INTEROFFICE MEMORANDUM

METROPOLITAN WATER RECLAMATION DISTRICT
OF GREATER CHICAGO

DEPARTMENT: HUMAN RESOURCES **DATE:** December 5, 2018

TO: Brian A. Perkovich, Executive Director

FROM: Beverly K. Sanders, Director of Human Resources

SUBJECT: **Investigatory Report of the August 30, 2018 Roof Collapse at the Calumet Plant Conducted by Human Resources Safety Staff**

Independent investigations of the August 30, 2018 roof collapse at the Calumet Plant were performed by Wiss, Janney, Elstner Associates, Inc. and the Illinois Department of Labor. In addition, an internal investigation was conducted by Human Resources Department (HR) Safety staff. The final internal report, dated November 27, 2018, and a report summary of observations and recommendations prepared by Ted Kosowski, Assistant Director of Human Resources are attached for your review.

The conclusion drawn by our internal investigation was that a cutting torch should not have been used in the Calumet Gravity Belt Thickener Room prior to completion of the Hot Work Permit and without following the requirements of the District's Hot Work Permit Standard Operating Procedure. Failure to follow these procedures was concluded to be the most likely explanation for the actions that led to the explosion. The report completed by Wiss, Janney, Elstner Associates, Inc. also concluded that the cause of the explosion was a lack of hot work procedure enforcement, coupled with a possible lack of worker understanding of the blending tank atmosphere below the floor of the Gravity Thickener Room.

HR is committed to addressing each of the recommendations and will work jointly with the Maintenance and Operations Department on the areas of responsibility with functional crossover. Subsequent to the roof collapse, Safety staff has provided retraining of the District's Hot Work Permit Program and on Hazardous Atmospheres, which includes the physical properties of gasses associated with waste water treatment and using gas detection equipment.

A Safety Manager position was added to the 2019 budget. This position will provide for additional oversight of the safety function. In addition, a safety consultant contract will be utilized to review our safety program in its entirety.

HR will prepare a monthly report to keep you apprised of our progress in implementing the recommendations. Please let me know if there is any additional information that I may provide.

cc: S. Morakalis

INTEROFFICE MEMORANDUM

METROPOLITAN WATER RECLAMATION DISTRICT
OF GREATER CHICAGO

DEPARTMENT: HUMAN RESOURCES **DATE:** December 3, 2018

TO: Beverly K. Sanders, Director of Human Resources

FROM: Ted J. Kosowski, Assistant Director of Human Resources

SUBJECT: **Review of the Investigatory Report of the August 30, 2018 Roof Collapse at the Calumet Plant Conducted by Human Resources Safety Staff.**

The conclusions drawn in the report prepared on November 27, 2018 by the Human Resources (HR) Department Safety staff was that a cutting torch should not have been used in the Calumet Gravity Belt Thickener (GBT) Room prior to completion of the Hot Work Permit and without following the requirements of the District's Hot Work Permit Standard Operating Procedure. Failure to follow these procedures was concluded to be the most likely explanation for the actions that led to the explosion. A separate investigative report completed independently by Wiss, Janney, Elstner Associates, Inc. also concluded that the cause of the explosion was a lack of hot work procedure enforcement, coupled with a possible lack of worker understanding of the blending tank atmosphere below the floor of the Gravity Thickener Room.

Several observations have been made from the results of the HR Department investigatory interviews and from the review of documents compiled as part of the HR investigatory process. The observations and recommendations that follow are strictly from the information contained in the November 27, 2018 HR report.

Observation 1:

The investigation refers to safety policies being in place for employees working in many of the District's work environments. Safety policies of particular relevance to the Calumet explosion include the District's Hot Work Permit Standard Operating Procedure and the Standard Operating Procedure for MWRD Portable 4-Way Gas Meters.

Interviews with more than one supervisor concluded that a Hot Work Permit was started for work in the GBT Room on August 30, 2018, but the permit was not completed before the presumed hot work began. Interviews with supervisors also indicated that it was possible that other hot work jobs are being performed not in compliance with the District's Hot Work Permit Standard Operating Procedure.

The investigation also revealed that it was difficult to identify the specific portable gas meters that were in use at the time of the explosion because the equipment sign out sheets were not completed in accordance with the procedures specified in the District's Standard

Operating Procedure for MWRD Portable 4-Way Gas Meters. It was also noted by the investigators that several of the portable gas meters in use at the time of the explosion, based on the equipment log sheets completed, were not bump tested on the day they were in use as required by the District's Operating procedure.

Recommendation 1:

It is recommended that Safety staff conduct periodic audits of compliance with the District's Hot Work Permit Standard Operating Procedure and the Standard Operating Procedure for MWRD Portable 4-Way Gas Meters. The results from these audits should be shared with appropriate supervisory staff and evaluated to determine if additional employee training is necessary or if other corrective and possible disciplinary action is warranted.

Additional auditing should also be considered for compliance with other safety procedures such as confined space entry, arc-flash hazard awareness, lockout/tagout and other procedures relevant to the employees' job duties. It is recommended that Safety develop and outline the process for auditing procedures related to compliance with safety policies.

Observation 2:

The Structural Ironworker presumed to have been using the cutting torch did have relevant training related to the District's Hot Work Program on January 30, 2013 and training specific to Hazardous Atmospheres and Gas Detection on March 2, 2011, March 1, 2013, and April 19, 2016. All eight District employees present in the GBT Room at the time of the explosion had received training on relevant safety topics. However, it appears that for all of the affected employees, the most recent training received in Hot Work Permitting Procedures was in 2013. It cannot be concluded if more recent refresher training could have prevented the explosion, however, refresher training likely would have reinforced for the workers who may have been required to perform hot work in the GBT Room of the need to be aware of, test and monitor for the potential of a volatile atmosphere on the other side of where the hot work was being performed.

Recommendation 2:

It is recommended that a review be conducted of the frequency of training required and a mandatory training schedule developed for relevant safety topics related to the work that employees routinely perform. This review should also consider the type of training to be conducted and if sufficient safety staff are budgeted to monitor and administer the required training.

Observation 3:

The investigation revealed that employees and supervisors generally believed there to be good communications between the maintenance and operations groups related to prioritization of work and the nature of the work required to be performed. Additionally, some employees interviewed stated that pre-job safety briefings are performed for larger

jobs and non-routine tasks, but not consistently, and the meetings are not documented. It should be noted that several employees interviewed were not aware of the existence of the tanks below the floor of the GBT Room. Without this information, it is difficult for employees to be fully aware of the potential hazards involved with the work they are performing.

Supervisors interviewed also reported that Standard Operating Procedures (SOPs) are identified on many work orders that are generated from the District's Maintenance Management System. However, the SOPs are generally related to the procedures needed to be followed to perform the maintenance work on the specified equipment. The supervisors interviewed were not aware of the SOPs containing safety related information, such as the hazards that may be associated with the work being performed on the equipment.

Recommendation 3:

Pre-job safety briefings should be performed prior to work on non-routine assignments, prior to work on large job assignments, prior to work on unique equipment and prior to work on a process that has been idle for some time, as was the case with the GBT Room equipment. Employees recently hired or who transfer to a new work location may not be familiar with the operational conditions present or the equipment associated with the work assignment. Pre-job safety briefings can create general awareness of the need for safety as well as an opportunity to identify potential hazards that could arise during the specific assignment.

Additionally, it should be evaluated whether the District's Maintenance Management System could include safety considerations as part of the SOPs identified with the work order.

Observation 4:

Several supervisors commented during the investigation that they desired more time to inspect job sites in order to provide oversight and inspect the work being performed in the field. It was further suggested that supervisors' desk responsibilities keep them away from the work site where they would be able to monitor work, including employee compliance with safety rules.

Recommendation 4:

These comments should be evaluated to determine if it is appropriate to reorganize work assignments or distribute work to other staff to address the issue of supervisory involvement with the inspection of field work.

Observation 5:

Interviews conducted as part of the HR investigation demonstrate that in general, employees and supervisors working at the Calumet Plant acknowledge that they are

generally responsible for their own safety. It was also acknowledged that the Safety Section staff plays a vital role in ensuring employee safety. The report does appear to point to a lack of understanding about the joint and individual responsibilities that both Safety staff and supervisors have relating to employees safely performing work assignments. This point is highlighted in the interview with the Master Mechanic I. The Master Mechanic I identifies a recent incident where he stopped at a job site and observed hot work being performed without a completed Hot Work Permit in place. The Master Mechanic I stated that upon observing this, he stopped the work and sent the employees to the Safety office. He further stated that he was unhappy with the response and the direction provided by the Safety staff. Both Safety staff and plant management staff must maintain open communications and a cooperative dialogue to provide for a safe work environment for all employees. Furthermore, the consistent enforcement of safety rules must be strictly adhered to. Employee retraining, oral reminders, counseling and even more severe forms of corrective disciplinary action must be taken to ensure that safety rules are adhered to District-wide in the same manner as all other rules governing employee behavior and conduct.

