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Con Edison's Success in Reducing Risk: Applying Real-World Lessons Learned to Broaden Spill Planning and Response Programs and Build Personnel Competencies

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ABSTRACT 299974:

Con Edison's service territory covers more than 1,000 miles of inland and coastal shoreline in one of the most heavily regulated and scrutinized areas of the Unites States: New York City. In November 2009, the company experienced a catastrophic failure of a large transformer at a high-voltage electric substation, resulting in approximately 200 gallons of dielectric oil impacting the Bronx River. While the volume of oil was relatively small, the duration of the cleanup lasted nearly one month with costs of approximately $1.75 million, plus a nearly $1 million compliance order issued by New York State for violation of state regulations. Following this event, and through a study of all historical spill incidents, it was clear that the primary risk of spills to the environment came from the more than 30 million gallons of oil contained in the company's high-voltage transformers and oil-filled electric transmission and distribution system, which were not covered by existing Facility Response Plans developed as part of implementing OPA 90. Given these results, the company sought to refine existing spill response program elements to further reduce risks and enhance environmental stewardship.

Using the existing Spill Management Team (SMT) model in the OPA 90 program, a company-wide SMT approach was created to better prepare for and reduce the risks associated with potential spills from all company sources. The team consists of more than 50 personnel from the various business units of the company, providing direct access to a wide spectrum of skill-sets and specialties. In addition, the company has developed Oil Spill Contingency Plans (OSCP)—also covered under OPA 90—with detailed response tactics for over 300 locations.

On the heels of the program implementation, a large spill of dielectric oil from an underground high-voltage electric distribution line resulted in more than 2,000 gallons impacting the Hutchinson River. While the impact to the waterway was greater than in the 2009 event, the response duration was only 6 days with clean-up costs just over $300,000 with no state issued compliance order, a significant improvement. This result was due, in large part, to implementation of the OSCP and SMT programs. Through these experiences, the many benefits of establishing a company-wide SMT and the OSCP's were realized, including developing spill response and Incident Command System expertise, refined coordination, and improved cost

management. These efforts have significantly reduced the company's spill risk exposure by improving response capabilities.

INTRODUCTION:

Consolidated Edison Company of New York operates one of the world's largest and most complex energy delivery systems (electric, gas, and steam) in a service area that encompasses the five boroughs of New York City and Westchester County, NY, and serves more than three million customers. Operating in a heavily regulated and scrutinized area demands not only providing world-class levels of service and reliability, but also a strong focus on environmental compliance and stewardship. This focus is necessary when considering the over 30 million gallons of dielectric oil contained in transformers and the oil-filled feeder system which exist throughout the service territory, and the more than 75 million gallons of fuel oil stored and used for our regulated generating stations.

Following passage of the Oil Pollution Act of 1990 (OPA 90), the company was required to ensure that its ten regulated facilities were compliant through the development of plans, training of personnel, and acquisition of response resources. Con Edison developed ten Facility Response Plans (FRP), mostly for its steam and electric generating stations, located adjacent to New York waterways, including the East and Hudson Rivers, with the largest having a storage capacity of approximately 31 million gallons of fuel oil. These plans were managed by the Company's Fossil Power department, which operated the generating stations. After deregulation of the electric industry in New York, Con Edison sold its electric generating stations but kept its steam generating stations (including East River which generates both steam and electricity), the Fossil Power department became the Steam Business Unit, and the Steam Business Unit assumed responsibility for the FRPs. Currently, the company owns and operates two generating stations that require FRPs.

Each plan identifies critical facility information, derives planning volumes to use in the event of an oil spill, and establishes the critical first response actions to ensure the spill is controlled and that resources – both company and contractor - are on scene quickly to begin cleanup and prevent further environmental impact. These initial actions would be the responsibility of the Facility Response Team (FRT), which is comprised of facility personnel identified in the plan. The members of the FRT receive basic Incident Command System (ICS) (U.S. Coast Guard, 2006) training and are expected to manage small incidents to their completion and larger incidents for roughly 24 hours.

The Steam Business Unit developed a Spill Management Team (SMT) (OPA 90 Facility Specific Response Plan, 2013) (U.S. Department of Transportation, 2002) to respond to incidents that could extend beyond 24 hours. This team was comprised mostly of personnel from each of the generating stations, who would be called upon to fill assigned ICS positions and manage the long-term response and recovery actions. This not only allowed the affected station's personnel on the FRT to restore their focus on maintaining normal plant operations, but also identified a core list of personnel to participate in training and exercises to further develop their spill response and ICS skill-sets. Under this initial program model, the Steam Business Unit SMT was staffed and trained to manage spills at the generating stations.

