

IN SITU BURNING: AFTER-ACTION REVIEW¹ (SUCCESSFUL BURN 48 HOURS AFTER DISCHARGE)

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ABSTRACT: A spill in May 1997, forced responders to think “outside the box” and utilize ingenuity and skills learned from previous experiences. The Region VI RRT Guidelines for In-shore/Near-shore In Situ Burn, while providing the framework for the plan, had to be modified on site to meet the special parameters this spill presented.

1. Responders had not had previous opportunities to burn this type of environment and were not sure what type of successes to expect.
2. The initial burn was to be conducted well outside of what is normally considered the window of opportunity for in situ burning.
3. PM-10 monitors were to be utilized to monitor smoke plume fallout particle size.
4. It was determined by the Federal On-Scene Coordinator (FOSC) that RRT approval was not necessary and deferred to the consensus among state agencies having jurisdiction.

This response indicates inland/nearshore burns will continue to be utilized as a response tool and points to the need for ongoing evaluations and adjustments to pre-approvals and guidance documents responders utilize.

Background

On the afternoon of May 12, 1997, a 10-inch pipeline owned and operated by Koch Pipeline Company carrying Refugio Light and Giddings Stream crudes from a gathering system in Refugio and Aransas counties to Koch Industries Refinery in Corpus Christi, Texas, experienced a weld failure spilling between 500 and 1,000 barrels of the crude into a wetlands environment. The area impacted was owned by a local rancher who used it as a grazing field for cattle, so the area had numerous cattle trails throughout it which contributed to the rapid spread of oil down the numerous paths. The terrain also sloped gently downhill, which allowed for further transport of the spilled product to the wetlands area with 4 to 8 inches of water cover. The wetland is characterized by Sea ox-eye daisy (*Borrichia frutescens*), Gulf cordgrass (*Spartina spartinae*), and Carolina wolfberry (*Lycium carolineanum*).

First responders’ priorities were to stop the leak and to contain as much of the oil as possible. The site of the pipeline leak was excavated and a clamp put on the leaking weld. Since downhill migration of the oil was still occurring, trenches were dug perpendicular to the slope of the terrain to contain the majority of

free-flowing surface oil on the first evening of the spill. Vacuum trucks were utilized to recover the oil from the trenches. This trenching also helped to contain oil further transported by heavy overnight rainfall.

Early on day two, after first responders further surveyed the spill site, it was determined the spill was under the jurisdiction of the Environmental Protection Agency (EPA) federal on-scene commander (FOSC) and the Texas Railroad Commission (TRRC) state on-scene commander (SOSC). Texas General Land Office (TGLO), Texas Parks & Wildlife (TP&WD), and U.S. Fish & Wildlife (USF&W) personnel remained on scene as technical advisors.

Response and burn plan development

Also early on day two, responders began addressing response options. After meetings with the responsible party and federal and state agencies, it was decided to continue trenching further downslope, flushing the floating oil in the wetland area into these trenches, collecting the oil, and padding up pools of oil left in drier areas. It was felt microbial populations, thought to be abundant in the area, would take care of the “finishing touches.” These methods were considered adequate and *in situ* burning was dismissed as unnecessary at this time. But, by that afternoon it was discovered the oil had migrated substantially farther beyond the original perimeters marked with wooden stakes and flags. The cause of the migration is not known, but is thought to be a result of increasing ambient temperatures and/or some sub-transporting of the oil through the downslope of the substrate. In light of the rapid migration of the oil, the *in situ* burning option was reconsidered and selected as the response tool of choice. *In situ* burning was also reconsidered because the rancher had previously used it as a means of vegetation control for the cattle.

While the Region VI Guidelines for In-shore/Near-shore *In Situ* Burns provided the framework for the burn plan, several elements particular to this incident needed addressing:

- The FOSC determined RRT approval was not necessary and deferred to consensus among the state agencies having jurisdiction over an inland *in situ* burn; the TRRC, the TP&WD, and the Texas Natural Resources Conservation Commission (TNRCC) (for air quality issues).
- *In situ* burning is a tool normally utilized within with the first 24 hours of a spill, this burn would be conducted 2 days after the spill.

- The SOSC, not having dealt with the approval process of an inland *in situ* burn of this type before, relied upon sister agencies to provide technical assistance.
- PM-10 monitors would be used to monitor smoke plume fallout particle concentration.