Recommendation 5:

Safety is one of the District's Core Values, therefore, effort must be taken to ensure that everyone in the entire organization understands their role in providing for and maintaining a safe work environment. While everyone at the District plays a part in promoting a safety culture, there are definitive roles and responsibilities that must be clearly established. Creating a culture of safe work includes developing policy and procedures, providing expert guidance and policy interpretation, auditing employee compliance with the rules, field inspections, along with enforcement and corrective actions where appropriate. Responsibilities for these actions needs to be established and communicated so there is no confusion over roles and responsibilities.

Upper-level management must reinforce the need for a cooperative attitude toward safety. Additionally, the effectiveness of existing plant safety meetings should be evaluated. These meetings can be invaluable in creating a constructive forum to raise and address new safety concerns and revisit the progress of unresolved concerns.

INTEROFFICE MEMORANDUM

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

DEPARTMENT: **HUMAN RESOURCES** **DATE:** November 27, 2018

TO: Beverly K. Sanders, Director of Human Resources

FROM: Ruth Joplin, Risk Manager

SUBJECT: **Safety Investigation of the Calumet Roof Collapse on August 30, 2018**

Attached is a report, along with relevant attachments, summarizing the investigation conducted by Safety of the roof collapse at the Calumet Water Reclamation Plant on August 30, 2018. The attached report summarizes findings and, based on those findings, draws conclusions on the probable cause(s) of the event.

BKS:RAJ

Attachments

REPORT ON THE SAFETY INVESTIGATION OF THE
AUGUST 30, 2018 ROOF COLLAPSE AT THE CALUMET WATER RECLAMATION PLANT

Overview

On August 30, 2018 at approximately 10:52am, an explosion occurred at the Metropolitan Water Reclamation District (District) Calumet Water Reclamation Plant in the Gravity Belt Thickening (GBT) area of the sludge concentration process in building #7. Eight District employees and two contractor employees (identified below) were present at the time of the explosion, in and around various areas of the structure. The explosion resulted in a complete collapse of the concrete roof in the area of the blast, as well as a lateral collapse of interior walls, temporarily trapping one District employee and one contractor employee. These individuals were subsequently extricated by Chicago Fire Department personnel. There were multiple serious injuries as a result of this explosion, however, there were no fatalities.

The following District and contractor employees were present at the GBT area of the sludge concentration process in building #7 at the time of the explosion:

Nicholas Andronis - Electrical Mechanic
Matthew Dillon - Electrical Mechanic
Hollis Hall - Truck Driver
Carl Malinowski - Structural Ironworker
Timothy Moore - Electrical Mechanic
Kevin O'Connor - Operating Engineer I
Steve Stanek - Pipefitter
Paul Sullivan - Operating Engineer II (at time of incident)
William Kissane - Pipefitter (Contractor Employee)
William Ruiz - Pipefitter (Contractor Employee)

Background

Waste water treatment is primarily achieved through a combination of mechanical and biological processes. The mechanical processes effectively separate water from solids. The biological processes break down solid organic matter while reducing potential pathogens. Some anaerobic bacteria commonly found in wastewater and throughout the waste water treatment process produce gasses through their metabolic processes. Two of the most common gasses associated with waste water treatment operations are hydrogen sulfide gas and methane gas.

Hydrogen sulfide (H2S) is a colorless toxic gas and has a distinguishable and objectionable odor similar to rotten eggs. The primary concern for H2S is health and safety due to its toxic effects. It is a heavy gas (Density 1.363) and tends to stratify at the lowest elevation that it can occupy, displacing other lighter gasses in the absence of forced ventilation. It is immediately dangerous to life and health (IDLH) at 100 parts per million (PPM). District policy is to evacuate at levels of 10 PPM, which is the alarm set point for gas detection systems and personal use gas meters. However, H2S can also be a combustible gas at concentrations of 4% to 44% Lower Explosive Limit (LEL) and Upper Explosive Limit (UEL), respectively. It is not typical to see hydrogen sulfide gas reach

the lower explosive limit (LEL) of 4% or 4,000 (PPM) in the waste water treatment process, so H2S remains primarily a health hazard due to toxicity rather than combustibility.

Methane gas (CH4) is a colorless and odorless gas. The primary concern for methane is combustibility, but it can also act as an asphyxiant if it displaces oxygen. Methane is a light gas (Density .657), about 55% lighter than breathable air. Methane is primarily generated from anaerobic digestion of solids or "sludge", but can also occur in early stages of water treatment as well. The explosive concentration level for methane gas is 5% LEL to 15% UEL (these are the concentrations of methane in air in which an explosion could occur). District personnel have been trained to evacuate if concentrations of any combustible gas reach 10% of the LEL as indicated by a gas meter, which is 90% below the actual LEL level.

Due to the explosion potential of methane gas in waste water treatment, the National Fire Protection Association (NFPA) has established NFPA 820 "Standard for Fire Protection in Waste Water Treatment and Collection Systems" which details standards in design and operation of Waste Water Treatment Plants (WWTPs) to minimize the potential for fires and explosions to occur. NFPA 820 works in conjunction with other applicable NFPA standards, OSHA regulations, and employer mandated safety programs as a comprehensive approach to mitigate potential fires and explosions through a combination of design, engineering, and administrative controls.

Explosive events often have a combination of factors that contribute to the event. To have a combustible gas explosion occur, there must be combustible gas present, and it must be within the explosive range. There must also be an ignition source present and it must be of sufficient temperature to ignite the explosive gas mixture. An explosion as forceful as what occurred at the Calumet plant also typically results due to the containment of the initial air expansion from the combustible gas mixture being ignited, otherwise the gas would ignite and flare off without the level of destruction observed.

Interviews

A series of interviews were conducted by Edward Karpinski (Senior Safety Specialist), Tim Delathouwer (Safety Coordinator), and Robert Byrne (Senior Human Resources Analyst) with the following individuals to identify their knowledge of the timeline and the events leading up to the explosion. In addition to the interviews, written narratives of the event were completed by some available employees (Attachment 1).

Interviews were conducted with:

Thomas Conway - Assistant Director of Maintenance and Operations (Acting Director of Maintenance & Operations at the time of the event)
Dean Corradino - Assistant Master Mechanic
Thomas Durkin - Assistant Master Mechanic
Reed Dring - Engineer of Treatment Plant Operations I
Neil Dorigan - Managing Engineer
Matthew Dillon - Electrical Mechanic
Nicholas Andronis - Electrical Mechanic

Jack McGrane - Electrical Mechanic Sub-Foreman
Joseph Hayes - Electrical Mechanic Foreman
Kevin O'Connor - Operating Engineer I
John Dalton - Master Mechanic I
Patrick Coleman - Structural Ironworker Leadman
Gerald Batchelor - Chief Operating Engineer I

The contractor employees were not interviewed. In addition, the following District employees were not interviewed as part of this investigation because they were off work due to injuries sustained at the time of the explosion:

William Kissane - Pipefitter (Contractor employee)
William Ruiz - Pipefitter (Contractor employee)
Hollis Hall - Truck Driver
Carl Malinowski - Structural Ironworker
Timothy Moore - Electrical Mechanic
Steve Stanek - Pipefitter
Paul Sullivan - Operating Engineer II (at time of incident)

Written statements (Attachment 1) were completed by:

Steven Brescia - Assistant Master Mechanic
Dean Corradino - Assistant Master Mechanic
John Dalton - Master Mechanic I
Reed Dring - Engineer of Treatment Plant Operations I
Thomas Durkin - Assistant Master Mechanic
Andrew Gierut - Operating Engineer II
Kevin O'Connor - Operating Engineer I
Donald Rohe - Treatment Plant Operator II
Paul Sullivan - Operating Engineer II

Thomas Conway, Assistant Director of Maintenance and Operations (10/16/18 8:45am)

Conway is in charge of the Calumet Plant, and was serving as the Acting Director of Maintenance & Operations (M&O) on August 30, 2018. On the date of the event, Conway was working downtown at the District's Main Office Building (MOB) as the Acting Director of M&O, and travelled to the Calumet Plant after receiving notice of the explosion. Therefore, Conway was not at the Calumet Plant when the explosion occurred. However, Conway was interviewed based on his knowledge of the Calumet Plant and for potential information relevant to the August 30 event. Conway informed the investigators that the GBT process had been out of service for approximately four years, and that the GBT process was being reactivated. When asked why the GBT process was now being reactivated, Conway responded that this change was due to a biological issue with

the sludge stream known as Zoogloea, as confirmed by laboratory analysis. Conway explained that reactivating the GBT process would allow for a more expedient resolution to the Zoogloea issue and allow the process to become more efficient due to the digesters not needing to heat sludge with a higher water content. Conway stated that the GBT process does increase the need for polymer which can be costly and that its use is budget driven to some extent. The equipment used in the GBT process had been previously run while it was out of service in order to exercise the equipment and ensure that it was still functional. There were four GBT units in the GBT area of building # 7, and two of those units were being checked and tested for their operational capabilities. Additionally, one of those GBT units was successfully test run on August 29, 2018.