While the company's generating stations are required to have FRPs, other company facilities, while regulated under OPA 90, are not. Typically, spills at these facilities were handled by local employees, with assistance from corporate and contractor resources, as needed. One crucial corporate resource is the Corporate Environmental, Health and Safety Response Team (ERT). The ERT is a highly trained specialized 12-person team responsible for regulatory release reporting and responding to environmental incidents to assist local organizations. While the ERT assisted with spill response management, they differed from the Steam Business Unit SMT in that they were not designed, or staffed, to assume long-term spill management responsibilities. From the time of implementation through November 2009, these programs served the company well in reducing risk and increasing preparedness.

During the time leading up to November 2009, the company did not experience any large spills associated with our FRP regulated facilities. In fact, most spills involved the loss of small quantities of oil from our large and small dielectric oil filled transformers, which are located on poles or mounted on pads throughout our system. The majority of these spills were contained within structures such as manholes and underground vaults, which were designed to contain any oil lost and prevent it from entering the environment. The majority of the remainder of the notable spill events during this time involved our dielectric fluid-filled electricity feeder cable system.

On November 4, 2009, a catastrophic failure of a large high-voltage transformer occurred at our Dunwoodie Substation, located in Westchester County, NY. The failure resulted in a large explosion and fire, compromising the integrity of the main body of the unit which contained approximately 29,500 gallons of oil. In addition, the explosion damaged the deluge system associated with the unit, which would have assisted in extinguishing the fire. The local fire department responded and used hundreds of thousands of gallons of water to extinguish the fire, which at this point had extended to nearby equipment at the facility. While the firefighting tactic used extinguished the fire, it also caused large amounts of dielectric oil to overflow the designed containment, and ultimately impact a nearby catch basin with an outlet to the Bronx River[1]. Although it is estimated that only 200 gallons of oil impacted the river, the cleanup lasted nearly a month, with a cost of approximately $1.75 million. This cost does not include the ~$1 million compliance order issued by the New York State Department of Environmental Conservation.

ASSESSMENT:

The Dunwoodie event provided key lessons learned in assessing how the company prepared for, and responded to, spill incidents. The more significant of these lessons-learned include:

- There was no existing corporate spill management team outside of that established for the FRP regulated facilities. Efforts outside of these facilities were handled by a mix of company and contracted resources, with no pre-identified incident management roster, processes, or roles and responsibilities.

[1] The Bronx River is approximately 23 miles long, and runs through Westchester and Bronx Counties in NY. It terminates at the confluence of the East River and Long Island Sound, and is New York City's only freshwater river (Bronx River Alliance, 2013).

- Outfalls to sewer systems and navigable waterways, including those associated with the Dunwoodie location, were not mapped. At Dunwoodie, this resulted in lost time in the early stages of the response trying to locate the area of impact to the Bronx River.
- Engineering designs under the Spill Prevention, Control, and Countermeasure (SPCC) Plans did not account for the introduction of large volumes of water associated with firefighting.

This event also brought attention to the broader risks and vulnerabilities that existed throughout the company. In response to these findings, the company established a Water Vulnerability Assessment (WVA) team to review compliance with water and discharge management processes, examine possible areas for risk reduction across the company's service territory, and recommend and implement corrective measures to address these gaps.

Throughout 2010, the WVA team, which included representatives from each of the major company operating organizations, the Environment, Health and Safety department, and Law, examined many aspects of company operations including spill control systems and design. A key finding of the WVA was that existing containment at our SPCC regulated facilities did not account for firefighting activities, and that such a design would be impracticable under the SPCC regulations (Con Edison of NY, Inc., 2010). To ensure protection of the environment and allow for more efficient spill response, the company decided to develop Oil Spill Contingency Plans (OSCP) for each of its over 300 SPCC locations not already covered under a FRP (General Requirements for Spill Prevention, Control, and Countermeasure Plans, 2013). Each of these plans would outline facility specific information and provide the most likely spill scenarios and response tactics for that location. OSCP development began in the middle of 2010, while the WVA team continued its review.

