49. However, based on the following reasons it is believed that use of this site would not have included the use of HE items; 1) Site OE-49 lies outside of the area established for the firing of high explosive ordnance (MRA); 2) Site OE-49 is not identified as a rifle grenade training area on historic training maps, 3) no range fan (typically associated with live fire ranges) is delineated in this area on available training maps; 4) a review of aerial photographs does not indicate the presence of firing points or targets within this site; and 5) areas identified as “Rifle Grenade Range” and delineated by range fans are present within the MRA on training maps from 1954, 1956, 1957 and 1958.

3.49.4 History of OE Investigations

The following describes the OE investigations that have been conducted at Site OE-49.

1997 Revised Archives Search Report (ASR)

The purpose of the archives search conducted at Fort Ord was to gather and review historical information to determine the types of munitions used at the site, identify possible disposal areas, identify unknown training areas and recommend follow-up actions. The archives search was conducted in accordance with U.S. Army Corps of Engineers guidance (*USAESCH, 1995*). The archives search included a Preliminary Assessment/Site Investigation (PA/SI) consisting of interviews with individuals familiar with the sites, site visits to previously established sites, site reconnaissance on newly identified training areas, and the review of data collected during sampling or removal actions. Requirements for preparation of an ASR are described in Section 2.0 of this report.

Site OE-49 was identified during interviews conducted during the Preliminary Assessment/Site Investigation (PA/SI) phase of the Fort Ord Archives Search (*USAEDH, 1997*). The area was identified as being used as a rifle grenade training range in the 1940s to 1950s. No sampling of Site OE-49 has occurred. A site reconnaissance was conducted in 1996 by a U.S. Army Corps of Engineers (USACE) Unexploded Ordnance (UXO) Safety Specialist. The reconnaissance of Site OE-49 involved walking a portion of the site and sweeping the path walked with a Schonstedt Model GA-52/Cx magnetometer. No evidence was found to indicate the site was used as an impact area (e.g., fragmentation, fuzes, or projectiles). It is assumed that on the basis of the EOD report which noted discovery of a rifle smoke grenade, the ASR recommended further sampling to determine the boundary of the site and presence of OE contamination (*USAEDH, 1997*). However, the smoke grenade was found outside of the boundary of Site OE-49.

2001 Basewide Range Assessment

Site OE-49 was investigated as part of a basewide range assessment (BRA) for small arms and multi-use ranges currently being conducted at Fort Ord. The assessment of Site OE-49 focused on potential hazardous and toxic waste (HTW)-related contamination and included a data review, site reconnaissance, and mapping of the site. For the BRA, the areas of investigation were identified as Historical Areas (HA). Site OE-49 was identified as HA-179 (Plate 49-4). Prior to conducting the site reconnaissance, a review of historical maps and aerial photographs was conducted. Areas of interest (e.g., training area boundaries, disturbed vegetation areas, and roads) were identified from maps and photos and their locations (way points) loaded into a Global Positioning System (GPS) unit. The site reconnaissance was conducted by a two-person team that included an OE specialist and a second team member trained in OE recognition. The site reconnaissance included walking portions of the site and navigating to the way points using the GPS unit. No OE items or evidence of ordnance use was found during the site reconnaissance conducted at HA-179 (Site OE-49).

2004 Site Walk

A site walk was conducted at Site OE-49 on March 7, 2004. The site walk location was selected to fill data gaps in reconnaissance efforts conducted previously at this site. The site walk was conducted by a two-person team, which included a UXO safety specialist. The team swept the path walked using a Schonstedt Model GA-52/Cx magnetometer. The path was also recorded using a GPS unit. The position of any anomaly detected by the Schonstedt GA-52/Cx was recorded with the GPS. The items found during the site walk included an expended smoke signal, an expended smoke grenade, the candle housing for a 105mm illumination projectile (OE scrap) and small arms ammunition. A description of the site walk is included as an attachment to Appendix C of this report.

Explosive Ordnance Incident Reports

There have been two Explosive Ordnance Incident Reports for ordnance finds either within or nearby the boundaries of Site OE-49. The incidents are summarized below:

- February 20, 1993 - The report states that a fox hole was found near the Officers' Club approximately 50 feet from the base of a water tower. The report also states that a single rifle smoke grenade (M23A1) and 100 rounds of M-1 ball and tracer ammunition were recovered. The location of this incident is about 300 feet outside the southeast boundary of OE-49.
- August 5, 1997 - This report states that two inert 40mm practice projectiles for a M79 grenade launcher were found in the wooded area behind 203 Ardennes Circle, inside the OE-49 boundary just north of the Fitch Park Housing area. This type of item was used in the Multi-Range Area (MRA) in the 1960s through base closure; however, it was not available for use prior to the 1960s. Because Fitch Park Housing already existed in the late 1950s, these items are considered discarded at the site and not present as a result of training at the site.