Conway had no other information relevant to the events leading up to the event on August 30, 2018. However, Conway provided additional information about the general safety practices and processes, which are summarized later in this report.

Dean Corradino, Assistant Master Mechanic (10/16/18 10:30am)

Corradino is an Assistant Master Mechanic and primarily in charge of the Truck Drivers, Hoisting Engineers, Structural and Architectural Ironworkers, and Sheet Metal Workers (when they are onsite from other facilities). Corradino was interviewed as a manager of Trades employees who were working in the GBT area on August 30, for his role as a supervisor of Trades employees, and because he was one of the first individuals to arrive at the scene of the explosion.

Corradino said that he was in the process of loading a piece of equipment onto a flatbed trailer near the maintenance garage area, which is approximately two blocks away from where the explosion occurred. Corradino said he happened to be facing the direction of building #7 when the explosion occurred. Corradino then said that he immediately proceeded to the location and was one of the first people on the scene following the blast. Corradino stated that he assisted District employees Paul Sullivan, Nick Andronis, Mathew Dillon and Timothy Moore down the steps as they were exiting the west side of the building. Corradino also said that he spoke with Hollis Hall who initially said that he was okay, but was subsequently directed to the Chicago Fire Department paramedics for evaluation due to his behavior. Corradino said that he then noticed the tanks for the cutting torch were on a truck that was backed into the loading dock. Corradino told the investigators that he proceeded to climb into the bed of the truck and closed the open valves for the oxygen and acetylene. Corradino then said that he removed the tank gauges in order to prevent the possibility of any gas leakage.

When asked about additional information that he was aware of the August 30 incident, Corradino stated that he was aware that a Hot Work Permit was started but was not completed. Corradino said that the permit would have been initiated by the Ironworker Leadman, and the employee performing the hot work would have been required to complete the Hot Work Permit prior to beginning the hot work. (A Hot Work Permit acts as a checklist to verify the environment is suitable before introducing an ignition source, as well as to ensure that the surrounding area is protected). When asked how many hot work jobs are conducted per week, and whether the Hot Work Permits are being completed as required, Corradino stated that yes they are, and estimated that the Pipefitters conduct approximately a half dozen hot work jobs per week, as most jobs are completed in the shop, when possible, where a Hot Work Permit would not be required.

Thomas Durkin, Assistant Master Mechanic (10/16/18 11:30am)

Durkin is an Assistant Master Mechanic, and primarily in charge of the supervision of Machinists, Painters, Pipefitters, Bricklayers, Pipecoverers and Boilermakers. Durkin was interviewed as a manager of Trades employees who were working in the GBT area on August 30, and for his role as a supervisor of Trades employees.

Durkin stated that a Hot Work Permit for potential work in building # 7 was on Patrick Coleman's desk at the time of the explosion. Durkin was then asked if he was aware of who would make the decision as to whether a torch may have been needed on the date of the explosion. Durkin responded that it is likely that Malinowski made the determination that a torch would be needed to perform this work.

Durkin was then asked about how many hot work jobs are conducted each week. Durkin said that he estimates that there are about three to four hot work jobs performed each week. Durkin was asked if the necessary tools and equipment are available to effectively and safely conduct maintenance work at the Calumet plant. Durkin responded that tools are generally available without issue, however he opined that it would be in the District's interest to investigate better inventory control to help quickly locate tools and equipment when needed.

Durkin then stated that he was relatively unfamiliar with the building where the explosion occurred. Durkin stated that he thought a sewer was beneath the floor and that he was unaware that there were tanks beneath the floor. Durkin noted that the building was very orderly and clean.

Reed Dring, Engineer of Treatment Plant Operations I (10/16/18 1:00pm)

Dring is in charge of the Treatment Operations at the Calumet plant. Dring was interviewed due to his knowledge of operations at the Calumet plant, and also because he supervises Operations Staff. Dring was asked to provide information on the GBT process. Dring stated that the product in the tanks below the floor in the GBT area originated from the sludge concentration tanks, with about 700,000 gallons of sludge per day going through the tanks in question. When asked why it was being contemplated to put the GBT back into service, Dring responded that the digesters were not getting as much gas (methane) output as they should, and he needed to investigate the reason why this was happening. Dring stated that with the assistance of Ms. Auralene Glymph, Senior Environmental Biologist, samples of sludge were taken and analyzed. Dring then said that it was determined that Zoogloea was causing the sludge to be too buoyant, hampering its ability to settle naturally in the concentration tank. Dring stated that one of the possible solutions would be to put the gravity belt thickeners back into service and add polymer to assist in reducing the water content of the sludge. Dring then described the dimensions of the tanks involved in the August 30 explosion. Dring described the tanks as being 70 feet long, 15 feet wide and 15 feet deep, and there being two tanks. Dring explained that the tanks would fill at the same rate, with an overflow weir between them. When asked who would have initiated the request to put the GBT back into service, Dring said that this would have been the decision of the Operations section.

Dring was then asked if there were any fixed gas detection systems in GBT area of the sludge concentration process in building #7, and his response was that there were not any fixed gas detection systems in that part of the building. Dring did not provide any additional information regarding the events that led up to the August 30 explosion. However, Dring did provide additional information about the general safety practices and processes, which are summarized later in this report.

Neil Dorigan, Managing Engineer (10/17/18 9:00am)

Dorigan was interviewed because he is in charge of the maintenance operations and the Trades employees at the Calumet plant.

When asked how many hot work jobs are conducted per week, Dorigan responded that not many hot work jobs are done in the field, and it is preferred that hot work jobs are performed in the Trades' shops. When asked who is responsible for determining means, methods and tool use for completing tasks in the field, Dorigan responded that the level of decision making is left to the skilled Trade person doing the work. Dorigan was then asked to provide information regarding the Hot Work Permit dated August 30 for work in building # 7. Dorigan stated that he believed that the Hot Work Permit was recovered from the desk of the Ironworker Leadman. Dorigan then said that the Hot Work Permit that he saw after the incident was incomplete.

Dorigan said that work orders are discussed at meetings between Maintenance and Operations staff, and the Operations side typically prioritizes work orders. Dorigan also said that he could not say for certain, but Malinowski may have been working on a priority 1 (highest priority) assignment in order to get the GBT back into process. Dorigan then told the investigators that his understanding is that the manhole cover in the GBT building needed to be opened to determine if any cleaning of the tank below was required. Dorigan was then asked about work order C99274 (Attachment #8), originated by Paul Sullivan in which the work requested was to "Remove various manhole covers in GBT room." Dorigan said that he does not know who directed Sullivan to create the work order and it could have been possible that Sullivan created the work order on his own.

Matthew Dillon, Electrical Mechanic (10/17/18 10:30am)

Dillon was interviewed because he was in building #7 when the explosion occurred. Jim Conaghan, Business Representative from Local #134, was also present for this interview. Dillon stated that he was scheduled to fill in for Electrical Mechanic Foreman, Joe Hayes, who was scheduled to leave at 11:00am that day. Dillon said he was going to the concentration building GBT area to show Electrical Mechanics Nick Andronis and Timothy Moore the work that they would need to perform. Dillon then said that the work involved assisting with isolating equipment and working on electrical equipment associated with pumps. Dillon said that he, Andronis, and Moore were walking down the corridor between the GBT room and the screen chambers when the explosion occurred. Dillon said he believes that he heard several explosions. Dillon said that, coincidently, he, Andronis and Moore were near electrical switchgear cabinets, which provided them some protection from the subsequent roof collapse. Dillon told the investigators that they were unable to exit the building on the east side due to the door being inaccessible, therefore they made their way back through the corridor and exited on the west side of the building toward the digester complex.