Oil Spill Contingency Plan (OSCP) Development

The company EH&S Response Team (ERT) was tasked, with assistance from an outside contractor, to work on the development of over 300 OSCP's. Given the volume of plans now required, the approach taken was to develop a single generic plan to capture basic company information including company contacts, response resources, training, and notifications. Location specific plans were then developed which provided specific information on location, identification of critical/sensitive areas, response priorities, and location of equipment and deployment areas. The critical/sensitive areas were identified using existing plans and documents, such as the New York/New Jersey Area Contingency Plan, and through field walks of each area.

In addition, utilizing GIS technology, flow maps were developed for each location showing the most likely flow of oil out of a location should a spill occur (Figure 2). Using the flow maps, response maps showing the most effective booming and response locations of impacted waterways, were also developed (Figure 3). The combination of these resources provides a quick reference for initial tactical actions to limit environmental impact should a spill occur.

In its final report, the WVA team noted that, with a move to a broad OSCP approach, an oil discharge response team became a need company-wide (Con Edison of NY, Inc., 2010). However, existing company resources were not in place to support this expansive effort. The Steam Business Unit SMT, which functioned well since the passage of OPA 90, was designed, staffed, and trained to only address spills at the then four FRP regulated steam generating stations. In addition, team members were not permanent; with a turnover rate that did not support strong team continuity. While the SMT roster remained full, the new members did not always possess the commensurate knowledge and experience in spill response and ICS. With the development of over 300 OSCPs to cover the over 40 million gallons of dielectric throughout the Con Edison system, it became clear that a shift in spill response and management philosophy was needed.

To address this, the development of a new Corporate Spill Management Team was proposed. This team would continue to use the model found under OPA 90 (U.S. Department of Transportation, 2002), and replace the existing Steam Business Unit SMT, thereby becoming the sole team responsible for supporting any spill response to a navigable waterway requiring long-term management throughout the company. The membership would consist of personnel from all areas of the company, and would have a degree of permanency - even if a team member changed organizations within the company, they would still remain a member of the corporate SMT. This new approach sought to not only account for the added responsibility of multiple potential spill locations outside of the FRPs, but also to take the next steps in developing advanced ICS skills, increasing spill response expertise, and improving spill-related cost management.

This vision was championed to the executives across the company with a list of potential benefits, including:

- Existing personal spill response and incident management skill-sets could be leveraged and available to all organizations through a corporate SMT.
- A standing corporate SMT could take over management of larger events, allowing operational personnel participating in the initial response, to return to their normal functions in ensuring reliable service to our customers.
- The team would provide a focus for the delivery of training in spill response and ICS, allowing for easier coordination and better leveraging of available time.
- Internal processes would be developed, to ensure personnel and resource availability to impacted business organizations, such that they could smoothly transition management to the SMT through to long-term remediation if needed.
- The corporate SMT could serve as a core group to help review and further refine existing OSCP’s and other spill response and management methodologies within the company.

The corporate SMT concept garnered unanimous executive-level support. Beginning in January of 2011, the formation of the team began.

Building the Corporate Spill Management Team (SMT)

It was important that the new Corporate SMT consisted of personnel who not only had a degree of experience in spill response and/or Incident Command, but also were representative of

the various company departments. This approach would help ensure the team had a well-rounded knowledge base of the different company operations, as such putting it in a position to be better prepared to respond to incidents in these areas. Furthermore, it put the team in a position to leverage the various team members operating relationships during both emergencies, and when planning training and exercises. To accomplish this, a team coordinator was established who, building around the existing 12-person corporate ERT, began identifying potential team members consisting of employees from Corporate Environmental, Health & Safety and each of the key operational departments. Using a basic Incident Command Structure for typical company spill response (Fig. 1), potential team members were identified based on their knowledge, experience, and the needs of the team in filling the key ICS positions.

The SMT Coordinator reached out to each employee identified – in some cases, interested employees reached out to the Coordinator directly - and gauged their interest in joining the team. Potential team members were presented with the opportunity to gain additional training and experience in spill response and ICS, while being part of an interdepartmental team with an opportunity to experience various company operations. In turn, team members were expected to commit to attending training and exercises, and being available to respond 24x7 if needed. The SMT Coordinator worked through the leadership of each employee to gain the organization's commitment of the employees' time. Upon commitment of the employee and their organization, the employee was added to the team roster. Even if switching organizations – barring any objections from the new organization - employees are expected to remain on the team. Overall team program coordination and development; to include procedure development, training plans, and roster maintenance, would be accomplished through the ERT, with the ERT manager serving as the SMT Coordinator.

