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THE EAST WALKER RIVER SPILL: CLEANUP IN A SEVERE WINTER ENVIRONMENT!

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ABSTRACT

On December 31, 2000, a tank truck overturned on a sharp curve and emptied its load of #6 Fuel Oil into the East Walker River near Bridgeport, California. The East Walker River is one of the premier trout fishing streams in the State of California, and the town of Bridgeport is economically dependent on large numbers of fisherman who come there during trout fishing season each year. The cleanup was complicated by extreme cold weather conditions that responders encountered for most of the three-month cleanup.

The paper will describe the successful response in detail, specifically addressing the many issues that the Unified Command dealt with and resolved during the cleanup. Those issues included: safety concerns related to the cold weather environment, cold weather influences on equipment, a containment and recovery strategy, legal requirements regarding irrigation rights, fish habitat protection, sport fishing organizations and multiple state jurisdictions.

INTRODUCTION

On December 30, 2000, a tank truck carrying 6,100 gallons of #6 fuel oil destined for a power plant in Yerrington, NV, overturned on an unmarked curve near milepost 7.5 on State Highway 182 north of Bridgeport, CA. The violent rollover killed the driver and caused about 3,608 gallons of the oil cargo to spill into the waters of the East Walker River where the truck had come to rest. The oil eventually contaminated nearly ten miles of river in the two states and took a labor force of up to 75 personnel three months to clean up.

The East Walker River flows out of the east slope of the Sierra Nevada in Mono County, passes through Bridgeport, CA, forms Bridgeport Reservoir just north of town then continues on north through Toiyabe National Forest into Nevada eventually terminating in Walker Lake. This river and lake system provides fishing opportunities highly valued by sportsmen. The East Walker River below Bridgeport Reservoir, in particular, is very productive and is renowned for producing trophy size rainbow and brown trout that offer fly-fishermen a high quality fishing experience. The river is well known among the many fly-fishing clubs of California and Nevada; and, in fact, fly fishermen from around the world reportedly come to Bridgeport for an opportunity to fish the waters of the East Walker River.

At the accident scene, State Highway 182, a two-lane asphalt highway, generally runs in a north-south direction following the East Walker River. In fact, at the point of the accident, the highway was only 15 feet from the river. Hwy 182 is very curvy along the ten-mile stretch between Bridgeport and the state line, and has a history of vehicle accidents. Although this was the first large oil spill to occur in the river, just one month earlier, a tractor-trailer rig hauling cattle overturned on the same curve. Other accidents at different locations along this road have spilled various non-toxic cargoes into the river.

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The spilled fuel oil was a 50-50 mixture of two products, Desulfurized Gas-Oil (DGO) and PS 1500 Topped Crude. The former is a yellowish green to dark liquid, with a specific gravity of 0.89 (API gravity of 27.5). The latter is a black, viscous liquid having a characteristic petroleum odor with a specific gravity in the range of 0.98 to 0.99 (API gravity about 12 to 13), a pour point of +90°F, and negligible vapor pressure. The oil had to be heated to about 160°F in order for it to flow for loading, transport and unloading. At low temperatures the oil mixture became tar-like.

RESPONSE ORGANIZATION

Because the spill event started as the result of a fatal accident, the California Highway Patrol provided the initial Incident Commander and the Department of Fish and Game provided spill assessment services. However, after the initial accident situation was controlled, the Incident Command was handed off to the California Department of Fish and Game, Office of Spill Prevention and Response (OSPR). The OSPR established a Unified Command for the event, which included representatives from the California Department of Fish and Game, the Nevada Department of Environmental Protection, and representatives of the trucking company who immediately assumed responsibility for the spill cleanup.

Command and General Staffs for the Unified Command included the California Highway Patrol as the Public Information Officer, the responsible party's response contractor supervisor as Operations Section Chief, a responsible party representative as Logistics Section Chief, and a representative for the trucking company's insurer was identified as the Finance Section Chief. This organization remained in effect without substantial change throughout the entire response. During the Final Cleanup Phase, the Unified Command included a U.S. Environmental

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Protection Agency (EPA) Federal On Scene Coordinator, or members of the U.S. Coast Guard Pacific Strike Team, which represented USEPA on scene. The Command and General Staff representatives remained constant throughout most of the response.