When asked if he believes the level of communication between the Operations section and the Maintenance section is adequate, Dillon stated that it is customary to discuss work with the Operations section, specifically the Operating Engineer in the particular area that they are working. Dillon was then asked if he was aware that there were sludge holding tanks beneath the floor of the GBT area, and he responded that he was not aware of the existence of tanks below. When asked if pre-job safety briefings are routinely conducted for jobs with unique safety hazards, Dillon stated that they are not done routinely. When asked if the necessary tools and equipment are available to effectively and safely conduct maintenance work, Dillon replied that necessary tools are not always available, specifically specialized tools. Dillon then added that in order to obtain specialized tools, a request must be submitted to, and approved by, the chain of command. When asked if supervisors routinely provide oversight and inspect ongoing work in the field, Dillon stated that the supervisors typically have a large workload and a lot of paperwork which reduces the time available to be present at job sites in the field.

Nick Andronis, Electrical Mechanic (10/17/18 10:30am)

Andronis was interviewed because he was in building #7 when the explosion occurred. Jim Conaghan, Business Representative from Local #134, was also present for this interview. Andronis stated that he was pulled from a job that he was working on before the morning coffee break in order to assist with work that was to be performed at the GBT area after the morning coffee break. Andronis said that he and Moore were assigned to isolate equipment in the lower level of the concentration building where the electrically driven pumps are located. Andronis said that at approximately 10:45 am, as he was discussing the electrical isolation and Lockout Tagout procedures that would be followed with the Pipefitters, he noticed Malinowski bringing in a cutting torch and hoses from a truck backed into the loading dock of the GBT area on the west side of the building. Andronis said that he then proceeded with Moore and Dillon toward the lower level where the pumps are located. Andronis told the investigators that, at the time of the explosion, he recalled hearing an initial blast and then the roof caving in.

When asked if pre-job safety briefings are routinely conducted for jobs with unique safety hazards, Andronis stated that they do conduct them, but they are not documented. When asked if written Standard Operating Procedures are available for jobs that present potential or unique safety hazards, Andronis stated that to his knowledge, there are no such Standard Operating Procedures. When asked if the necessary tools and equipment are available to effectively and safely conduct maintenance work, Andronis stated that they do not always have all of the tools needed to perform the work. When asked if the level of communication between the Operations section and the Maintenance section is adequate, Andronis stated that yes it is customary to check in with Operations staff in the area. When asked if supervisors routinely provide oversight at ongoing work sites in the field, Andronis stated that they try to but have workloads that keep them in the office. Andronis was asked about anything that he believes contributed to, or that could have prevented the explosion. Andronis stated that the safety culture of the District is poor, and that safety needs to be a higher priority. Andronis stated that he feels there needs to be a better process for correcting unsafe conditions quickly, and he also stated that he believes the newer Arc-Flash Rating labels being used are not helpful enough.

Joseph Hayes, Electrical Mechanic Foreman and Jack McGrane Electrical Mechanic Sub Foreman (10/17/18 11:35am)

Hayes and McGrane were interviewed at the same time since their subordinates involved were in the GBT room at the time of the incident. Although Hayes and McGrane were not present in the vicinity of building #7 at the time of the explosion, they were interviewed because their insight could be helpful. Hayes and McGrane supervise Electrical Mechanics and assign work and assist with scheduling jobs, as well as acquiring parts to facilitate repairs. Jim Conaghan, Business Representative from Local #134, was also present for these interviews. Hayes and McGrane were collectively asked to describe any involvement that they may have had prior to the explosion that occurred in building #7. They stated that the Electrical Mechanics were there to look at the pump and to do a Lockout Tagout for the GBT. Hayes said that he was scheduled to leave that day at 11:00am, and Dillon was to be upgraded to Foreman in his absence. Hayes then stated that Dillion was escorting Andronis and Moore to their new job assignment when the explosion occurred. Although Hayes and McGrane did not have much to offer regarding the August 30 event, they did provide other relevant information regarding general safety procedures which is summarized later in this report.

Kevin O'Connor, Operating Engineer I (10/17/18 10:30am)

O'Connor was interviewed because he was in building #7 when the explosion occurred. O'Connor stated that he was working in the area conducting a variety of tasks involved with the restarting of the GBT process. O'Connor stated that the manhole covers over the sludge tanks below the floor of the GBT area needed to be removed in order to inspect the tanks prior to the GBT start up. O'Connor said that Malinowski had successfully removed one manhole cover along the southern wall of the building in the morning by using hand tools. O'Connor then told the investigators that when they looked into the space below the previously removed manhole cover it appeared to be some type of void, however, and he determined that this was not the tank that needed to be observed. (Work Order C99274 specified the removal of several manhole covers which would provide access to the two tanks beneath the floor of the GBT area to allow visual inspection of the tanks.) O'Connor said that neither his nor Malinowski's personal gas meter went into alarm as they inspected the area below the opening when the first manhole cover was removed. O'Connor said that since the original manhole cover was determined not to be over the correct area, Malinowski was going to open another manhole cover so that tank could be inspected. O'Connor then said that Malinowski was unsuccessful in using the hand tool to remove the next manhole cover. O'Connor stated that Malinowski then applied a penetrating oil to the corroded hardware securing the manhole cover to the floor, and that he then stated that he would return after break with a larger drive tool to attempt remove the hardware attached to manhole cover.

O'Connor said that he and Sullivan then proceeded to the polymer tank area of the concentration building to conduct troubleshooting on the polymer feed system for the GBT. O'Connor said that at approximately 10:20 am, he and Sullivan felt they had successfully identified the valves that were contributing to the polymer feeding issues, and they decided to take a quick break, and proceeded to the Digester Control Room. O'Connor told the investigators that shortly after arriving at the Digester Control Room, Stanek arrived to conduct work on the GBT systems that would require an isolation and Lockout Tagout (LOTO) of equipment in which they would need to function as "Isolators" (Per the District LOTO program). O'Connor said that he, Sullivan and the

Pipefitters (Stanek and two contractor Pipefitters) were approximately seven feet from the corridor separating the GBT area from the polymer storage and dosing room when the explosion occurred. O'Connor described the sound of the explosion as a very loud rumbling noise which got louder, and then everything seeming to go up in a column. This description of the explosion is consistent with a written account he previously provided.

John Dalton, Master Mechanic I (10/18/18 8:40am)

Dalton is in charge of the Trades employees at the Calumet plant. Dalton was interviewed due to his knowledge of the Maintenance operations at the Calumet plant, and because he supervises the Trades employees at the Calumet plant. Dalton was asked how many hot work jobs are conducted per week, he stated there are about three hot work jobs per month. When questioned about work being performed without Hot Work Permits, Dalton said that it is possible that there have been hot work jobs conducted without the use of a Hot Work Permit. Dalton recalled an event that had occurred several months prior to this incident when he had stopped by a job site and work was being performed without a completed Hot Work Permit. Dalton said he sent the employees to the Safety office. Dalton stated that he was not happy with the level of direction provided by Safety section, although he did not specify what was lacking in the direction provided by Safety.

Dalton was next asked who chooses the means and methods of completing a task in the field. Dalton replied that the decision is left to the Trade doing the work. When asked if he felt the Hot Work Permit Program was being followed at the time of the explosion, Dalton stated that he did not believe that the Hot Work Permit Program was being followed, and acknowledged his awareness of the existence of an uncompleted permit for work associated with building # 7. When asked about his knowledge of the area, and whether he was aware that there were tanks beneath the floor, Dalton stated that he was not aware that there were sludge holding tanks beneath the floor of the GBT area. Dalton then relayed an account of an event where a non-qualified worker in the Sewer Control group opened an electrical cabinet while an Electrical Mechanic was present, which would be in violation of District policy and Union Agreements. Dalton feels that everyone needs to work harder as a group to ensure safety.