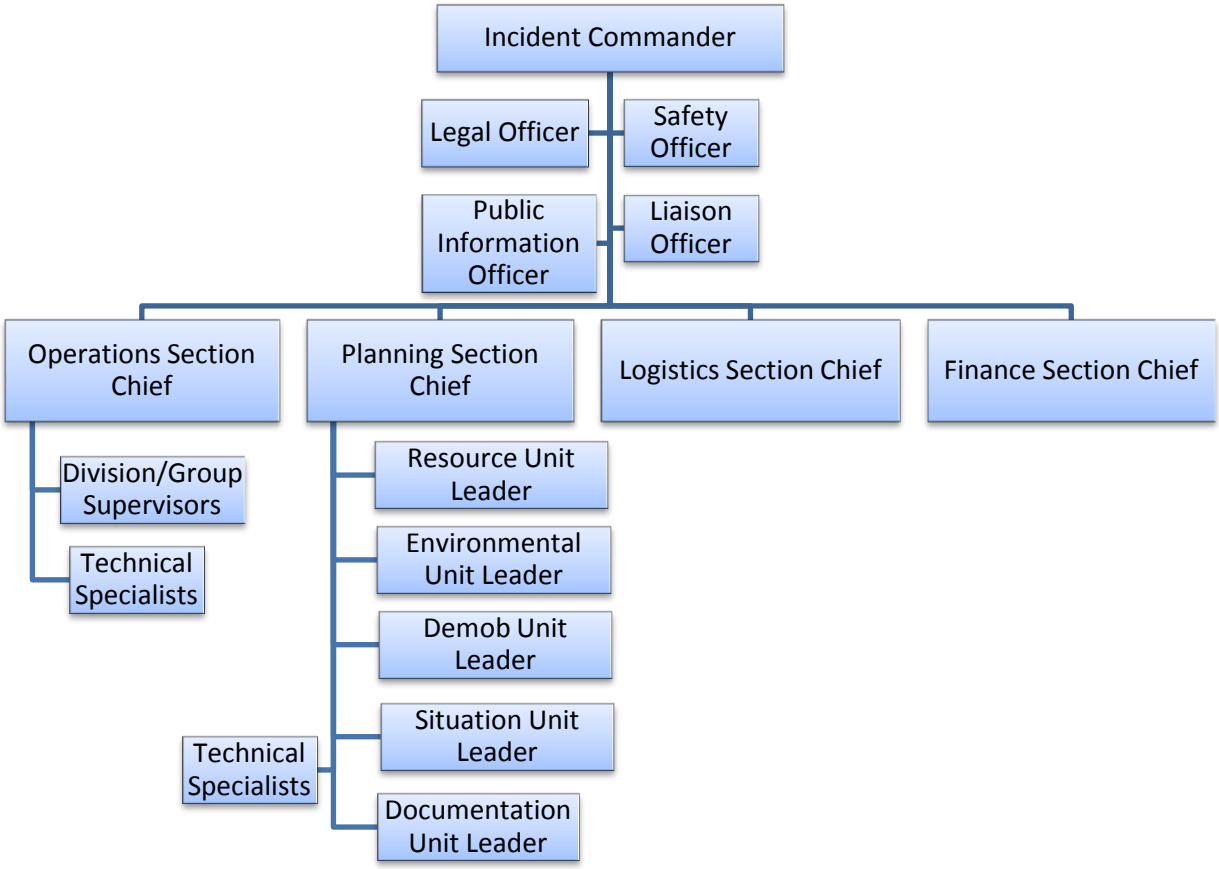


Figure 1 – Con Edison Typical Spill Response Organization

Corporate Spill Management Team Training Program

Once team members were identified, a training and experience inventory was developed. This not only assisted in assignment of ICS positions to team members, but also provided a basis for building short and long-range training plans. As a result of this initial survey, it was determined that some of the larger knowledge gaps existed in understanding spill response equipment and techniques. As such, training sessions were held with local cleanup contractors which focused on gaining a better understanding of the equipment, such as skimmers, and tactics used in responding to various spill types and conditions. Training was scheduled on a quarterly basis and covered general topics including OSCP development status, SMT procedure development, and lessons learned from company events. In addition to these, guest speakers with experience in major national responses were brought in to share their experiences. One quarterly training session a year has been dedicated to ICS training and preparation for Con Edison's annual OPA 90 exercise.