3.49.5 Conceptual Site Model

Conceptual site models (CSMs) are generally developed during the preliminary site characterization phase of work to provide a basis for the sampling design and identification of potential release (functioning of the OE item; e.g., detonation) and exposure routes. CSMs usually incorporate information regarding the physical features and limits of the area of concern (the site), nature and source

of the contamination (in this case OE), and exposure routes (potential scenarios that may result in contact with OE).

The CSM for Site OE-49 is based on currently available site-specific and general information including a literature review, review of aerial photographs, training maps, field observations, and technical manuals. It is provided to help evaluate the adequacy of the investigation completed to date and to identify potential release and exposure pathways. Plate 49-5 presents a conceptual site model.

3.49.5.1 Training Practices

Training practices are discussed below to provide information of the types of OE that may have been used at the site and the possible location of OE potentially remaining at the site.

Practice Rifle Grenade Training

Range configuration information for practice rifle grenade training was obtained from *Policies and Procedures for Firing Ammunition for Training, Target Practice and Combat* (Army, 1983). Ordnance descriptions for recent training rifle grenades was obtained from TM 43-0001-29 and information on World War II grenade launchers and information on the available World War II ordnance was obtained from *The American Arsenal* (Hogg, 2001). According to the policies and procedures (Army, 1983), live rifle grenades are fired behind a protective barrier equivalent to a screen of sandbags 0.5 meter thick or reinforced concrete walls 0.16 meter thick. It is suspected that this would be simulated in the practice training area. The maximum danger radius for live rifle grenades is 200 meters. The maximum range of the practice rifle grenade M29 (version found in TM 43-0001-29) is 150 meters, therefore it is expected that the training area used would be at least 150 meters in length. According to information in *The American Arsenal*, the depth to which the launcher is inserted into the stabilizer tube determines the range attained by the fired grenade. Therefore, it is expected that targets would be placed at various distances to practice firing at different ranges. Because the practice rifle grenades are inert, no OE associated with practice rifle grenade training would be expected.

Rifle Grenades, Smoke

General information on the use of rifle fired smoke grenades and smoke signals was obtained from *FM 21-60, Chapter 4, Pyrotechnics* (Army, 1987) and *TM 43-0001-37, Chapter 4, Signals* (Army, 1977a). Rifle fired smoke grenades (pyrotechnics) available in the 1940s and 1950s were used by the military for a variety of purposes including visual signals (communication) and smokescreens. Pyrotechnics produce either smoke or light and are consumed in the process. When used for communication, prearranged signals are developed based on the color and characteristics of the pyrotechnic device used. This allows personnel in the field to rapidly transmit prearranged messages over short distances (Army, 1987).

3.49.5.2 Site Features

Site OE-49 was predominantly an oak woodland in the 1940s and 1950s. There is a canyon in the center of the site. Currently, one cleared area above the northwest site boundary is evident. The clearing is associated with the George C. Marshall Elementary School baseball field. The Officers' Quarters and the Chartwell School are also located just outside the northern site boundary. The Fitch Park housing area is directly to the south of the site.

3.49.5.3 Potential Sources and Location of OE

Based on the review of historical data, OE that may be present at Site OE-49 would include inert practice rifle grenades and possibly rifle fired signals. OE scrap found at Site OE-49 during a site walk conducted in March 2004, included a smoke signal (M62), a smoke grenade (M18), and the candle housing for a 105mm illumination projectile. Additionally, a live colored smoke rifle grenade (M23A1) was found on the ground by military personnel approximately 300 feet southeast of the site boundary. The M23A1, the M62, and the M18 were used for signaling purposes. The OE scrap found in and adjacent to Site OE-49 by design are non-penetrating items and if present at this site would typically be found on or near the ground surface.

3.49.5.4 Potential Exposure Routes

This site is mostly within land that is undeveloped. The site is adjacent to the Fitch Park housing area and the George C. Marshall Elementary School and is accessible to the public. A rifle fired smoke signal, a smoke grenade, and the candle housing for a 105mm illumination projectile (OE scrap) were found at Site OE-49 during a site walk conducted in March 2004. No other physical evidence of the firing of rifle grenades (e.g., firing points or targets) was found during site reconnaissance. Because no OE were discovered during the site walk or reported previously, OE is not expected in this area. However, because the site was not 100% investigated and non-penetrating OE scrap was found during the site walk, the possibility exists (although unlikely) that future construction workers could come into contact with surface OE.

Although no OE items were found at Site OE-49 a brief discussion of the potential injuries that could result from contact with a live rifle fired M62 or hand thrown M18 smoke signal are provided below. These items were selected for discussion, because expended M62 and M18 smoke signals were found during site reconnaissance. Additional details regarding the M62 and the M18 are provided in Attachment 49-A2.

For each of the OE items potentially remaining at the site, the following discussions provide information on: (1) how the item was designed to function, (2) the likelihood the item would function if found onsite and handled, and (3) the type of injury the item could cause if it functions. Additional information on these items is provided in Attachment 49-A2.