Patrick Coleman, Structural Ironworker Leadman (10/18/18 10:30am)

Coleman supervises Ironworkers at the Calumet plant and was recently promoted to the Leadman position on July 23, 2018 from his previous role as an Ironworker at the Stickney plant. Craig Satalic, President/Business Manager of Local #1, was also present for this interview. Coleman was asked to describe the events leading up to the August 30 explosion. Coleman said that he went to the GBT area on the previous day (Wednesday the 29th) with Batchelor to look at the work. Coleman said that he sprayed the bolts of the manhole covers that were to be removed with penetrating oil to help facilitate their removal. Coleman said that on the following morning he assigned the work of removing the manhole covers to Malinowski and offered to assist, if needed. Coleman stated that Malinowski declined his assistance. (It should be noted that work order C99274 was originated on August 30 at 9:51 am, which is after Malinowski began working on the removal of the manhole covers. Typically, a work order is generated prior to work being performed. However, in certain cases such as this one, the work needed to be performed is identified and discussed with the appropriate personnel prior to a formal work order being

generated. In this case, Batchelor and Coleman looked at the manhole covers the day before the explosion. Therefore, Coleman was made aware of the work that would be have to be completed prior to the work order having been generated.)

Coleman told the investigators that he began a Hot Work Permit in anticipation that the job might require the bolts being cut off with a torch due to the amount of corrosion on the bolts that he had observed the day before. Coleman then said that Malinowski mentioned to him around break time that he would probably need to use a torch to cut the bolts off of the other manhole cover due to multiple unsuccessful attempts of using a battery powered pneumatic impact driver and socket tool to remove the bolts. Coleman said that Durkin then stopped by the office and requested that he come look at a job that involved Ironworkers removing grating and that would need to be scheduled soon. Coleman said that he and Durkin then proceeded to lower level pump number 5 in the old pump and blower building which is approximately 70 feet below grade. Coleman stated that upon returning to the surface, he and Durkin were informed of the explosion and immediately went to the area to assist. When asked how many hot work jobs are conducted per week, Coleman estimated that one to two are completed per week for the Ironworkers. Coleman said that it is possible that Malinowski may have begun performing hot work prior to completing the Hot Work Permit. However, Coleman never indicated that this was routine or acceptable.

Gerald Batchelor, Chief Operating Engineer I (10/18/18 11:30am)

Batchelor oversees the Operating Engineer staff that run mechanical processes on the solids side of the treatment process for the Operations section. Batchelor was not involved with the August 30 event but was interviewed due to his extensive knowledge of the area affected. Batchelor stated that he can pinpoint the time of the explosion at approximately 10:52am because that was the time when all readings for the tank level indicators and gas monitors in other areas of the building went blank. This is believed to have occurred as a result of the explosion interrupting electrical service to the tank level indicators and gas monitors.

Batchelor confirmed that there were two unbolted cover plates where two additional GBT process machines could be installed (one for each tank) at a future date, if an expansion were to occur for the process. Batchelor stated that manhole covers in the GBT room had been removed several times previously and his recollection is that gasses had never been an issue in the area, although it was common to have H2S alarms in the concentration tank and screen areas of the building. When asked if level of communication between the Operations section and the Maintenance section is adequate, Batchelor stated that it was, and when there are issues, they are quickly resolved by working with the Master Mechanic's office.

Additional Information Gathered From Interviews

In addition to the information gathered about the explosion event, questions were asked to help identify gaps and areas of necessary improvement in the safety process, as well as assist in making recommendations to help prevent a future catastrophic event. Based on the information gathered from the interviews, the supervisors generally agree and acknowledge that employees and supervisors are primarily responsible for ensuring that employees comply with District safety rules and procedures. Many of the supervisors also stated that the Safety section also plays a role in

ensuring employee safety. Dalton stressed that the Safety Department is responsible for ensuring employee safety.

When asked about compliance and enforcement with safety procedures, the consensus was that employees are usually corrected by verbal means, however, no one was able to recall discipline being issued for safety violations. Dring said that he would initiate discipline for major safety violations, such as violating the LOTO procedures. Dalton stated that the Safety section or the supervisor would enforce safety policies and retrain people to do things correctly if they were being done incorrectly.

The supervisors also agreed that there are pre-job safety meetings conducted for jobs with out of the ordinary hazards and for bigger jobs. However, Dillon stated that pre-job safety meetings are not done routinely. It was also determined from the interviews that pre-job safety meetings are not documented.

The Maintenance Staff all stated that tools are procured through the Master Mechanic's office, and generally agreed that tools are available to perform their jobs correctly. However, Dorigan, Dalton and Corradino have noted that the District's budget may sometimes be a factor when acquiring necessary tools.

The supervisors all agree that there is good communication between the Maintenance staff and the Operations staff, and that Operations staff ultimately determines the priority of work orders based on operational needs. The supervisors also stated that there are regular scheduling meetings between Maintenance staff and Operations staff where priorities are discussed.

When asked about Standard Operating Procedures for potential or unique hazards, some supervisors stated that some procedures are identified on work orders printed from the MMS system. Dorigan stated that even though there are some procedures identified on work orders, those procedures primarily indicate what needs to be done within the specified scope of work only. Dalton, Durkin and Coleman were not aware of any standard operating procedures for potential or unique safety hazards.

When asked if the supervisors conduct on-site visits for jobs in the field, most of the supervisors stated that they do conduct on-site visits as much as possible. However, many supervisors stated that due to other job duties, they do not visit job sites as often as they would prefer. Dalton and Corradino both stated that since they are performing duties that were previously performed by Engineers assigned to the M&O Department, therefore, time constraints and their workload prevent them from visiting the field as often as they would like.

It should be noted that Conway was asked a question regarding the Calumet Plant's decision to not chair the monthly safety committee meeting, as was historical practice at District facilities. Conway stated that the Maintenance Manager is too busy with other work to continue that role, and since the Engineers who used to chair those meetings were removed from the M&O Department, there is no Engineer available to chair those meetings.

Review of Other Investigation Information and Supporting Data

In addition to the written statements and interviews, other sources of information were used in the investigation process. Several visits to the site were made by the investigators during the demolition process of building #7 by the contractor. Photographs were taken of some items collected during the demolition, including the manhole cover that potentially could have been the point of ignition for the explosion (Attachment 2) as noted by the charring and two bolts that appear to have been cut off with a torch. The partially completed Hot Work Permit was recovered early in the investigation process from Pat Coleman (Attachment 3). Gas meter sign out logs and gas meter data logging results (Attachment 4) were collected and copied in order to confirm gas meters were present and being used. The gas meters that were used at the time of the explosion and recovered did not register any gas alarms at the time of the event or at any other time on August 30. The gas meter that Malinowski was using was not recovered from the scene, despite efforts to locate it. (It is suspected that the meter could have fallen into the sludge tanks below the floor which collapsed either at the time of the explosion or when the roof collapsed down onto the floor.)

Electronic records of documented safety training for the affected employees were also analyzed to confirm that relevant training topics in regard to hot work and gas meter usage and hazardous atmospheres had been conducted (Attachment 5). A copy of the District's "Hot Work Permit Program" which was in place at the time of the explosion is attached (Attachment 6), along with a memo dated May 6, 2004 when the District officially implemented the Hot Work Permitting portion of the Hot Work Program (Attachment 7). A series of work orders that were generated for the various tasks involved with reinitiating the GBT process is attached (Attachment 8). Also attached is a building diagram of the GBT area within the concentration building (Attachment 9).

Based on the information gathered from the interviews, there were reportedly five portable gas meters being used prior to, and at the time of the event in the GBT area. O'Connor stated that both he and Sullivan were wearing gas meters prior to and at the time of the explosion. Operating Engineers who are stationed in the Digester Control Room typically receive gas meters from the central control room pooled meter location. The central control Operating Engineers "bump test" and deliver meters to the Digester Control Room personnel for their use, for a 24-hour period. (A "bump test" is the process of exposing gas meters to a known concentration of gas to assure that the gas meter is working properly.)

Dillon stated that he believes he was wearing a gas meter, but could not be certain. The investigators were unable to confirm if Moore was wearing a meter at the time of the event as he was not interviewed, but he did not have a gas meter signed out at the time of the event.

Stanek was reportedly wearing a gas meter, and handed it Dalton after the explosion (confirmed by Dalton on October 30, 2018). Identifying the specific meters used at the time of the explosion is difficult due to the equipment sign out sheets not being completed correctly. Several of the gas meters suspected to have been in use, based on the equipment logs (with the exception of Malinowski's) were not bump tested on the day they were used per the District's Portable Gas Meter Program (Attachment 10). It should be noted that this does not indicate that the meters would not work correctly; the meters conduct a self-diagnostic test when turned on and would go into an alarm mode if there was an issue related to the meter functioning properly. However, the District's safety policy conforms with the manufacturers recommendations that meters be bump

tested each day of use to a known concentration of calibration gas to confirm that the meters are working properly.