The long-range plan is focused on building upon the basic ICS training in place, and offer more position and function specific training to include resource management and operational planning. Under the previous Steam spill team model, this was not possible given the movement of personnel in and out of the team. In addition to these internal efforts, advanced ICS training opportunities outside the company – such as ICS 300 and 400 level training - have been identified and made available to team members. It is expected that members serving as Incident Commander or Section Chief will complete training at least to the ICS 300 level. As training is completed by each member, the training inventory is updated and, should they gain the training and experience needed to fill additional ICS positions – as decided on by the SMT Coordinator – that is reflected on the team roster.

Once these programs were in place, existing corporate instructions and policies were reviewed to ensure the necessary changes were made which would formalize the corporate SMT within the company construct. By the end of summer 2011, the team roster – made up of employees from throughout the company, including those who were members of the Steam SMT - was nearing completion, and the basic precepts of how the corporate SMT would function were in place. In addition, the initial work on each of the over 300 OSCP's had been completed. In October 2011, as training and the formalization of team members and processes continued, the company would be presented with its first opportunity to test the corporate SMT.

RESULTS:

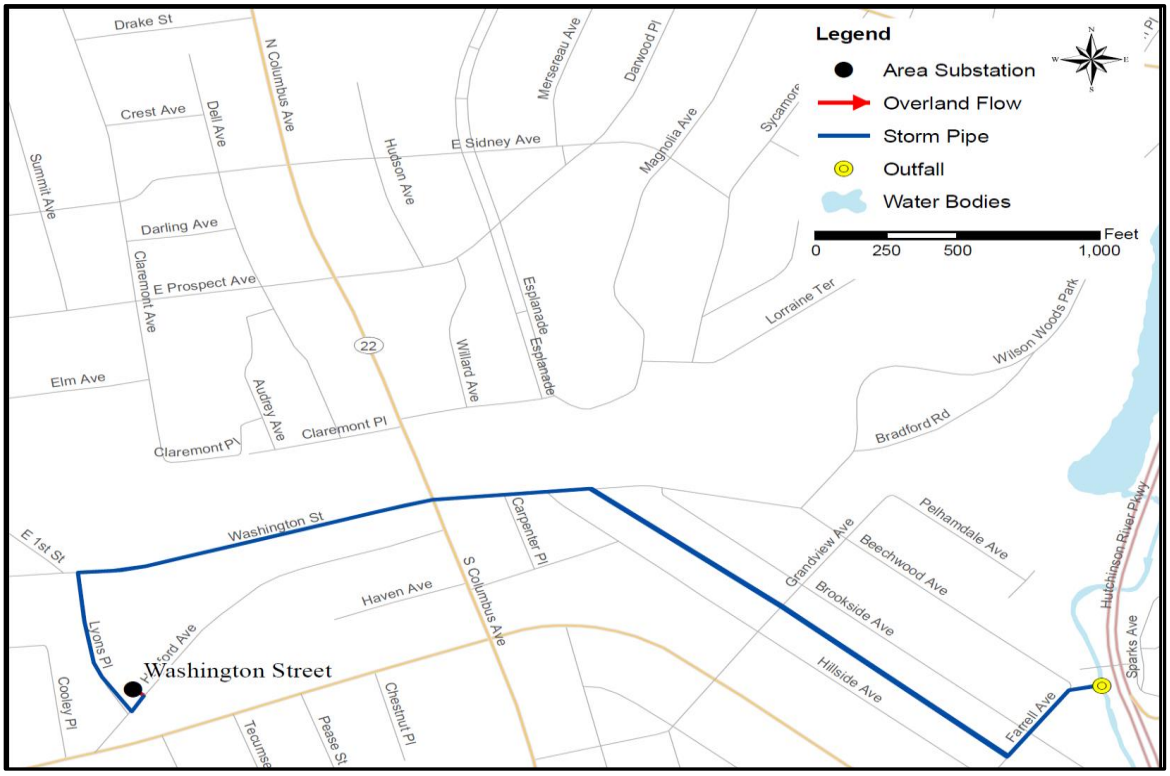
On October 13, 2011, a contractor working for a New York State government agency was boring holes for monitoring wells in Mount Vernon, NY, and pierced a high voltage oil-filled feeder pipe. This resulted in dielectric oil pouring out of the pipe, impacting nearby soil and asphalt, and ultimately making its way to a nearby catch basin which led to the Hutchinson River through the Mt. Vernon storm water system. The Hutchinson River, while not a large body of water, meanders through sensitive populated areas and ultimately makes its way to the Long Island Sound.