Signal, Smoke, Ground: M62, M64, M65, and M66. The colored smoke signals (M62, M64, M65, and M66) were designed for signaling during daylight. The signals consist of an expelling charge and six smoke charges. A flash from the grenade launcher cartridge passes through a stabilizer igniting the propelling charge. The burning propellant charge ignites a delay train. Near the top of the trajectory, the time train initiates the expelling charge. The expelling charge ejects and ignites the smoke charges out through the top of the case (*Army, 1977a*). These would be difficult to cause to function by incidental contact. They would require preparation and a flash through the stabilizer to ignite the propelling charge. If caused to function, the type of injury that could be sustained would be burns from the propelling charge.

Summary: It is unlikely that a person could cause a rifle-fired signal to function through casual contact if one were found at the site and be burned, because it: (1) would require precise assembly to function, and would have been exposed to moisture, degradation, and weathering for many years, which could decrease the effectiveness of the components that cause it to function.

Grenade, Hand, Smoke, M18. The M18 is a colored smoke hand grenade used for ground to air or ground to ground signaling. The grenades may be filled with any one of four smoke colors: red, green, yellow, or violet. Each grenade will emit smoke for 50 to 90 seconds. The grenade body is of thin sheet metal and is filled with smoke composition and topped with a starter mixture. The hand grenade fuze M201A1 is a pyrotechnic delay igniting fuze. The body contains a primer, first-fire mixture, pyrotechnic delay column, and ignition mixture. Assembled to the body are a striker, striker spring, safety lever, and safety pin with pull ring. The grenade weighs 19 ounces and contains 11.5 ounces of smoke composition. It was functioned when a soldier removed the safety pin from the safety lever and threw the grenade allowing the safety lever to fly free, releasing the spring-loaded striker to strike the primer. The percussion primer ignited the first fire mixture. The fuze delay element, which burns for 0.7 to 2 seconds, ignition mixture, and grenade starter mixture and filler, are ignited by the preceding component. The pressure sensitive tape is blown off the emission holes from which the colored smoke emits (*Army, 1977b*). Assuming an M18 smoke grenade was discovered in an unfired condition and caused to function, the type of injuries that could be sustained would be burns from the burning smoke composition. Due to the heat generated, it is unlikely that a person who found a grenade and caused it to function would hold onto it after ignition. Given that these items have been exposed to the elements for many years, moisture can penetrate and degrade the pressure sensitive tape, the smoke composition, and the condition of the sheet metal case of the grenade.

Summary: It is possible that a person could cause the smoke grenade to function if one were found at the site and be burned, but it would have been exposed to moisture, degradation, and weathering for at least 10 years, which could decrease the effectiveness of the components that cause it to function.

3.49.6 Site Evaluation

The available data (e.g., archival and reconnaissance data) regarding Site OE-49 were reviewed and evaluated according to procedures described in the *Final Plan for Evaluation of Previous Work (HLA, 2000)*. The evaluation process is documented through the completion of a series of checklists. Copies of the checklist are provided as Attachment 49-A. This section presents a summary of the results of the checklist evaluation and is divided into two sections, an assessment of the literature review and an assessment of the reconnaissance performed at the site.

3.49.6.1 Literature Review

Type of Training and OE Expected

As part of the archives search, an interview was conducted with Mr. Fred Stephani. Mr. Stephani served as a Fort Ord fire fighter from 1942 until 1944 at which time he left the Fort Ord fire department and joined the Army. Mr. Stephani returned to the Fort Ord fire department in 1947 where he worked until he retired as Fire Chief in 1978. Mr. Stephani stated that Site OE-49 “was a rifle grenade range in the 1940s and 1950s,” however; the site is not identified on historical training maps. Archival information indicates this area was not used as an impact area for high explosive items. The practice rifle grenades may have impacted the ground if used. It is possible that pyrotechnic items could have been used during training.

Development and Subsequent Use

There has not been any subsequent use or development of this area. Housing, two schools, and an Officers’ Quarters have been constructed in the vicinity, but none of these structures are located within OE-49.

Establishment of Site Boundaries

The aerial photographs from the early 1940s through the 1990s show no clear indication of a defined training area, and no structures or permanent features associated with suspected training activity are evident. A rifle grenade training area is not identified on any available training maps. The Site OE-49 boundary was established during the archives search.

Summary of Literature Review Analysis

According to the Archives Search Report, Site OE-49 was used as a rifle grenade range in the 1940s and 1950s. A site walk conducted as part of the archives search found no evidence to support the use of Site OE-49 as an impact area. A review of Fort Ord specific documentation including training facilities maps and plans and aerial photographs provide no indication that this area was used to support the firing of rifle grenades. The interview statements by Mr. Stephani, and the discovery of a practice rifle smoke grenade southeast of the site are the only indication that Site OE-49 may have been used as a rifle grenade training area. Construction of military housing occurred in the late 1950s and 1960s immediately to the north and south of Site OE-49. For safety reasons, the presence of the housing area would have ended the use of rifle grenades in this area after that time. On the basis of the literature review no further OE-related investigation is warranted.