At the initial Unified Command Meeting on January 3rd, the U.S. Forest Service offered their heliport facility at the Bridgeport Airport as an Incident Command Post. The facility was used primarily for Unified Command meetings and for Planning Section tasks. Operations and Logistics Section activities were, for the most part, carried out in trailers provided by the cleanup contractor at the spill site. The Finance Section activities were generally accomplished offsite with information provided to all parties as needed via telephone and fax.

During the initial Unified Command meeting, the responsible party's Safety Officer was directed to prepare a complete Site Safety Plan. Personnel Protective Equipment (PPE) and Personal Flotation Devices (PFD) were of particular concern, and the Safety Officer was instructed to ensure that all personnel working in or near the river were properly outfitted with both of these items. Furthermore, the Safety Officer was tasked with ensuring that tailgate safety briefings were held with the workers each morning before work commenced. Again, the Safety Plan remained constant throughout the response, with modifications made when necessary to address changing operations or safety concerns.

The general meeting schedule for the incident was also set at the initial Unified Command Meeting, and this schedule remained constant throughout the entire project. That schedule consisted of one primary planning meeting that was held every afternoon. During this meeting safety and the days accomplishments would be discussed, priorities established for the next operational period, and the Incident Action Plan (IAP) prepared for the following day.

During the Gross Oil Cleanup Phase, December 31, 2000 to January 20, 2001, there were

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generally about 68 response personnel in the organization. During the Final Cleanup Phase, the number of response personnel in the organization averaged between 65 and 75 persons.

The impacted section of the river was divided into ten geographic divisions to accommodate the planning process, to assist in documenting oil impacts, and to track response resources along the ten-mile long impact area (approximately six miles in California and four miles in Nevada). The divisions were assigned geographical names rather than alphabetical as is the normal approach under the Incident Command System. It was decided that this would make it easier for response personnel to readily identify the various divisions and the location of heavy pockets of oil identified by agency personnel during their assessment operations. The California Divisions were: Division 7 (spill site), Murphy Pond Division, Stock Bridge Division, Middle Division, DFG Ranch Division, Culvert Division and Border Division. The Nevada divisions were: Upper Sceirine Ranch Division, Lower Sceirine Ranch Division, and Upper Rosaschi Ranch Division.

RESPONSE SAFETY

A Site Safety Plan was prepared at the outset of the response and was modified as operations and conditions warranted. All responders were required to read the Site Safety Plan, and document such by signing a sheet in the plan. In addition, tailgate safety briefings were conducted prior to the start of work each day and site safety was discussed daily at the start of each Incident Command Meeting. The Plan was thorough and addressed the following site characteristics: the stream, its banks, the surrounding terrain, adjacent highway, and private property; physical and chemical hazards associated with stream, terrain, oil, and the environment (hypothermia and dehydration); biological hazards such as rattle snakes and mountain lions; the

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personal protective equipment required and the decontamination procedures to be followed on the site.

In-stream work was the most hazardous and difficult. Hazards included cold air temperature, water temperatures near freezing (and sometimes below-freezing), and slippery rocks made even more slippery by ice, sleet, snow and oil. Air and water temperatures were sometimes so low that anchor ice would form on the stream bottom in flowing water. The stream had deep pools, small rapids, steep gradient and banks, and water levels that fluctuated as in-stream ice formed, melted, and reformed. During January, much of the stream was covered with ice and in shaded areas the entire stream surface could be ice-covered. This ice was treacherous, especially when covered with new snow. Workers were instructed to generally stay off the ice sheets that completely covered the stream in some locations. However, as previously indicated, these ice dams naturally collected substantial amounts of oil forcing workers to walk on the ice to recover the oil. In this situation, where working on the ice was necessary, workers were required to wear harnesses and safety lines.

The strenuous work of oil recovery and removal in these conditions caused laborers to perspire heavily beneath the rubber chest waders. Wet clothing led to rapid chilling during work breaks and increased the risk of hypothermia. Sometimes daytime temperatures never climbed above freezing and were occasionally as low as -27°F. The cold was exacerbated due to the fact that the canyon only received a few hours of sunshine during the short winter days.