The initial response to this event occurred similar to those prior to the corporate SMT. The spill was reported to federal, state, and local agencies, and local crews and environmental managers went to the site to perform initial response actions and assessment in accordance with existing procedures. Also to respond was the corporate ERT. As noted above, the ERT assisted in large environmental events in the past, however as part of the new corporate SMT, they would serve as the initial SMT representative in assisting local managers with making the determination as to whether an SMT response should be requested. Local agencies, including the local Fire Department, also responded to the scene.

A key difference between this response and the Dunwoodie response was the existence of the recently developed OSCP for the company's substation associated with the damaged feeder pipe. The OSCP included flow maps which identified the most likely outfall location into the nearby Hutchinson River (Fig. 2). In addition to the flow maps, initial response actions, including booming locations, had been developed within the plan (Figure 3). With the work undertaken in the development of these plans and associated mapping over the last year, the personnel on site were able to quickly determine the outfall associated with the catch basin.

With initial boom deployment completed, and additional actions being taken at the location to address oil that had already made its way downstream, the on-scene managers quickly realized the river response would likely last for at-least days and as such they decided to mobilize the SMT and transition management of the Hutchinson River response to the team beginning the next morning. Needed ICS positions/team members were identified, and selected corporate SMT members were notified to respond to the scene to assume command beginning the next operational period.