3.49.6.2 Preliminary Assessment/Reconnaissance Review

This section describes the items that were found during reconnaissance and the types of fillers that would be used in the items and the implications for the site history. Three site reconnaissances have been conducted at Site OE-49. The first reconnaissance was conducted in 1996 by a USACE UXO Safety Specialist. The reconnaissance was part of the PA/SI to determine whether the site required (USAEDH, 1994) further action. The second reconnaissance was conducted in 2001 as part of the Fort Ord BRA. The site reconnaissance was conducted to determine whether sampling for chemical residue associated with OE use was warranted. The third reconnaissance, conducted in March 2004, was performed to fill data gaps in reconnaissance efforts conducted previously at this site.

Reconnaissance Methods Discussion

The site reconnaissance conducted in 1996 was completed as part of the PA/SI phase of the archives search for known and suspected OE sites at the former Fort Ord. Several areas of potential ordnance use were identified based on information gathered during interviews conducted as part of the PA/SI. Site OE-49 was identified in those interviews as a Practice Rifle Grenade training area used during the 1940s and 1950s. A practice rifle smoke grenade was discovered southeast of the site, and two inert 40mm practice projectiles for a M-79 grenade launcher were found inside the OE-49 boundary.

The USACE UXO Safety Specialist walked over a portion of the site visually searching the path walked while simultaneously searching for subsurface OE using a magnetometer. The area walked was reportedly in the Site OE-49 boundaries. No evidence of ordnance, explosives, or fragmentation, fuzes or projectiles was observed. No evidence of other types of training or use as an impact area was identified as a result of reconnaissance. The USACE UXO Safety Specialist assigned Site OE-49 a Risk Assessment Code (RAC) score of 5, which indicates that no further OE-related investigation is necessary. The site reconnaissance is conducted to look for evidence of past ordnance use. Visible evidence found during the site reconnaissance provides information on the type, extent, and magnitude of ordnance present. Physical features that may be present at a former site include impact craters caused by penetrating ordnance, the presence of OE and/or OE scrap on the ground surface, and soil staining

associated with the use of bulk explosives. Upon completion of the reconnaissance at each site a Risk Assessment Code (RAC) worksheet was completed and submitted to the Mandatory Center of Expertise (MCX) and Design Center (CEHND) as required (*USACE, 1995*).

The Fort Ord BRA reconnaissance was conducted in 2001. The site reconnaissance was conducted by a two-person team that included an OE specialist and a second member trained in OE recognition. Prior to conducting the site reconnaissance, historical features were identified from training maps and aerial photographs and their locations entered into a GPS unit (way points). The team then conducted the site visit using a magnetometer to detect OE as they navigated to the way points. The path of the site walk was digitally recorded using the GPS unit. The following features or items were required to be mapped if present based on a visual search of the site as part of the BRA reconnaissance: 1) targets; 2) firing lines; 3) range fan markers; 4) survey bench marks; 5) areas of stained soil that could indicate petroleum hydrocarbon or bulk explosives contamination; 6) OE or OE scrap; 7) potential sample locations based on, a) the presence of spent ammunition (lead) (accumulations of 1 to 10 percent and areas exceeding 10 percent), or b) accumulations of OE or OE scrap; 8) other training related features (e.g., fighting positions, fox holes, etc.); and 9) areas of thick vegetation that could limit access to the investigation area. No evidence of OE was found at Site OE-49. Based on the absence of features including targets, range markers, fighting positions, and OE scrap, no further investigation for chemical contamination was recommended for Site OE-49 under the Fort Ord BRA. The path walked during the BRA reconnaissance is shown on Plate 49-4.

The most recent site reconnaissance involved the team walking a portion of the site, surveying the path walked using a Schonstedt Model GA-52/Cx. The Schonstedt was used in an attempt to detect subsurface anomalies to determine if further investigation was warranted. The team also carried a GPS to record the path of the reconnaissance and the locations of any anomalies identified with the Schonstedt. The items found during the site walk included an expended smoke signal, an expended smoke grenade, the candle housing for a 105mm illumination projectile (OE scrap) and small arms ammunition. A summary of the results of the most recent reconnaissance effort is included as an attachment to Appendix C of this report.

Site Boundaries Review

Through the archives search, a general area of concern was identified during interviews with Mr. Stephani. The Site OE-49 boundary includes the canyon that Mr. Stephani stated was used for firing rifle grenades. No evidence of a specific training area or features associated with training areas (e.g., targets) were identified during either the ASR or the BRA site reconnaissance and no modification to the Site OE-49 boundary is necessary based on the review of the ASR or BRA site reconnaissance data.