An analysis was conducted by running a query of the data logging of all gas meters assigned to the Calumet Plant to determine if there were any combustible gas alarms from approximately 6:00am to approximately 2:00pm on August 30, 2018. During that time period there were no alarms recorded of any combustible gasses for any meter. Since Malinowski's meter was not recovered from the explosion, the meter data was not able to be logged. The data from the previous use is downloaded the next time the meter is bump tested. Malinowski did bump test the meter he was using at 8:52am on August 30th when he signed the meter out from the tool crib in the Calumet trades shop area.

Analysis

Building #7 is of masonry construction with a concrete roof structure. The concrete roof structure was connected to the building walls on the east side. The concrete roof structure was sitting on, but not attached to, the building on the west side of the building to allow for expansion and contraction of the building components resulting from temperature changes. There are fixed gas detection systems for methane and hydrogen sulfide in the concentration tank and screen chamber areas of the building where process water is in the open air environment of the enclosed building. There are no fixed gas detection systems in the polymer room or the GBT room of the building, as there are no tanks open to the indoor atmosphere in those areas.

The gravity thickening process had not been used at Calumet for approximately four years. However, the sludge stream in the two holding tanks (15' deep x 15' wide x 70' long each) below the GBT process area remained active with sludge streams coming from the gravity thickening concentration tanks and going to the digesters. Operations had noticed some biological issues (Zoogloea) with the sludge stream that were reducing the effectiveness of the gravity thickening process coming from the concentration tanks because the gelatinous masses increasing buoyancy of the solids causing them to not settle out effectively.

To address this issue, a decision was made by Operations to explore the option of returning the GBT thickening process to service. The expected result was to thicken the sludge and reduce moisture content; which would increase plant efficiency, reduce energy costs required to heat sludge with a high water content, and allow the biological issues to be remedied more quickly by increasing the "wasting" of sludge. Wasting of sludge is the process of getting rid of the poor quality sludge and allowing the microbial population to become "healthy" again, as more suitable sludge for the microbial population is introduced to the process.

On August 30, 2018, Building Trades personnel and Operating Engineers were dispatched to work in the GBT area within building #7 to perform a variety of tasks to facilitate the restarting of the GBT process. A series of work orders were initiated to conduct inspections and preventative maintenance and repairs on the GBT process equipment in order to bring it back into operation (Attachment 8). One of the work orders (C99274) specified removal of several manhole covers which would provide access to the two tanks beneath the floor of the GBT area to allow visual inspection of the tanks. Ironworker Carl Malinowski was assigned the task of removing the manhole covers by his supervisor, Pat Coleman, Ironworker Leadman.

A partially completed Hot Work Permit form (Attachment 3) was recovered from Coleman. At 8:00am, Coleman had initiated this Hot Work Permit form in preparation for the potential need to use torch cutting as a method of last resort to facilitate the removal of the manhole covers if mechanical means were unsuccessful.

The hot work process stipulates that the Hot Work Permit is to be generated by the supervisor and provided to the employee (known as the "Hot Work Operator") conducting the hot work. The Hot Work Permit acts as a checklist for the Hot Work Operator to verify that environmental conditions are suitable prior to introducing an ignition source outside of a designated hot work area such as a shop. Part of the process in completing a Hot Work Permit includes; monitoring for combustible gasses (if applicable), ensuring combustible materials are removed or protected within a 35 foot radius of the hot work, and ensuring necessary safety equipment is at the worksite. The completed permit is to be posted at the worksite, thereby allowing the hot work to begin. Hot work is not to be initiated until the permit process has been successfully completed and the permit posted at the jobsite. Hot work conducted without a valid Hot Work Permit is prohibited.

Tool selection and use is primarily the decision of the skilled Trade completing the work, unless the Trades person asks for guidance from their supervisor. When completing a Hot Work Permit for a job that requires removing bolts from manhole covers, the Hot Work Operator would need to use a MSA 5X gas meter, which is a pump drawn sampling device, allowing the user to extend the sample probe and tubing into the area where the sampling is to be done, such as the tanks below the floor. According to Bachelor, there were several small plate covered access points that were not secured to the floor. These were two separate spaces for the potential expansion of the GBT process to add two more machines. The plates could be lifted off and the probe dropped into the tanks below the floor to sample atmospheric conditions in the tanks. Interviews confirmed that some staff involved in this work were unaware of the existence of tanks below the floor.

On August 30, 2018 before the 10:00 am coffee break, Malinowski had removed the first manhole cover near the south wall with a battery powered pneumatic impact driver. However, when O'Connor, and Malinowski looked at the area below the manhole cover it appeared to be an overflow area rather than the holding tank that needed to be inspected. Malinowski began working on the removal of another bolted on manhole cover. The bolts were seized due to rust on this manhole cover, so Malinowski applied a penetrating oil to the bolts of this and another manhole cover and then informed O'Connor that he would return after coffee break with a larger drive tool. This occurred around 10:00am and Malinowski went to break.

At approximately 10:20 am O'Connor and Sullivan were just finishing trouble shooting an issue with the polymer delivery system required for the GBT process which was preventing it from running in automatic setting. They had identified the valves that would need to be inspected and repaired and then walked across the street to the Digester Control Room to take a short break. Within a few minutes of them getting to the Digester Control Room, Stanek came into the Control Room. Stanek was dispatched to work on the pumping and piping systems for the building #7 GBT process and his work would require an isolation of the pumping system. Stanek, along with the other Pipefitters and the Operating Engineers, worked with the Electrical Mechanics to follow the District's Lockout Tagout (LOTO) procedures to ensure effective control of hazardous energy sources (both electrical and mechanical) which would allow the Pipefitters to complete their work.

Electrical Mechanics Moore and Andronis were pulled off jobs they were working on in the morning and were dispatched to assist with the LOTO needs associated with the various work, as well as troubleshooting any electrical issues with the pumping systems. Dillon was assigned to fill in for Electrical Mechanic Foreman, Hayes, who was scheduled to leave at 11:00am. Dillon went to meet the Electrical Mechanics in the area to show them the job and provide guidance, as necessary. The Electrical Mechanics arrived at the job site around 10:30am and began discussing the scope of work.

At approximately 10:45 am Andronis was in the northwest corner of the GBT room talking to the Pipefitters and observed Malinowski bringing hoses and a torch in from a District truck backed into the loading dock at the GBT area. This observation by Andronis was just minutes before the explosion.

It should be noted that several people in the area, including Malinowski, were wearing portable gas meters and have been trained to evacuate upon alarm of the units. O'Connor and Sullivan were both wearing an MSA portable gas meter and were approximately seven feet into the building on the southwest side of the building working with the pipefitters for their LOTO when the explosion occurred. They did not have any gas alarms from their portable gas meters at any time while in the building on that day, which was also confirmed by a review of the gas meter data by the Safety staff. Batchelor stated during the interview that various manhole covers had been removed in the past and he did not recall ever having had gas readings of concern. It is therefore assumed that the indoor environment of the GBT floor and common area was free of atmospheric hazards including combustible gasses, as there were no gas alarms reported of any type throughout the morning work period preceding the explosion. However, this would not indicate what gasses and their concentrations were present beneath the floor of the GBT area. Therefore, at the time of the incident, the environment below the floor where staff was working remains unknown.

At the time of the explosion, Corradino was overseeing the loading of a piece of equipment onto a truck bed nearby. Corradino was one of the first people on the scene following the explosion. Corradino assisted by helping people out of the structure as those who were able to make their way own way out were exiting. Corradino noticed the tanks for the cutting torch on the truck backed into the loading dock and proceeded to climb into the bed of the truck and closed the valves for the oxygen and acetylene, which were in the open position. The open position of the valves is required to operate a cutting torch.

Gierut initiated the Emergency Medical Services (EMS) response immediately following the blast from the Digester Control Room. There was an overwhelming response by Chicago Police, Fire and Rescue crews. The response and level of tools, knowledge, and bravery displayed in the rescue effort was truly remarkable. District staff provided assistance in bringing equipment requested by the EMS responders and making cribbing (blocks of wood) for the rescue staff to use in removal of the concrete beam and roof structure which were trapping Malinowski's lower leg.