Figure 2 – Washington Street Substation Flow Map



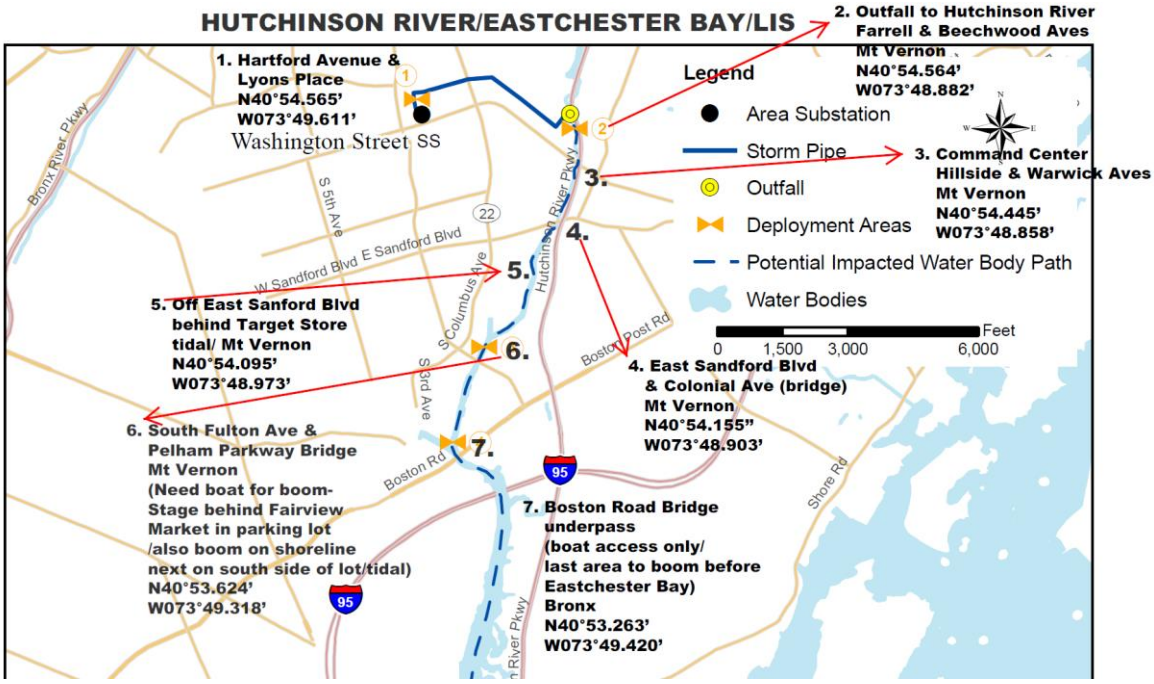


Figure 3 – Hutchinson River Response Map

The corporate SMT worked over the next 6 days within the ICS structure setting objectives, writing Incident Action Plans, and managing cleanup contractors, until the spill cleanup had been completed to the New York State Department of Environmental Conservation's (NYSDEC) standards. The final amount of oil lost from the feeder pipe was just over 6,000 gallons, with an estimate of approximately 2,000 gallons impacting the Hutchinson River. The cleanup costs associated with the river were just over $300K. Facing an event involving approximately ten times the oil, under similar inland waterway conditions, the combination of the SMT and OSCP programs was able to realize a reduction in cleanup duration of ~ 72%, and a reduction in cost of approximately $1.45 million – not including the $1 Million consent order (Table 1).

Event	Oil Volume/Type	Waterway Cleanup Duration	Waterway Cleanup Cost
Dunwoodie	~200 Gallons/Dielectric	21 Days	$1.75 Million (+ $1 million Order)
Hutchinson River	~2,000 Gallons/Dielectric	6 Days	$300 Thousand
SMT/OSCP Impact		~ 72% Reduction	~ $1.45 Million reduction ($2.45 w/order)

Table 1 – Comparison of events Pre/Post Corporate SMT and OSCP

Cost management continued to be a focus of the program, and members of the corporate SMT, all operating under the same vision and mission, sought to take advantage of opportunities in this area realized after the response. To accomplish this, each of the environmental spill contractor's agreements were reviewed by a group of corporate SMT members with experience in response and contractor management. Through this review, opportunities for cost savings and better alignment of contracts to resource needs were identified. This process not only ensured the availability of cost effective resources, but also served to continue to reinforce SMT members' knowledge of spill equipment and methodologies.

CONCLUSION:

Just two years after the Dunwoodie event and its resulting lessons learned the success of the OSCP and corporate SMT programs during the Hutchinson River event served to reinforce the benefits of both programs, and solidify the understanding of the importance of each throughout the company. In addition to the obvious savings in cost and time, there were other less tangible, but equally as important benefits, including recognition by regulatory agencies of the company's work in ensuring compliance and advancing environmental stewardship through both programs.

As part of the initial team buildup, prior to the Hutchinson River response, training sessions were held to begin the process of refining existing skills, knowledge, and abilities as related to spill response and management under ICS. The contribution that this training had on the success of this response cannot be measured, but certainly was a key contributor. The creation of the corporate SMT allowed for this more focused training program, and the realization of those results. Such a formal and refined program would have been extremely difficult under the previous steam SMT program.

Now over two years removed from the Hutchinson River response, the corporate SMT stands at approximately 50 members, each with unique backgrounds and skill-sets, representing all of the major company organizations. Instructions and processes have been refined, and specific team resources - such as response trailers and equipment - have been acquired to increase capabilities and overall company preparedness. Excluding operational contractors/personnel, given a 12 hour or greater operational period, the team is capable of staffing a full spill-response ICS structure - as demonstrated through two full scale OPA 90 exercises. All members are trained to at least the ICS 200 level, with key personnel having completed ICS 300. The team stands ready to respond 24/7/365.

Through its key principles of fostering prevention and mitigation strategies, ensuring preparedness, ensuring resource availability, goal of environmental restoration, and stakeholder engagement; the corporate SMT has continued to build upon this young, but strong, foundation. The team has continued to identify key sensitive areas, such as Jamaica Bay – one of the most sensitive areas on the East Coast - and educate both company employees and response partners, such as the Fire Department of New York, on the importance of understanding the possible results of environmental incidents and response actions in these areas. Building and maintaining these strong partnerships serve not only to lower risk through education, but have also

established greater access to stakeholder resources that could be available to the corporate SMT in the future.

The development of the OSCP and corporate SMT programs has significantly reduced Con Edison's spill risk exposure, while also furthering the development of assets and methodologies that will increase preparedness and response capabilities for spill events covering the over 1,000 miles of coastal and inland shoreline that the company territory encompasses. The potential of each of these programs continues to be explored, but it is clear that each will remain a central element to Con Edison's commitment to environmental compliance and stewardship in the years to come.

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