April 2018

Lessons from the Past: The Rapid Clearance of Denmark’s Minefields in 1945

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Lessons from the Past:
The Rapid Clearance of Denmark’s Minefields in 1945

by Roly Evans [Geneva International Centre for Humanitarian Demining]

The clearance of the vast majority of Denmark’s minefields during 1945 was remarkable. In just under five months, a force ranging between 750 and 2,600 German prisoners of war (POW) under the supervision of 250–350 Danish officers and noncommissioned officers cleared 1,389,281 mines from an area of 1,103.2 sq km (425.9 sq mi). Such speed of clearance stands in stark contrast with much of modern humanitarian mine action since the 1990s. This article will explain how such speed was possible and why it could not reasonably be repeated today. The article will also identify a number of important lessons that remain to be learned.

Between 1943 and 1945, German forces in Denmark emplaced approximately 1,401,946 anti-personnel and anti-tank mines, mostly on beaches suitable for amphibious landing, but also around key facilities such as radar stations. On 4 May 1945 at Lüneburg Heath, east of Hamburg, the Allies accepted the unconditional surrender of the German forces in Denmark, along with those in the Netherlands and northwest Germany. Item 3 of the Instrument of Surrender stipulated that “the German command is to carry out at once, and without argument or comment, all further orders that will be issued by the Allied Powers on any subject.” On this basis an initial force of 1,000 German

Image courtesy of Vardemuseerne.
POWs, mostly Pioneer troops, were required to conduct clearance within Denmark. To better allow for the provisions of the 1929 Geneva Convention, the Germans were officially categorized as Surrendered Enemy Personnel rather than POWs. The other 200,000 odd German troops in Denmark returned to Germany in the weeks following the surrender.

Clearance started quickly and proceeded quickly. On 11 May 1945, within one week of the unconditional surrender, the first clearance tasks had begun. This arrangement was formalized on 18 June 1945 with the founding of Minekommando Dänemark by order of General Dewing, commander of the British forces in Denmark. The initial contingent of 1,000 Pioneer soldiers had fallen to 750 in six weeks, most likely at least in part due to accidents; the June order increased the group to 1,892 officers and men. By August 1945 the
The number grew to 2,600. Two-thirds of the personnel were directly employed in the field, while the remainder fulfilled staff functions. The organization of the clearance is worth noting. The British had overall command of the demining effort from the old German headquarters on Rådhuspladsen in Copenhagen. Major Stanley Holland, Royal Artillery, was the officer in charge. Supervision would be conducted by a cadre of about 250–350 Danish officers and men within an organization known as Dansk Minekontrol, headed by Kaptajn D.A.Wieth-Knudsen. Working for both was the head of German Minekommando Dänemark, Hauptmann Geuer, formally Head of the Wehrmacht Pioneer School in Horsens.

The Dewing order of 18 June 1945 was explicit on a number of points. First, "the execution of the work is completely left to the Germans themselves - they can use which methods they wish to take up the mines provided all security measures for the protection of civilians and property are observed. At each Minefield where mining takes place, at least one Danish soldier must be in control and he is responsible for compliance with all regulations and rules." Second, Minekommando were to "complete the demining in Denmark at the shortest possible time."

The Germans used a number of methods to remove mines. Many of these would be deemed dangerous today. Safety distances between deminers were not observed in a way recognizable now. Prodding for mines in groups without any personal protective equipment was routine, whereas it now only tends be used as a secondary aid to excavation rather than a primary detection technique. Prodding was also done using long prodders when searching for anti-tank mines.

British Number 3 mine detectors were also available to search for metallic anti-tank mines, most commonly one of four versions of the Tellermine. For anti-tank mines that were not easily detected, such as the Holzmine, only long prodders could be used. A breakdown of the 1,389,281 mines cleared between 11 May and 31 September 1945 can be found in Table 1.

Sometimes highly detailed clearance statistics were collected and recorded. Mines removed from a panel (i.e., a grouping or block of mine rows) would be marked as missing or booby-trapped. The same precision involved in creating the excellent minefield records was often repeated in the maintenance of clearance records. At a national level the number of mines found per day was recorded (see Table 1). Even today, many countries could not give a similar breakdown of the mines and explosive remnants of war (ERW) cleared, despite the huge advances in information technology.