Quality Assurance/Quality Control

The site reconnaissance conducted as part of the PA/SI was performed in accordance with USACE guidance (*USACE, 1995*). The recommendation of no further OE-related investigation was reviewed by the Ordnance and Explosives Mandatory Center of Expertise (MCX) and Design Center (Corps of Engineers Huntsville Division [CEHND]). The CEHND reviewed the recommendation and the EOD incident report, and recommended further sampling to determine the boundary of the site and presence of OE (*USAEDH, 1997*).

Although the Fort Ord BRA is not a part of the OE program, many of the Data Quality Objectives (DQOs) identified for the Site Assessment Phase of the BRA investigation are the same DQOs established for the site reconnaissance phase of the current OE site investigation program being implemented at the former Fort Ord (*Parsons, 2001*). The DQOs for the BRA and the OE investigation

program identify similar inputs to the decisions used to help answer questions regarding historical site use and to define the boundaries of the area of use. The DQOs for the OE investigation program site reconnaissance identify various inputs to the decision such as compilation of historical information regarding potential OE at the site (e.g., the review of interview records, field notes, aerial photographs, and historic maps). The DQOs for the BRA historical review identified similar sources of information including the review of interview records, historical maps, and aerial photographs. As part of the DQOs for a site inspection conducted for the OE investigation program, documentation of the type and location of OE and OE scrap if found is recorded. As part of the DQOs for the BRA site reconnaissance the quantity, type and location of OE and OE scrap found is also recorded. Both programs include using the results of the site inspections to determine if additional work (i.e., sampling for OE and soil sampling for chemicals associated with OE) is necessary. The Fort Ord BRA was conducted in accordance to the *Basewide Range Assessment Work Plan* and meet the data DQOs established therein (*IT Corporation [IT], 2001*).

3.49.7 Conclusions and Recommendations

The following section presents conclusions and recommendations for this site based on the review and analysis of data associated with historical information and reconnaissance events performed at the site.

3.49.7.1 Conclusions

Site Use and Development

- Site OE-49 was identified as a training area through an interview conducted during the PA/SI. The site was identified as a rifle grenade range in the 1940s and the 1950s. Based on the interview records it appears that rifle grenades could have been used within Site OE-49. There was no evidence found during both reconnaissance events conducted at Site OE-49 to support the use of rifle grenades.
- The area surrounding the site has been used for housing and schools since the 1960s. It is expected that any OE on the surface would have been discovered previously.
- This area is proposed for future development.

Reconnaissance Evaluation

- To date, no intrusive sampling for the presence of OE has been conducted at this site. Based on evidence from the literature review and from site reconnaissance events, no sampling is necessary.
- The site reconnaissance conducted at Site OE-49 for the ASR was conducted in accordance with USACE guidance.
- The data collected and observations made by the UXO Safety Specialist are useful because no OE or OE scrap targets or firing points were found, supporting the conclusion that no further OE-related investigation is necessary at Site OE-49.
- The BRA work conducted at Site OE-49 met the DQOs established for that program. Many of the DQOs for the BRA are the same DQOs that are currently in use for the OE investigation program.

- The data collected and observations made by the BRA team conducting the reconnaissance at Site OE-49 are useful because no OE or OE scrap, targets or firing points were found which further supports the conclusion that no further OE-related investigation is necessary at Site OE-49.
- Based on historical use of the site and materials found at the site, it is unlikely that OE is present at the site. However, the following OE items, if present at the site, are considered to pose an acceptable risk if encountered for the following reasons:
 - **Grenade, Hand, Smoke, M18.** It is possible that a person could cause the smoke grenade to function if one were found at the site and be burned, but it would have been exposed to moisture, degradation, and weathering for many years, which could decrease the effectiveness of the components that cause it to function.
 - **Signal, Smoke, Ground: M62.** It is unlikely that a person could cause a rifle-fired smoke signal to function if one were found at the site because it: (1) would require precise assembly to function, and (2) would have been exposed to moisture, degradation, and weathering for many years, which could decrease the effectiveness of the components that cause it to function.
- Although the site reconnaissances conducted at Site OE-49 did not include walking the entire site, the quantity and quality of the information generated is sufficient to make an informed decision regarding the site. The investigation (site reconnaissance) was sufficient to confirm the type of OE used at Site OE-49. Additionally, because the OE potentially remaining at Site OE-49 pose an acceptable risk if encountered, further effort to refine the site boundaries or conduct 100 percent sampling of the site would not add significantly to the understanding of the site or change the conclusions of this report.

3.49.7.2 Recommendations

Based on the review of existing data:

- It is not anticipated that OE will be found at Site OE-49 and no further OE-related investigation is recommended. However, because OE were used throughout the history of Fort Ord and because OE scrap has been found at the site, the potential for OE to remain at Site OE-49 cannot be ruled out.
- This site meets Track 1, Category 3 conditions because it was used for training. OE items that potentially remain pose an acceptable risk based on site-specific evaluations conducted in the RI/FS.