Worker safety in these conditions remained the top priority for the duration of the cleanup. As a consequence, no serious injuries occurred during the 3 months of cleanup effort.

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RESPONSE PLANNING

The response plan was a three phase approach: containment and gross oil cleanup as the first phase, a maintenance phase during the period of severe cold, and then a final cleanup and "polish" phase when the entire river was ice-free. This approach was documented in a plan drafted by the responsible party representative and approved by the Unified Command on January 17th. By then the containment and gross oil removal had been achieved for the most part, and the document was written to ensure that all parties understood what the future plan would be. Although weather conditions permitted final cleanup to be completed earlier than the planning document anticipated, the response phases and objectives documented in the plan proved to be on target. Although efficient and rapid cleanup of the oil was the primary objective, the timing and urgency of the cleanup was predicated on other factors as well. Those factors were: maintenance of mandatory water levels to prevent fish kill from river ice conditions; mandatory water levels for irrigation rights; and opening of California fishing season on the East Walker River.

The initial strategic objectives, which remained constant throughout the response, were as follows: insure safety of all response personnel; minimize the downstream spread of oil; contain and remove oil from the stream, banks, and vegetation; and regulate river water levels to extent possible. Tactical objectives changed on a daily basis depending on weather conditions and other factors.

THE RESPONSE

At about 1300 on December 30, 2000, the California Highway Patrol contacted the California Department of Fish and Game Warden in Mammoth, via the Department of Fish and Game/Oil

Spill Prevention and Response Communication Center, regarding the tank truck accident and the resulting spill of oil into the East Walker River. The Warden arrived on scene at 1415 that day and began assessing the oil spill situation.

After finding significant oil on the riverbank and in the water, the Warden then called the company that owned the tank truck. The President of the company assumed full responsibility for the cleanup as the responsible party (RP). He had already dispatched a response crew from the company, and had hired a cleanup contractor to begin cleanup activities. The cleanup contractor arrived on scene during the night of December 30th and began the initial cleanup. The oil remaining in the tank truck was pumped off to another tanker, then the overturned tanker was righted and removed from the scene.

On January 1, 2001, the Warden/State Incident Commander met with representatives of the Lahontan River Water Quality Control Board and the responsible party, and mutually determined that additional personnel, equipment, and supplies would be needed for the cleanup operation. The responsible party had already ordered the contractor to send additional personnel to the scene. On January 2, 2001, the Department of Fish and Game/Office of Oil Spill Prevention dispatched additional personnel to the scene to support the cleanup effort.

On January 3, 2001, local, state, and federal agencies having either concern and/or jurisdiction, met with the responsible party representatives and their cleanup contractor supervisor in Bridgeport to brief everyone on the status of the spill. At that time, the Department of Fish and Game assumed the Incident Command responsibility from the California Highway Patrol, and established the Unified Command and structure of the Incident Command System organization.

By January 5, 2001, the number of cleanup laborers had increased to 45. Containment boom

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was deployed along the river to curtail the downstream transport of the oil. The Unified Command was working with the Walker River Irrigation District to hold flows in the river at about 20 cfs to aid cleanup activities in the river. It was immediately clear that due to ice and snow conditions and large boulders in the riverbed, the use of heavy equipment would not be possible and could have caused more environmental damage. However, a backhoe was used at the accident site to remove and replace contaminated soils and riprap, to remove several trees and wood debris piles where oil was trapped, and to create catchments basins at the downstream end of diversion containment boom. The primary method of collecting and recovering oil was using manual methods and passive collection devices (adsorbent oil snare or pom-poms); given the habitat and conditions, these methods removed the greatest amount of oil without additional environmental damage.

The in-stream ice both hindered and helped the cleanup. Along the frozen banks, oil was carried beneath the ice making it nearly impossible to find and remove. In areas where the stream froze completely across its width ice dams formed that were a barrier to floating oil. The significant amounts of oil that collected in these ice dams was efficiently removed using rakes and buckets. During the first week of the response, hundreds of gallons of oil were removed from these natural collection points.