With pen, paper, and typewriters, better basic statistics were available over seventy years ago than is sometimes the case currently at national and even program level today.

Minekommando Dänemark also innovated in terms of the use of mechanical assets. A number of Panzer III tanks, StuG III assault guns, and Sd.Kfz. 251 halftracks, often in bad condition, were co-opted into service. Typically these would be used as some form of verification asset after clearance in a form of quality control known at the time as "test runs." Two types of test runs were devised: an anti-tank minefield run and an anti-personnel and anti-tank minefield run. Unlike most modern mine verification vehicles, rollers were fitted to the rear of the tanks. Initially rollers were made of concrete,

<table>
<thead>
<tr>
<th>Type of Mine</th>
<th>Model of Mine</th>
<th>Number Cleared - Type</th>
<th>Number Cleared - Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT Mine</td>
<td>Teller Mines</td>
<td>452,819</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Riegelmine</td>
<td>326,407</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Holzmine</td>
<td>16,519</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pansermine Danemark</td>
<td>85,435</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stockmine</td>
<td>213,338</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stockmine Schutenmine Danemark og berger (locally made Schu Mines)</td>
<td>222,955</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Schützenmine</td>
<td>311,334</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S-Mine</td>
<td>188,835</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stockmine</td>
<td>213,338</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Schützenmine</td>
<td>222,955</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>1,389,281</td>
<td>1,389,281</td>
</tr>
</tbody>
</table>

Table 1. Table showing breakdown of mines cleared in Denmark 11 May–31 September 1945.
Image 5. Members of Minekommando Dänemark erecting a minefield fence, Jutland, Denmark, summer 1945. A bunker can just be made out on the sand dune behind the second figure from the right. As elsewhere on the Atlantic Wall, the minefields emplaced by the Germans were integrated into a wider defensive system and would often be covered by fire from a hardened shelter. 
*Image courtesy of the Danish Coastal Authority.*

Image 6. Members of Minekommando Dänemark pose on the front of a Sturmgeschütz III (StuG III) assault gun, Jutland, summer 1945. The Stug III was one of a number of armored vehicles used to tow rollers. 
*Image courtesy of the Danish Coastal Authority.*
Image 7. Members of Minekommando Dänemark pose with a number of Stockmine 43s and three Tellermine 42s cleared from a nearby minefield, Jutland, Denmark, summer 1945.
*Image courtesy of Dan Mouritzsen – Silkeborg Bunkermuseum Denmark.*

Image 8. Members of Minekommando Dänemark walking the ground they have cleared in Jutland, Denmark, summer 1945. The practice of marching in close order over land to prove it was clear was widespread in the post-war years throughout Europe. Often the local population would be invited to observe in order to reassure them that their land was clear. While it appears callous, an equivalent does occur today—sometimes a clearance organization will play football on land cleared to reassure the local population. Mapham, James (Sergeant), No. 5 Army Film & Photographic Unit.
*Image courtesy of WAR OFFICE SECOND WORLD WAR OFFICIAL COLLECTION, IWM.*
Image 9 (top). Still from the 2015 Danish-German film *Land of Mine*, showing cleared Tellermine 42s defused and awaiting transport to a demolition site. Often more mines were cleared daily in Denmark in 1945 than are cleared yearly in a number of countries today.

Image 10 (middle). Still from the 2015 Danish-German film *Land of Mine*, showing a character prodding for mines. Today if mines are hard to detect due to having minimum metal content or are in ground with heavy metal contamination, the deminer will usually employ full excavation within their lane rather than prodding.

Image 11 (bottom). Still from the 2015 Danish-German film *Land of Mine*, showing the terrain of the Juntland coast.

All images this page courtesy of Camilla Hjelm.
but these disintegrated too easily during repeated test runs. Concrete was replaced by steel and concrete rollers especially made at the Varde Steelworks. Fifteen vehicles are recorded as initiating mines with their tracks during test runs. Panzer IIs and StuG IIs mainly only lost a track and a wheel. Unfortunate drivers typically experienced hearing damage. Examples of the patterns driven in test runs can be seen in Images 17 and 18.