Upon approval of the proposed remedy (no further OE-related investigation), Site OE-49 will be incorporated into the basewide OE RI/FS 5-year review schedule. The purpose of the “5-year review” is to determine whether the remedy at Site OE-49 continues to be protective of human health and the environment. The 5-year review will also document any newly identified site-related data or issues identified during the review, and will identify recommendations to address them as appropriate.

3.49.8 References

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PLATES

Disclaimer

The following plates have been prepared to present pertinent features digitized from historical training maps and scanned aerial photographs. It should be noted that minor discrepancies between source maps, combined with the natural degradation of older source maps and photographs, has resulted in misalignment of some map features. In addition, camera angle and lens distortion introduced into older aerial photographs, combined with changes in vegetation and site features over time may contribute to misalignments of some map features with respect to the aerial photographs.

ATTACHMENT 49-A1

**ATTACHMENT 49-A
EVALUATION OF PREVIOUS WORK: SITE OE-49
EVALUATION CHECKLIST PART 1: LITERATURE REVIEW**

TYPE OF TRAINING AND OE EXPECTED

Yes No Inconclusive

1. Is there evidence that the site was used as an impact area (i.e., fired OE such as mortars, projectiles, rifle grenades or other launched ordnance)?

Yes		
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Sources reviewed and comments

This OE site is not identified on any of the available training maps (e.g., circa 1945 map or after). According to former Fire Chief Fred Stephani, the site was a Rifle Grenade Range in the 1940s and 1950s, and its operations ended when the Officer's Club was built in 1971. The Officer's Club is now Chartwell School. According to Mr. Stephani, they fired in a southeast direction, into the canyon. The canyon is located south of a feature that is referred to as Welch Ridge on historical maps of the area. Review of incidence reports indicates that a practice rifle smoke grenade was discovered southeast of the site and two inert 40mm practice rounds for a M-79 grenade launcher were found inside the OE-49 boundary. It is believed that the 40mm rounds were brought to the site from the MRA.

2. Is there historical evidence that training involved use of High Explosive (HE) or Low Explosive (LE) items?

Yes		
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Sources reviewed and comments

Practice rounds could have LE.

3. Is there historical evidence that training involved use of pyrotechnic and/or smoke producing items (e.g., simulators, flares, smoke grenades) but not explosives?

		Inconclusive
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Sources reviewed and comments

Based on the reported historical use of the site there is the potential for the use of rifle smoke grenades. A smoke grenade was reportedly found in a fox hole southeast of the site. (USAEDH, 1997; USA, 1999).

**ATTACHMENT 49-A
EVALUATION OF PREVIOUS WORK: SITE OE-49
EVALUATION CHECKLIST PART 1: LITERATURE REVIEW**

DEVELOPMENT AND USE OF THE SURROUNDING AREA

Yes No Inconclusive

4. Does subsequent development or use of the area indicate that OE would have been used at the site?

	No	
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Sources reviewed and comments

Site OE-49 has not been developed. Development of adjacent areas suggest that OE use at Site OE-49 was unlikely. Two different schools and an Officers' Quarters were built near the boundaries of OE-49. The 1956 aerial photograph shows that four Officers' Quarters buildings had been built just outside of the northeast border of OE-49. The 1966 aerial photograph shows that the Officers' Quarters Buildings have expanded with three more buildings to the east. The 1966 photograph also shows that George C. Marshall Elementary School has been built just north of the northwest site border. The Officer's Club was constructed in this area in 1971 near the northeast border of the site (it is now known as Chartwell School). Site OE-49 has not been sampled. A site walk of OE-49 found no evidence of OE use.

5. Does use of area surrounding the site indicate that OE would have been used at the site?

		Inconclusive
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Sources reviewed and comments

Currently, the area is bordered by Old North South Road to the west, the two schools and the Officer's Club to the north, and housing area to the south. To the south is OE-24B (Practice Hand Grenade Range) and OE-24C-E. To the west is a training area (which in the early 1950s became a golf course) and to the north is Site OE-39 and buildings. The training area to the west does not contain any OE sites. Only one OE scrap item was found in the sampling of the adjacent "Booby Traps" training area. No OE was found during sampling of Site OE-39 to the north.

**ATTACHMENT 49-A
EVALUATION OF PREVIOUS WORK: SITE OE-49
EVALUATION CHECKLIST PART 1: LITERATURE REVIEW**

Yes No Inconclusive

ESTABLISHMENT OF SITE BOUNDARIES

6. Is there evidence of training areas on aerial photographs that could be used to establish boundaries?

		Inconclusive
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Sources reviewed and comments

Cleared/disturbed areas are visible in this location on the 1951 aerial photograph but they do not provide a good indication of a site boundary.

7. Is there evidence of training on historical training maps that could be used to establish boundaries?

	No	
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Sources reviewed and comments

The boundary of OE-49 is not defined on any Training Facilities Maps or the 1946 Master Plan. OE-49 is not labeled as a Rifle Grenade Range on any of the maps.

8. Should current boundaries be revised?

	No	
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Sources reviewed and comments

No indication that the boundaries should be modified.