By January 10th, assessments and recovery amounts made it clear that the most heavily oiled sections of the river were Stock Bridge Division, Middle Division, and DFG Ranch Division, a total distance of about three miles. Although the daytime weather had remained mild since the spill, which had provided a window of opportunity to recover the large pockets of oil on the river, daily weather reports predicted a change for the worse. Cleanup effort continued unabated through January 10th with a total of 1443 quantified gallons of oil being recovered. However,

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during the night of January 10th and 11th, the weather changed dramatically. The East Walker River area received 12" of snow and nighttime temperatures dropped well below 0°F. During the period of January 12-17, 2001, the skies cleared and temperatures became even colder. Morning temperatures of -27°F were recorded at the Bridgeport Airport, and even colder, although unofficial temperatures were witnessed at cleanup sites in the East Walker River Canyon.

Because the extreme weather conditions created new safety concerns and made cleanup progress all but impossible, the Unified Command agreed to send all but 20 personnel home. Furthermore, most of the response technicians doing the work had been on scene for almost two weeks working in very cold temperatures and icy water and were ready for a break. The Unified Command agreed that resumption of large-scale activity would occur as soon as the ice thawed and conditions generally improved to allow safe and efficient operations.

An additional ten-person crew was ordered to begin work on January 17th, based on weather forecast predicting a warming trend. However, although the skies cleared, air temperatures became even colder. Furthermore, on the 17th, while the Unified Command was in the process of discussing when the appropriate time would be to transition to the Winter Maintenance Phase, two workers fell through the ice up to their chests while attempting cleanup of oil in a isolated section of the river. While no one wanted to quit the cleanup, safety concerns made it necessary to halt gross removal operations and wait for more temperate weather for the final cleanup. Between January 17th and January 20th, the crews on scene deployed extra boom and filter fences, demobilized unneeded equipment, and arranged for storage of response gear in a temporary storage building where it would be readily available for the Winter Maintenance Phase Crew.

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The Winter Maintenance Phase commenced with good communication between the on-scene crew and the Unified Command. However, by the first week of February 2001, it was apparent to the Unified Command that the three person Winter Maintenance Phase Crew would have to be increased to five people to ensure productivity and safety.

By February 10th, the weather had improved temporarily and the lower five miles of river was generally open and free of ice except along the banks. The five miles of river below the spill site, however, remained icebound. Both the Winter Maintenance Crew and Regional Fish and Game personnel communicated this change in river condition to the Unified Command, and the Unified Command began increasing the number of response personnel on scene according to the improving weather. By February 16, the Unified Command had made the decision to move another ten laborers to the site by February 20th, and bring in an even larger number by the end of the month.

Due to financial considerations, the primary cleanup contractor was changed when the operation transitioned from the Winter Maintenance Phase to the Final Cleanup Phase. This did not create a significant problem, as the new contractor was well qualified in oil spill response activities and could provide an even greater number of trained personnel. During the Final Cleanup Phase the goals and objectives for the response remained unchanged: insure worker safety, minimize the spread of oil, and maximize removal of oil and oil-contaminated materials from the stream.

During this period, a considerable effort was undertaken by the Resource Trustees to conduct assessments of oiling in the stream corridor and to identify and flag cleanup priorities for the work crews. This reconnaissance information was provided to the contractor in the form of maps with narratives describing each important observation and the cleanup required. Although,

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daytime temperatures would regularly get above freezing during this period, nighttime temperatures remained below freezing, and ice in the stream and along the bank continued to hamper cleanup efforts.

In spite of the challenging environmental conditions, by Wednesday, February 28, 2001, there were 64 responders on-scene, 52 from the cleanup contractor and 12 agency personnel. This number increased again to 69 the next day. But nighttime temperatures dipped below 0°F and daytime temperatures barely got above freezing some days. As a result, much of the upper river contained from one to four feet of ice along each shore and in some reaches, the entire stream surface was still frozen. This ice obscured the oil and made cleanup nearly impossible and unsafe in these areas. Work was concentrated in those reaches mostly free of ice to await better conditions in the upper stream. The daily routine consisted of agency personnel working cooperatively in teams to collect River Bank Oiling Survey (RBOS) information along stretches of stream that had been subdivided into named units in order to facilitate the cleanup. Cleanup crews were provided the RBOS data and assigned to designated reaches to remove the oil and oiled debris identified by the survey teams. This pattern of assessment, cleaning, and re-assessment, continued to the conclusion of the cleanup.