Conclusions

While significant effort has been exerted to identify all aspects of and contributing factors to this event, it is not possible to determine with absolute certainty all of the facts concerning the event that occurred on August 30, 2018 that resulted in the explosion. Some employees affected by, and involved with, the events do not have perfect recollection of events as they happened. Some involved personnel would not have been in a position to have involvement with, or affect, the contributing factors as they were not inside the GBT room at the time of the explosion. Therefore some conclusions must be based on the most logical sources of contributing factors as we understand them through the investigation process. A logical hypothesis can be made based on the treatment process involved, the potential atmospheric environment, and configuration of the affected area, as well as tools involved and work being done at the time of the explosion. The information ascertained from interviews, site visits, as well as the physical evidence observed and collected, have led to these conclusions.

Explosive gas concentrations can develop in various waste water treatment processes. It is an inherent potential hazard in the industry. A variety of methods are in place and must be used to mitigate the hazard, including design, engineering and administrative controls. Administrative controls pertinent to this work include the use of portable gas meters in areas where these gasses could be concentrated, and a Hot Work Permit Program (Attachment 6) in the event that hot work must be performed.

Prior to the explosion, there were no signs of combustible gas present in the atmosphere of the building #7. There were multiple employees using personal gas meters in the area prior to, and at the time of, the explosion and none were emitting alarms. On the other hand, the sludge holding tanks beneath the floor which were being accessed, would have a potential to generate both hydrogen sulfide and methane gas. Methane is combustible and is a light gas, which would allow it to accumulate at the top of the tanks, just beneath the floor above where the manhole covers were being removed.

The sludge holding tanks, which were below grade, had concrete slab tops which acted as a ceiling to the tanks and a floor for the GBT area. It is believed that the concrete slabs above the tanks were likely the path of least resistance for the rapid expansion of air generated by the heat of the methane gas igniting from the torch used to remove the bolts on the manhole cover. This likely resulted in the explosion blowing up vertically from the tanks. This is consistent with a written account from O'Connor, who stated that the explosion appeared to him as a large column, and everything appeared to be going up; the floor and the roof, in a large cloud of debris.

No one interviewed observed the actual striking of the torch. However, it is presumed that based on the timing of the torch being brought to the work site and the tank valves being in the open position, that the torch was being used by Malinowski to facilitate the removal of the second manhole cover. The manhole covers were placed and observed in a secured evidence holding area for the forensic investigation. The manhole cover labeled B shows charring consistent with torch burning, and two bolts cut off (Attachment 2). It is hypothesized that the torch used by Malinowski provided an ignition source for a combustible concentration of methane gas that had accumulated in the tanks just below the floor resulting in the explosion. It is therefore believed that Malinowski did not have the completed the Hot Work Permit form prior to performing the work, as is required

by the Hot Work Program. The uncompleted form for this specific job was recovered from Coleman (Attachment 3).

Malinowski received safety training specific to the Hot Work Permit program on January 30, 2013, and training specific to Hazardous Atmospheres and Gas Detection on March 2, 2011, March 1, 2013, and April 19, 2016. The Hot Work Permit program training focuses on the procedural requirements for completing a Hot Work Permit. The Hazardous Atmospheres and Gas Detection training provides information related to the hazardous atmosphere potentials most commonly associated with waste water treatment, the physical properties of the gasses, and the gas meters used to detect them. Training data for affected employees is included as Attachment 5.

It should be noted that during the interview process Dalton stated that he receives approximately three Hot Work Permits per month, as most jobs involving hot work are completed in the shops where Hot Work Permits are not required. However, in retrospect he suspects that there may have been some jobs where Hot Work Permits were not completed as required. He relayed an account of an incident several months prior to the event, when he visited a jobsite where hot work was being conducted without a Hot Work Permit being posted. Dalton stopped the job and sent the employees to Safety for guidance on the Hot Work Permit Program.

In summary, based on the results of the investigation, it appears that Hot Work Procedures were not followed. It is presumed that if Hot Work Procedures had been followed in accordance with written policy, gas readings would have been taken below the floor on the opposite side of where the hot work was occurring. It cannot be known for certain what, if any, gasses were present below the manhole covers at the time of the explosion. However, since methane is a gas that is present during the waste water treatment process, if procedures were followed, it is possible that methane gas could have been detected and the work stopped until it would be deemed safe to work in the area again. Additionally a variety of methods could be used to create safe conditions to use the torch either through isolation of sludge stream, forced air mechanical ventilation, purging with an inert gas such as nitrogen, or a combination thereof. While it is estimated that there are multiple factors that contributed to the August 30, 2018 event, and the fact that the cause cannot be determined with absolute certainty, the result of the investigation can reasonably conclude that if the existing Hot Work Policy had been followed, the explosion could likely have been prevented.

Attachment 1

Written Narratives

Concentration Explosion Incident

On Thursday, August 30, 2018, I was in my office talking with Laura Reilly, EITM Foreman, at approximately 10:50am when we heard a loud boom; what sounded like something being dropped in the Machine Shop or something possibly hitting the building.

We immediately went outside and saw the smoke or dust cloud rising to the south above the Digester. I asked Laura to stay in the office and handle the phones. I got in a Gator and drove to the site.

Upon arriving on the scene I saw the destruction of the portion of the Concentration building. I saw Nick Andronis and Tim Moore in a Gator, driving away from the explosion. Tim was holding his right arm. I saw Matt Dillon, Steve Stanek, and Bill Ruiz exiting and walking in the street. I went up to them and asked them if they were okay and what happened. I told them to stay by the Digester building. I took down names of those they told me were in the building.

Dean Corradino and John Dalton were there with me. We went up to Hollis' truck. Dean got up on the back of the truck and shut off the acetylene and oxygen tanks. John tossed him a pair of channel locks in case he needed them.

I continued to monitor those that I saw and try to account for those involved. When the Fire Dept. arrived I gave the Fire Chief, at the Command Center, the names of the injured and trapped.

I helped direct any tradesmen needed by the Fire Dept. on the east side of the building.

When John was made aware that Carl Malinowski's wife arrived, he asked me to pick her up at the gate and bring her to the Command Center and stay with her. We waited there.

After Carl was air lifted, his wife was taken to Univ. of Chicago Hospital by the police. I was sent there to assist her and the other employees sent there in case they or their families needed anything. I spent the rest of the afternoon in the emergency room awaiting their needs.

Stephen Brescia

Asst. Master Mechanic

MWRD Calumet

Sept. 20, 2018

9/20/2018

On Thursday August 30th I was standing outside in front of the Truck Garage, on top of the material screener we were preparing to send back to LASMA when I heard an explosion. I looked up and saw the dust rise from the building and then fall back down.

I got off the machine and had Truck Driver Earvin Tate drive towards Concentration.

When I arrived at the site I saw Paul Sullivan sitting on the base of the stairs going into the hallway. I went up the stairs and saw Nick Andronis coming out of the rubble. I helped Nick exit the building, then Matt Dillion followed by Tim Moore.

I then went to the loading area and saw Hollis Hall standing around his vehicle. I asked how he was and he said he was ok.

I asked John Dalton if we should move the truck out of the way to allow access to the building for the Fire Department. There was a set of torches on the back of the truck. I turned off the tanks and then removed the gauges. The hose was wrapped around the tank so we could not move the truck. A police officer told us not to worry about moving the truck.

I came off the truck and saw Hollis Hall leaning against the building, I brought him over to the paramedics to have him looked at.

I then joined John Dalton and went on the east side of the building to join the Fire department to assist in any way possible.

Dean Corradino

Assistant Master Mechanic

Concentration Timeline Dalton

On Thursday August 30th I was working in my office when I heard a loud noise. It was approximately 10:50 am. I left my office to investigate. When I exited the Trades building I saw that the sky near 130th street was grey. I immediately headed over to the Digester/Concentration area to see what caused the noise I had heard. When I reached the area, numerous Trades personnel came up to me to tell me what had occurred. Some of them were injured and I directed personnel to relocate the injured to the front gate and wait with them for ambulances. Then one of the Pipe coverers told me that he believed that one of the Pipefitters that had been working in Concentration was trapped in the building. We got as close as we could to see if it was possible to communicate with him (Bill Kissane). I was then informed from another Pipe coverer that Iron worker Carl Malinowski may still be in the building. The roof had collapsed on the section that they believed Carl was in so we were not able to enter. I then contacted every Trade Supervisor and Assistant Master Mechanic to get an accurate head count of all of our employees. The Chicago Fire Department then came on scene and I brought them up to speed with what we knew to that point. We stayed with the CFD and our Operations people at the Digester/Concentration area to provide support until Malinowski was removed from the building.