The clearance of Denmark was costly, as was recognized at the time. In December 1945, Dansk Minekrontrol listed 149 dead, 165 severely injured, and 167 lightly injured during the demining effort. While the total workforce was not static, Dansk Minekrontrol calculated that 20 percent of all deminers were either killed or injured. Dansk Minekrontrol were keen to point out that the statistic of 100 deminers killed and 240 injured for every million mines removed in Denmark compared favorably to France, where it was claimed that 1,000 deminers were killed and 1,000 were injured for every million mines cleared.

Demining was and is dangerous. In the 1940s, demining techniques were in their infancy. The casualties among allied military deminers were also very high. In 1949, the Geneva Conventions were updated. A revised Article 52 stated that "Unless he be a volunteer, no prisoner of war may be employed on labour which is of an unhealthy or dangerous nature. The removal of mines or similar devices shall be considered as dangerous labour." The post-war clearance of Europe as a whole was undoubtedly quick, both by the standards of the day and historically. While hard to prove categorically, the 1945 Denmark clearance operation was probably amongst the fastest ever undertaken. On average in Denmark in the summer of 1945, 9,715 mines were cleared daily. By way of comparison to Denmark’s 1,389,281 mines cleared from an area of over 1,103.2 sq km (425.9 sq mi) by a force ranging between 750 and 2,600 German POWs, in the Netherlands between 20 May and 31 December 1945, the Draeger Brigade of up to 3,688 personnel cleared 1,079,857 landmines. The scale and speed of both efforts in Denmark and Holland are perhaps dwarfed by those in France, where from 1945 to 1947, 48,000 German POWs and 3,000 French deminers cleared 13 million mines at a cost of 1,709 killed and 3,000 injured.

In November 2004, during a speech in Nairobi, a senior mine action figure compared the European efforts in the
Image 13. Dansk Minekrontrol map showing the general locations of 1,389,281 mines cleared in Denmark 11 May–31 September 1945. On each line the figure above indicates anti-tank mines, the figure below indicates anti-personnel mines. Image courtesy of Dan Mouritzsen, Silkeborg Bunkermuseum Denmark.
Image 14. The minefield record for the Luftwaffe Directional Radio Relay Station in Kirkehöje. The detail and precision of the record is impressive. The draftsman who completed it was the equivalent of a Lance Corporal. Modern clearance operators rarely if ever get access to minefield records of this quality. Such records are key in enabling rapid clearance and reasoned land release decisions based on evidence.

*Image courtesy of the Danish Engineer Regiment.*
1940s directly to the slowness of modern clearance operations. Was this a fair comparison? The answer is yes and no. Yes in that modern clearance efforts are not as efficient as they could be. But no in that it is not practical to repeat much of the 1940s approach in the modern context. How much speed of clearance in Denmark contributed to high casualty figures remains debated to this day. Acceptance of casualties can be argued to be a contributory factor in the rapid clearance but it was by no means the only factor or necessarily the key one. The main reason why Denmark and other countries could be cleared so fast was simple: the operators knew where the mines were. The Germans kept excellent records of the vast majority of their minefields. Wehrmacht draftsmen were highly skilled and made very accurate minefield maps. This was nothing short of essential for rapid minefield clearance. A good example of such minefield records can be seen at Kirkehøj R.V.St near Paarup in central Denmark. Between 26 July and 7 August 1944, a minefield of 5,983 Schützenminen was emplaced around the Luftwaffe Directional Radio Relay finding station. Obergefreiter Busse produced the minefield record, reproduced in Image 14, and the panel record reproduced in Image 22. The high level of detail and precision was common in German minefield records across Europe. This level of detail included the location of each panel and the number of Schützenminen it contained as well as the panel plan showing which mines were booby-trapped and which mines were left out of the pattern. Such detail would be envied by many modern clearance operators, even those clearing pattern minefields with reasonable minefield records in locations such as Turkey and the Falkland Islands/Malvinas. The principle problem of modern mine clearance, “where are the mines?” did not really exist in Denmark in 1945.