RESULTS OF LITERATURE EVALUATION

Does the literature review provide sufficient evidence to warrant further investigation?

	No	
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Comments

No evidence that the area was used for rifle grenade training was discovered during the literature review. No further OE-related investigation is warranted.

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Training Facilities Map, Revised August 1945
Master Plan - Fort Ord, April 5, 1946
Field training Areas and range Map, April 27, 1964.
1941, 1949, 1951, 1966 and 1999 aerial photos

ATTACHMENT 49-A1
 EVALUATION OF PREVIOUS WORK: SITE OE-49
 EVALUATION CHECKLIST PART 2: RECONNAISSANCE EVALUATION

Yes No Inconclusive

1. Is there evidence that the site was used as an impact area (i.e., fired OE such as mortars, projectiles, rifle grenades or other launched ordnance)

	No	
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Sources reviewed and comments

No evidence of an impact area has been found.

2. Is there evidence that training involved use of High Explosive (HE) or Low Explosive (LE) items?

Yes		
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Sources reviewed and comments

LE only. Expended and live small arms ammunition, portion of an expended illumination projectile, expended smoke grenades.

3. Is there evidence that training involved use of pyrotechnic and/or smoke producing items (e.g., simulators, flares, smoke grenades) but not explosives?

Yes		
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Sources reviewed and comments

Expended smoke grenades were found during the 2004 site walk.

4. Does subsequent development or use of the area indicate potential that OE would have been used at the site?

	No	
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Sources reviewed and comments

No development of the site has occurred. The George C. Marshall Elementary School, an Officer's Club (which is now known as Chartwell School), and Officer's Quarters' were constructed just north of the site border. Fitch Park housing was constructed in the 1960s south of the southern site border.

5. Does use of area surrounding the site indicate that OE would have been used at the site?

	No	
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Sources reviewed and comments

No training areas border the site on any of the historical training maps. The 1964 map shows the East Officer's Housing Area to the south of OE-49. Two schools and Officers' Quarters are currently located just north of the site.

ATTACHMENT 49-A1
 EVALUATION OF PREVIOUS WORK: SITE OE-49
 EVALUATION CHECKLIST PART 2: RECONNAISSANCE EVALUATION

Yes No Inconclusive

6. Is there evidence of training areas on aerial photographs that could be used to establish site boundaries?

	No	
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Sources reviewed and comments

Aerial photographs provide no clear indication of a defined training area. There are no structures or permanent features within the site boundaries (Aerial photos from 1941, 1949, 1951, 1966, 1999).

7. Is there evidence of training on historical training maps that could be used to establish boundaries?

	No	
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Sources reviewed and comments

The area was identified during interviews with Mr. Fred Stephani. Historical maps do not indicate any training activities within OE-49. The 1953 and 1956 Training Maps show the Welch Ridge bleachers. These bleachers would have been located east of the southeastern edge of OE-49. It is not apparent what training activities would have been observed from these bleachers.

8. Was sampling and/or reconnaissance performed within appropriate area?

Yes		
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Sources reviewed and comments

No OE sampling was conducted at the site. Site walks were performed for the PA/SI, Basewide Range Assessment (BRA), and in 2004 within the area described by Mr. Stephani.

9. Does reconnaissance indicate OE and/or ordnance-related scrap are present at the site?

Yes		
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Sources reviewed and comments

OE scrap (smoke and illumination signals) were found during the 2004 site walk. Incident reports indicate that 40mm practice rounds were found within the site boundaries. However, based on the age of the items, it is believed that these were brought to the site from the MRA.

ATTACHMENT 49-A1
 EVALUATION OF PREVIOUS WORK: SITE OE-49
 EVALUATION CHECKLIST PART 2: RECONNAISSANCE EVALUATION

Yes No Inconclusive

10. Were the type(s) of items found consistent with the type of training identified for the site?

	No	
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Sources reviewed and comments

Only smoke producing items and part of an illumination round were found during the 2004 site walk.

11. Were the type(s) of items found consistent with the era(s) in which training was identified?

Yes		
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Sources reviewed and comments

Items found are consistent with training in the 1940s and 1950s.

12. Was HE fragmentation found?

	No	
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Sources reviewed and comments

No HE fragmentation were found during the site reconnaissance, and the 2004 site walk.

13. Was HE found?

	No	
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Sources reviewed and comments

No HE were found during the site reconnaissance, or the 2004 site walk.

14. Was LE found?

	No	
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Sources reviewed and comments

No LE were found during the site reconnaissance, or the 2004 site walk.

15. Were pyrotechnics found?

	No	
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Sources reviewed and comments

No pyrotechnics were found during the site reconnaissance, or the 2004 site walk.

16. Were smoke producing items found?

	No	
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Sources reviewed and comments

No, only OE scrap smoke producing items were found during the 2004 site walk.