The EPA FOSC assigned to this event determined that RRT approval was not necessary because of the amount of area impacted, the fact that the land in question was privately owned, impact on waterways and/or water pathways was not expected, and an RRT-approved guideline would be utilized to develop the burn plan. The stipulations put on the burn by the FOSC were that all state agencies having jurisdiction must come to consensus amongst themselves and a written plan must be produced and followed; also if there was to be a deviation from the guidelines, RRT approval would become necessary. A courtesy notification of key RRT members was made prior to the burn at the suggestion of the USCG and included the Department of Interior and the Department of Commerce representatives.

Responders have usually conducted *in situ* burns early in responses, usually within 24 hours of the spill; but this burn would be conducted more than 48 hours after the spill. Prior to conducting the burn, responders needed to ascertain whether or not the product could be ignited and expected to burn this long after the initial release. A sample of the floating oil was recovered and put into a basin filled with water where it was successfully ignited on the first attempt. During this test it was obvious some of the light ends had not evaporated and they would assist in ignition as well as sustaining the burn. It is thought that the shade provided by the vegetative cover slowed the weathering process and preserved the lighter ends of the product. Responders were also able to conduct secondary burns on the afternoon of the third day along the fringes of the wetland and in residual pockets of oil that had not originally burned for the same reasons stated above.

This was also a type of environment responders had no previous experience in burning; previous burns had been in grassy coastal marshes, not woody-stemmed wetlands vegetation. Technical personnel on-scene felt the water coverage of 4 to 8 inches over the root systems of the plants was adequate to protect the plant roots from the heat of the fire. This water depth also ensured not all the water would "boil" off in the heat of the fire, leaving the root systems exposed to the heated soil. It was also early in the growing season and it was thought the vegetation would have adequate time to recover before the heat of the summer set in.

In a unified command modified to fit the incident, the SOSC retained several personnel from sister agencies for the technical expertise needed in both formulating the plan and providing assistance for the response. All state agencies worked together with the responsible party to work out the inevitable "glitches" that occurred as the plan was being developed and implemented. The TNRCC agreed to PM-10 monitoring as required by SROMP (Special Response Operations Monitoring Program) with additional monitoring of VOCs (volatile organic compounds). Particulate monitoring in the plume fallout was conducted using three PM-10 monitors provided by the TGLO. The first PM-10 monitor was placed directly downwind of the expected plume at a distance of 1–2 miles, the other two PM-10 monitors were utilized at a 45 degree angle on either side from the first monitor and also stationed 1–2 miles from the burn site.

These monitors were mobile monitors and moved with the direction of the plume if it changed substantially. Personnel tended the monitors and data was also stored in the data logger for later downloading. KOCH personnel did monitoring of VOCs with portable equipment brought in from their refinery. These personnel were mobile and followed the plume. At no time during the burn, did the PM-10 monitoring show levels of PM-10s in excess of 150 micrograms per cubic meter during two or more consecutive 5-minute sampling periods.

The burn

It is estimated the spill impacted 11 acres of the 40-acre wetland. Refinery & Terminal Fire Company (RTFC) personnel ignited the oil on May 14 about 6 p.m. The RTFC ignited the burn in a "U" fashion using three points of ignition, one at the apex of the downwind side of the spill and two points about one-third of the way down each downwind perimeter. The oil burned intensely for over 4 hours and continued to burn to various degrees overnight. A site inspection on the morning of May 15 revealed 5–6 acres had burned with about a 90% oil removal rate. Secondary burns were ignited that afternoon to decrease the oil remaining in the fringe area of the original burn and increased the burn area to approximately 8 acres.

Lessons learned

Responders to this spill came away with many lessons.

- Guidelines are just that and responders must have the knowledge and flexibility to adjust them as needed.
- The incident command system, if utilized correctly, allows for multiple entities to work together towards a common goal.
- *In situ* burns can be conducted outside the expected window of opportunity if conditions are right. Responders should not discount burning simply because more than 24 hours have elapsed since the spill occurred. Conducting small test burns will enable responders to determine if a burn will be successful. Secondary burns are also distinct possibilities which should be considered.
- While PM-10 monitoring was conducted successfully, the infrequency of its use can result in delays if responders need to refresh their training during the incident. Responders should refresh their training on this type of specialized equipment three to four times a year.

Biography

Ms. Clark currently serves as the Director of Prevention for the Oil Spill Prevention and Response Division of the TGLO.

References

1. Internal General Land Office spill documentation, reports, and notes.

¹ The views and opinions in this paper are those of the authors and do not represent official opinions of the Texas General Land Office.