In many mine-affected countries in Europe, much of life today carries on as if there had never been minefields. The town of Esbjerg on the east coast of Jutland, very near to the Skallingen peninsula, illustrates this point. The town was heavily fortified by the Germans from 1943 onwards on both the seaward and landward side since any allied landing in the area would have needed to capture such a large port as soon as possible. Images 19 and 20 show the overall minefield plan for Esbjerg. Anti-tank and antipersonnel minefields were integrated to cover landward approaches along with various prepared demolitions in the port area.

Esbjerg was cleared during the summer of 1945. Records detail 63,888 mines of all types being removed. Image 23 shows Esbjerg as it is today, much expanded, with the former minefields superimposed onto housing estates, industrial sites, etc. As with other countries in Europe at the time, it was shown that the recovery from landmines could be rapid...
to a point where the legacy is barely remembered by the general population decades later.

In December 1945, the Danes declared that 99 percent of the minefields in the country had been cleared—a remarkable achievement by any standard and one that deserves recognition despite the high human cost involved. Most mine clearance by German POWs appears to have finished in February 1946. The only areas remaining to be cleared were in Skallingen. These minefields presented a particularly difficult challenge. “The remaining mines were laid in a random distribution and consisted of several types, including both anti-tank and anti-personnel mines.” The movement of the sand presented further problems. Even in 1945, mines that had been in the ground for one or two years could be found under 1.5 m (1.6 yd) of sand. Movement of mines by the sea was also an issue, just as it had been in the United Kingdom from 1940 onward. The records suggested around 72,000 mines were laid at Skallingen of which 61,000 were cleared up to 1947. Skallingen appears to be the one place where German minefield record keeping fell below the normal standard. It is also the one area that was not cleared in 1945. Since 1947, a further 3,500 were cleared, and an estimated 2,500 were swept away, having been in an area eroded by the sea over time. From 2005 to 2012, Denmark conducted the difficult and costly clearance of the last minefields believed to be in an area of 187,200 sq m (223,889.3 sq yd). A further 3,357 mines and 552 other items were destroyed.

Summary

Debate will continue about the decision of the Allies to co-opt Surrendered Enemy Personnel to conduct mine clearance in the 1940s, especially given a recent film on the subject called Under sandet or Land of Mine in English. The demining techniques used then were far higher risk than those that would be acceptable now. The inability to fully repeat this approach to some degree undermines direct comparisons with modern mine action. However, the key factor that allowed such rapid clearance, regardless of casualties, was the excellent minefield records kept by those who emplaced the minefields in the first place. In many parts of the world we unfortunately do not have the equivalent records that allow rapid identification of the actual contaminated ground and quick clearance.

It is clear that modern-day mine action still has much to learn from those who went before us, not least the importance...
Image 19 (left) and Image 20 (above). Original overall German minefield plan for the defence of Esbjerg. Any Allied landing on the west coast of Denmark was unlikely due to difficulties in providing air cover. If such a landing had been attempted it would have required the capture of a port. Esbjerg was the second largest port in Denmark and the only viable option on the west coast of the country. For this reason the islands and spits on the seaward side, including Skallingen, were heavily mined. On the landward side of Esbjerg and around the port itself, 63,888 mines of all types were removed in 1945. Images courtesy of the Danish Engineer Regiment.
of field staff collecting sufficient and accurate data in order to better allow effective conduct of their operations and to better address the Mine Ban Treaty Article 7 obligations. The Germans and Danes collected better data with pen, paper, and typewriter in 1945 than many programs and national authorities manage today with computers. We should aim to not only match them, but routinely surpass them. The introduction of IMSMA Core in coming years will hopefully aid improvements in relevant data collection and analysis. What is also needed is a change in working culture amongst more field staff so that they see accurate data collection and reporting as fundamental to their role.

What is indisputable is the bravery and sacrifice of those German deminers who, often very young, gave so much in the summer of 1945 in order to assist Denmark and other countries in Europe to begin the recovery from such a destructive conflict. I know of no memorial to these and the other POWs who died or were injured, in Denmark or in any other European country. Perhaps those who gave so much so that

Image 22 (right). One of the panel layouts for Fink section of the Kirkehøj minefield. Most mines emplaced by the Germans would be recorded individually in a panel plan such as this. Red crosses indicated booby trapped Schutzenmines, blue where mines were deliberately not laid. Note that in this panel of 143 mines, 19 Schutenmines (13%) were booby trapped with anti-lift devices.

