

**Whitepaper Discussing Kuwait's Efforts for the
Cleanup of the Gulf War Oil Spills**

**Kuwait Government
Efforts to Clean Up
the Oil Spills
Resulting from the
Gulf War**

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The oil spills resulting from the 1991 Gulf War, deliberately caused by retreating Iraqi forces, were an unprecedented environmental disaster for Kuwait, affecting both land and sea. The Kuwaiti government, with significant international assistance, has undertaken extensive and ongoing efforts to clean up and remediate the affected areas. These efforts can be broadly categorized as follows:

1. Immediate Response and Containment (1991):

- **Extinguishing Oil Well Fires:** The immediate priority was to extinguish the hundreds of oil well fires. International teams including Bechtel, Red Adair Company, Boots and Coots, SafetyBoss Canada, and Wild Well Control, were contracted for this dangerous task. They employed various techniques, including seawater injection, explosives, and even jet engines mounted on tanks ("Big Wind"), to cap the wells. This effort took until November 1991.
- **Containing Marine Oil Spills:** Efforts were made to contain the massive oil slick in the Persian Gulf to prevent it from reaching critical desalination plants and further damaging the coastline. This involved skimming oil from the water's surface using specialized vessels.

2. Early Cleanup and Assessment (1991-1990s):

- **Oil Recovery from Land:** The Kuwait Oil Company (KOC) initiated efforts to pump oil from the "oil lakes" that had formed in the desert. A significant percentage (estimated at 95%) of this recoverable oil was salvaged and exported.
- **De-mining Operations:** Vast areas around the oil fields and coastal regions were contaminated with landmines and unexploded ordnance, hindering cleanup efforts. Extensive de-mining operations were necessary before remediation work could proceed safely.
- **Initial Coastal Cleanup:** Manual and mechanical methods were used to remove heavy oil contamination from the extensive stretches of Kuwaiti and Saudi Arabian coastlines affected by the spill.
- **Environmental Assessment:** Extensive studies were conducted by international and Kuwaiti organizations to assess the long-term environmental damage to the soil, groundwater, marine ecosystems, and air quality.

3. Long-Term Remediation Efforts (1990s - Present):

- **Kuwait Environmental Remediation Program (KERP):** Established by the United Nations, KERP is a large-scale, multi-billion-dollar program managed by the Kuwait Oil Company (KOC) to clean up the contaminated land. It is considered the largest inland environmental cleanup project in history.
- **Soil Remediation Technologies:** KERP employs various technologies to treat the contaminated soil, including:

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- **Bioremediation:** Using microorganisms to break down the oil contaminants in less contaminated areas.
- **Soil Washing:** A process to extract and separate oil, salts, and other contaminants from highly contaminated soil.
- **Landfarming:** Spreading contaminated soil in thin layers and tilling it to enhance biodegradation.
- **Infrastructure Development:** The program involves the construction of treatment centers, access roads, and containment areas for the excavated soil.
- **Ongoing Monitoring:** Continuous monitoring of soil, groundwater, and marine environments is conducted to assess the effectiveness of remediation efforts and track the recovery of ecosystems.
- **Focus on Innovation:** KOC has explored and tested various experimental oil cleaning techniques, including biotechnologies, to optimize the remediation process.
- **Addressing "Tarcree":** A significant challenge is the "tarcree" – a hardened layer of oil mixed with soot and salt – that has formed in some areas, requiring specialized methods for removal and treatment.
- **Unexploded Ordnance (UXO) Removal:** Alongside oil remediation, KERP also continues the dangerous task of removing remaining landmines and UXO.

4. Marine Environment Recovery:

- Natural recovery processes have played a significant role in the marine environment, with fish and dolphin populations returning relatively quickly in the years following the spill.
- However, long-term impacts on coastal habitats like salt marshes and mangrove forests required monitoring and, in some cases, active restoration efforts.

Challenges and Ongoing Work:

- The sheer scale of the contamination (hundreds of square kilometers of land and millions of barrels of oil spilled) makes the cleanup a long and complex process.
- The age and weathering of the spilled oil, along with the formation of tarcrete and salt deposits, pose technical challenges for remediation.
- Ensuring the long-term sustainability of the cleaned areas and the recovery of sensitive ecosystems remains a priority.
- The presence of remaining UXO continues to pose a risk and complicates remediation work.

In conclusion, the Kuwaiti government, through the KOC and with international collaboration, has made significant and ongoing efforts to clean up the devastating oil spills resulting from the Gulf War. While substantial progress has been made in extinguishing fires, recovering oil, and initiating land and coastal remediation, the scale and complexity of the disaster mean that the cleanup process is still underway and will likely continue for years to come. The Kuwait Environmental Remediation Program represents a long-term commitment to restoring the affected environment.