Because of another heavy snowfall on Sunday, March 4, and ice conditions on the upper part of the river, cleanup crews were moved to the divisions in Nevada and the Border and Culvert Divisions on the California side of the spill impact site. Weather prohibited the normal cleanup strategy for a stream (to begin at the upper areas and work down). Therefore, work was directed toward cleaning up the lower river areas first where snow and ice conditions were less severe and then to work upstream as more temperate weather conditions allowed. The majority of the free oil was removed during the Gross Oil Removal Phase. The remaining oil was very

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immobile. Booming and filter fence strategies had proved effective in controlling downstream migration of oil that was released during cleanup operations.

On March 7th, the cleanup required on the Nevada river segments was completed and were ready for inspection and sign off. The Trustees and RP prepared a document that identified those stream conditions that had to be met in order for a stream segment to be signed off. Generally, it stated that all reasonable oil removal actions had been complete and that further operations would do more harm than good. This inspection and signoff process included representatives from the State Natural Resource Trustee, Federal Natural Resource Trustee, The Responsible Party, and the Private Landowner Representative, when appropriate.

Very little oil was found in the Nevada Divisions and the Culvert and Border Divisions in California. The primary activity in Nevada and the lower two California divisions was installation of containment boom and filter fences to ensure that any mobile oil or oil lost during cleanup operations in the upper stream divisions was contained to prevent any further impact downstream. Since the strategy during the Gross Oil Removal Phase was to work from the spill site downstream, Division 7 (Spill Site) and Murphy Pond Division had been worked very hard during that phase. Therefore, the Stock Bridge, Middle, and DFG Ranch Divisions were the only remaining areas that still required substantial cleanup effort. Hence, from March 7th to March 14th, the entire workforce was distributed over these three divisions during a period of good weather, allowing for maximum progress.

On March 14th, all of the remaining divisions were inspected and signed off by the inspection team. At that time, a majority of the workers were demobilized and only a small team that was kept at the site to prepare passive collection and recovery devices that were installed to catch any oil that might have been missed during the inspection process and which could be released when

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in-stream flows increased.

On March 19th, the Walker River Irrigation District increased the release of water from Bridgeport Reservoir from 20cfs to 84cfs to meet Nevada irrigation requirements. This was one of the time factors that pushed the cleanup effort from the very beginning. During the initial period of increased flow, there was some minor sheening and very small tarballs noted below Stockbridge Division, one of the heaviest impacted and more difficult zones to clean. However, the collection devices placed in the river did a good job of recovering these small releases, and by March 24th the Unified Command was confident that no undiscovered pockets of oil remained in the river. Contractor crews then removed the remaining collection and recovery resources, and on March 26 the Unified Command signed the final sign-off document and released the responsible party's from further cleanup. On March 29th, the cleanup contractor was completely demobilized ending 90 consecutive days of cleanup on the East Walker River

LESSONS LEARNED

A spill response plan that describes equipment deployment sites would have been useful to the first responders, and may have limited the downstream spread of oil. The maps showing deployment sites for this spill should be placed into a regional response plan.

10" to 12" river boom is adequate for most containment, deflection and diversion strategies involving fast flowing mountain streams in the western states. Larger boom, such as 18" boom, poses more disadvantages than advantage. Contractors serving the western states should consider increasing their inventories of 10 to 12" boom.

Course sediment and gravel on the banks and emergent in the stream occur in the steeper gradient reaches of the stream. These course sediments trap oil and are more difficult to clean

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than lower gradient reaches.

Daily freezing and thawing conditions cause water levels to rise and fall. This fluctuation in water level causes oil to be trapped under ice and along the banks where the stream remains frozen. It also causes oil to flow up on top of the ice where it refreezes and becomes encapsulated in the ice.

Deploying oil snare (pom-pom) material on the ice will allow the snare to trap oil as the ice melts and the stream opens up. Oil snare boom (pom-pom on a rope) is recommended over single pom-pom material to allow for easier recovery.

Use of geographic positioning system (GPS) is an especially useful tool for locating and relocating oil conditions in a spill impact site. GPS coordinates provide the means for Shoreline Cleanup Assessment Teams (SCAT), cleanup crews, and Sign Off Field Teams (SOFT) to readily locate areas that require cleaning or inspection.

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