Image courtesy of the Danish Engineer Regiment.
Roly Evans is an Advisor in Land Release and Operational Efficiency in the Risk Management Division at the Geneva International Centre for Humanitarian Demining (GICHD). He also covers training issues and conventional explosive ordnance disposal (EOD) including the Collaborative ORDnance data repository (CORD) and the GICHD Cluster Munitions Identification Tool (CMID). He has worked in the fields of survey, clearance, EOD, and physical security and stockpile management in Africa, Europe, the Middle East, South Asia, and Southeast Asia.

Image 23. Previous minefields cleared in 1945 superimposed on an expanded Esbjerg today. Red lines indicate anti tanks minefields containing either Tellermines or Holzmines. Green lines indicate anti-personnel minefields containing either Schützminen, Stockmines or S-Mines. S-Mines were known to cause most casualties to both attacking troops and deminers. Image courtesy of the Danish Engineer Regiment.

The author wishes to sincerely thank the following without whom this article would not have been possible. Major Peter Jegsen, Lance Corporal Preben Erichs, Dan Mouritzsen, Martin Jebens, John Jensen, and Antoon Meijers.

See endnotes page 61
Footage of Major Holland and Hauptman Geuer discussing the minefields of the Skallingen peninsula in Jutland can be found at http://www.sculptingthepast.dk/
Film-øvervigt/Besættelsen/Livsfare—Miner.aspx


24. Email from Martin Jebens to the author, 09 February 2018.

25. Holland the British and Canadians calculated that “well recorded minefields were cleared at about three times the rate of poorly or unrecorded ones.” Military Operational Research Unit Report no. 7: Battle Study, Minefield Clearance and Casualties. Date: 03 May 1946. Stichting Geschiedkundige Verzameling EOD, Netherlands.


27. Lieutenant Colonel Draeger, had over 3300 men who were, as in Denmark, self-administered and were largely left to get on with the job. The records the Brigade kept could not be matched by many national authorities and a number of operators today. In six months 1’162’458 mines were cleared (60% AP/40% AT). Booby traps were fitted to 1.4% of mines. Email from Antoon Meijers, author of Achtung Minen, 14 February 2018. See also Antoon Meijers, Achtung Minen - Danger Mines, Het ruimen van landmijnen in Nederland 1940-1947 (Soesterberg, 2013), pp. 138-139. On average 100 mines were lifted for every sixty two man hours. Of the 3300 men, 179 were killed and 381 injured. Records were kept of what mines caused what casualties. Schu mines had a fatality rate of 2%, S-mines31% and all AT mines 60%. Again many national authorities and operators would be unable to produce equivalent figures for the last 25 years of mine action. See Military Operational Research Unit Report no. 7: Battle Study, Minefield Clearance and Casualties. Date: 03 May 1946. Stichting Geschiedkundige Verzameling EOD, Netherlands.

28. Email from Dan Mouritzsen, 10 February 2018


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37. A follow on organization, Sprengkommando Dänemark started to be formed in 1947. However, the Chief of the Danish mine action was a Captain, aptajn D.A.Wieth-Knudsen, Minerydning i Danmark, "Tidsskrift for Ingeniørofficerer" 14. Aargang, Appendix 1.

38. Email from Antoon Meijers, author of Achtung Minen, 14 February 2018. See also Antoon Meijers, Achtung Minen - Danger Mines, Het ruimen van landmijnen in Nederland 1940-1947 (Soesterberg, 2013), pp. 138-139. On average 100 mines were lifted for every sixty two man hours. Of the 3300 men, 179 were killed and 381 injured. Records were kept of what mines caused what casualties. Schu mines had a fatality rate of 2%, S-mines31% and all AT mines 60%. Again many national authorities and operators would be unable to produce equivalent figures for the last 25 years of mine action. See Military Operational Research Unit Report no. 7: Battle Study, Minefield Clearance and Casualties. Date: 03 May 1946. Stichting Geschiedkundige Verzameling EOD, Netherlands.