ATTACHMENT 49-A1
 EVALUATION OF PREVIOUS WORK: SITE OE-49
 EVALUATION CHECKLIST PART 2: RECONNAISSANCE EVALUATION

Yes No Inconclusive

17. Were explosive items found (e.g. rocket motors with explosive components, fuzes with explosive components)?

	No	
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Sources reviewed and comments

No explosive items were found during the site reconnaissance, or the 2004 site walk.

18. Do items found in the area indicate training would have included use of training items with energetic components?

Yes		
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Sources reviewed and comments

Small arms ammunition, smoke producing items and illumination signals (OE scrap) were found during the site reconnaissance, and the 2004 site walk.

19. Were items found in a localized area (possibly the remnants of a cleanup action)?

	No	
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Sources reviewed and comments

The site reconnaissance, and the 2004 site walk.

20. Is it appropriate to divide the site into sectors to focus on areas of common usage, similar topography and vegetation, and/or unique site features?

Yes		
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Sources reviewed and comments

Site reconnaissance and 2004 site walk were performed in the canyon area that was identified as the target area.

21. Should site boundaries be revised?

	No	
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Sources reviewed and comments

The site boundaries include the Welch Ridge area, the canyon that, according to Mr. Stephani, would have been used for firing practice grenades. No indication that the boundary should be revised on the basis of the reconnaissance evaluation.

ATTACHMENT 49-A1
 EVALUATION OF PREVIOUS WORK: SITE OE-49
 EVALUATION CHECKLIST PART 2: RECONNAISSANCE EVALUATION

Yes No Inconclusive

22. Has the field data been collected and managed in accordance with quality control standards established for the project?

Yes		
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Sources reviewed and comments

Data collected for the Basewide Range Assessment (BRA) was managed in accordance the DQOs established in the Basewide Range Assessment Work Plan (IT, 2001). The site reconnaissance conducted as part of the PA/SI was performed in accordance with USACE guidance (USACE, 1995).

Result of Reconnaissance Evaluation

Does the reconnaissance evaluation provide sufficient evidence to warrant further investigation?

	No	
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Comments

A map indicating the path walked during the RAC should have been provided with the RAC sheet. Based on the RAC evaluation, the site reconnaissance conducted under the BRA, and the 2004 site walk, there is no additional evidence to support the use of this area as a rifle grenade range.

References

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 US Army Corps of Engineers, 1995. Procedures For Conducting Preliminary Assessments At Potential Ordnance Response Sites. ETL 1110-1-165, April.

ATTACHMENT 49-A2

ATTACHMENT OE-49-A2

POTENTIAL ORDNANCE FOUND AT SITE OE-49

Ground Signals, Smoke

M62 (Red), M64 (Yellow), M65 (Green), and M66 (Violet) Smoke Signals – The M62, M64, M65, and M66 colored smoke signals are used for signaling during the daylight. The signals are fired from an M76 grenade launcher. Each signal consists of an expelling charge and six smoke charges. The signal case, closed at the nose end with a steel closing top, is a drawn aluminum body secured at the base to an aluminum fuze housing. The fuze housing has a circular time train groove filled with black powder and a smokeless powder propelling charge. A retaining disk holds the charge in place. A circular stabilizer, consisting of a hollow steel tube with a circular tail fin, is threaded to the fuze housing. The open end is closed, prior to firing, by a cork plug with a removal tape.

Flash from the M64 grenade launcher cartridge passes through the stabilizer to ignite the propelling charge, and the burning propellant ignites the 5.5 second delay train. Near the top of the trajectory, the time train ignites the expelling charge. The expelling charge ejects and ignites the smoke charges out through the top of the case. As the charges descend tumbling from the trajectory height of approximately 600 feet, colored smoke streamers are emitted. The streamers will persist for about 20 seconds in a 5 MPH wind and may be seen up to 3 miles in clear weather (*Army, 1977a*).

M18 Colored Smoke Hand Grenade – The M18 colored smoke hand grenade is used for ground-to-air or ground-to-ground signaling. The grenades may be filled with any one of four smoke colors: red, green, yellow, or violet. Each grenade will emit smoke for 50 to 90 seconds. The grenade body is of thin sheet metal and is filled with red, green, yellow, or violet smoke composition. The filler is topped with a starter mixture.

The hand grenade fuze M201A1 is a pyrotechnic delay-igniting fuze. The body contains a primer, first-fire mixture, pyrotechnic delay column, and ignition mixture. Assembled to the body are a striker, striker spring, safety lever, and safety pin with pull ring. The split end of the safety pin has an angular spread. Safety clips are not required with these grenades.

Removal of the safety pin permits release of the safety lever. When the safety lever is released, it is forced away from the grenade body by a striker acting under the force of a striker spring. The striker rotates on its own axis and strikes the percussion primer. The primer initiates the first fire mixture. The fuse delay element, ignition mixture, and grenade starter mixture and filler are initiated in turn by the preceding component. The pressure sensitive tape is blown off the emission holes and the colored smoke emits from these holes (*Army, 1977b*).