John Dalton

Master Mechanic

CWRP

Reed Dring
Operations Manager
773.256.3509 w, 708.990.9143 c

Following are recollections of the events leading up to the explosion on August 30th, 2018:

On August 9, 2018, Ms. Glymph, Microbiologist, came to the Calumet plant to perform an inspection as requested by myself. The plant was experiencing settling issues in the gravity concentration tanks which the introduction of polymer provided no positive results. In addition, due to the low feed rates to the digesters, gas production was on the decline. It was discovered that the aeration tank mixed liquor was rife with zooglea and exocellular lipopolysaccharides (ELP). Both Zooglea and ELP are very viscous and can interfere with settling, sludge dewatering, and can cause foaming and floating solids in the treatment process. The only means to rectify the situation is to pull the MLSS into the 2800 to 3000 mg/l range, which mean an increase in wasting. However, increasing WAS to gravity concentration would only perpetuate the problem by recycling solids back to the head of the plant. It was determined early in the week to get the GBTs operating and increase the feed concentration to the digesters.

On August 29th, I visited the GBT facility with Gerry Batchelor and observed three OEs operating Unit 3. They were trying to get a feel for what systems didn't work and thus what work orders to write. The unit ran well, but needed some adjustments to go into continuous run status.

On August 30th at approximately 10:50 am I was in the parking lot near my car talking to Jim Stulga and Ken Lawrence when we heard a tremendous blast. I initially thought it could have been an explosion in one of our digesters. However, I glanced across the digester complex and realized that was not the location. Within ~30 seconds, Gerry Batchelor arrived in his truck and said he thought it was the GBT building. I and Ken jumped into his truck and we arrived on site within minutes of the blast. I witnessed people helping each other across the road with dusty smoke wafting out of the building. People were running about, some entering the building to help, but realizing the hazard of going into an unstable building. Some people were stating that they could hear people talking within the wreckage. In under 10 minutes of the blast the CFD arrived and began securing the area. I identified myself as the highest ranking person in the plant and thus would be the incident commander. Throughout the event I stayed in contact with the Commander who was CFD's incident commander.

Reed Dring, 9/25/18

September 20th 2018

Thursday August 30th, was a scheduling meeting day for our office. It's where we talk over the work load for the following two weeks with plant personnel. The lead topic at the meeting was the Low Level Pump # 7 impeller job and the coordination needed (C99197). After the meeting had wrapped up my supervisor John Dalton ask me to take the ironworker lead man to look at low level # 7 and see what grating need to be removed, so the machinist could lower the impeller for # 7. Just before coffee break 10:00 am I called the ironworker lead man Pat Coleman and asked him to come with me after break and look over the work that needed to be done. Pat Coleman and I went down to the low level pump area to discuss the work needed. We finally left the area at about 11:10 and I returned to the Master Mechanics office. It was then I was informed that there had been an explosion at concentration, at that time I got into my car and drove to concentration. The Chicago fire Department was already on the scene. I talked to John Greenfield and Josh Bailey who said there were two guys trapped, Bill Kissane and Carl Malinoski. John and Josh had both spent time immediately after the explosion reassuring the two trapped employees that help was soon to arrive. Soon after I followed Gerry Batchelor and Dan Mikso in the basement of the concentration building to attempt to locate any personnel. We found no one on the lower level, and returned to the east side of the building. I talked to John Dalton and he asked if I would drive to Carl's house and pick up his wife and bring her back to the plant. I I left and drove to his house in Burbank when I was informed she was already on her way to the plant. I returned to the plant to assist in any way possible.

From: Gierut, Andrew
Sent: Thursday, September 06, 2018 11:24 AM
To: Carrington, Raymond <CarringtonR@mwrd.org>
Subject: Events of 8/30/18

To the best of my recollection the following events occurred.

I was in the Digester Control Room at the time of explosion along with 2 other Operating Engineers (Gary Dorigan and Pat Gaughan). I heard a loud explosion followed by a loud crashing noise. The three of us jumped from our chairs and attempted to exit through the south control room door. Just as we opened the control room door a large cloud of debris entered through the screen door to the southeast of the control room. The debris cloud was too thick to see through. We then closed the control room door and briefly waited for the heaviest of the debris to settle. Once the debris settled enough to see through, we ran out the control room to the outside where we heard people shouting. I saw Operating Engineer Kevin O'Connor helping Operating Engineer Paul Sullivan out of the west doorway of the GBT Room and down the stairs. It appeared something was wrong with Paul's leg and Gary took Paul from Kevin. I ran back into the control room and called 911. Paul was then brought into the control room and sat in a chair. After getting off the phone with 911, I went back outside and found Operations Manager Reed Dring and gave a head count of the Operating Engineers that were accounted for. I then found a paramedic and brought her to Paul to receive medical attention. We helped him outside. I then met up with Chief Operating Engineer Gerry Batchelor and discussed the utilities which needed to be isolated from the compromised area. I met up with Gary and Pat and isolated necessary utilities to/from the compromised area.

Andy Gierut
Calumet Plant
Operating Engineer II

Employee Statement & Interview:

Name: Kevin OConnor
Position: OE - 1 Length of Employment: 4 yrs 2 mos.
Address: 12601 E. Navajo Dr Palos Heights 60463
Phone Number: (773) 480-6139 Email: OconnorK@mwrd.org

It has been over 2 weeks since the incident but this is what I witnessed To the Best Recollection

I was In The GBT Facility, Wearing A 4x Gas Meter, To Isolate Four 2" Gate Valves ON The Suction Side of The Wash Water Pumps So The Locks, Chains, + Tags Could Be Applied, So The Fitters Could Replace 4 Check Valves ON The Discharge Side.

The Valves Had Been Closed + Chains were Dropped Through The Valve Handles. Steve + I Were Waiting For Paul To Return With The Red Locks. The Electricians Nick + Tim Came In + Asked Were The Work Was Needed For The GBT Feed. Matt Had The Info They Needed + Led Them out of The Room. Paul Returned With The Locks + As I Walked A Couple OF Steps To Meet Him I Heard A Loud Noise. I Looked Up To see A Vertical Column of White Debris. Everything Seemed Like It was Moving Up, Even The Roof + Floor. I Was Knocked To The Ground + Curled Up In The Fetal Position Holding My Hard Hat ON + Keeping My Elbows over My Face. It Then Felt Like A Tornado With The Wind, Everything Got Darker And As It Started To Lighten Up Loud Banging + Shaking started In Quick Succession. When Everything Calmed I Called For Paul And He Answered From Under A T- Shaped Roof support. Paul Crawled out ON His Stomach + We Exited The N.W. Door. There Was No Sign of Steve.

Questions or Concerns:

Kevin O'Connor | Kevin O'Connor | 9-15-18

Employee Signature | Print Name | Date

I, the above signed party do certify the factual accuracy of this information.

September 6, 2018

At approximately 10:50 am on August 30th I drove my vehicle south past the Sludge Control Building and parked at the South End of it in front of the dumpster garage. I exited the vehicle and started walking North toward the Gravity Belt Thickener section of the Sludge Concentration Building. At that time I heard a loud boom and saw a large, brown cloud of dust and debris fly high up in to the air then start to come down on me. I started jogging to the South to get away from it but the cloud was soon all around me. After a short time the wind had blown most of the dust away so I moved North toward the buildings to see if I could help. I saw several workers leaving the building and another worker who was calling for his partner who he said was still in the building. I heard someone say that 911 had been called and that help was on the way. I then retrieved my phone from my vehicle and called my supervisor, Dan Mikso, to tell him what had happened and to let everyone else know that there had been an accident.

Donald Rohe

Regarding the events of August 30, 2018

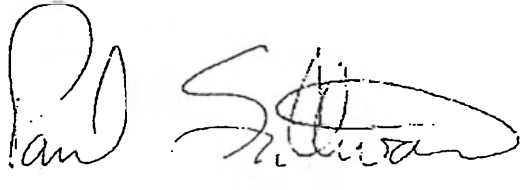
My name is Paul Sullivan and I an assistant chief operating engineer at the calumet water reclamation plant. On August 30, 2018 my job title was operating engineer 2. I was promoted effective September 3, 2018.

On the morning of August 30, our plan was to get the repair work underway to return four gravity belt thickeners (GBTs) to service. The machines had not run in four years and needed various things done to get them back into working order.

At around 10:30 am, I went to retrieve some locks to begin the process of isolating a set of booster pumps. The pipefitters had planned on replacing a number of broken check valves, gate valves, and sections of piping. At around 11:00 am I was standing in the room about ten to fifteen feet from the northwest door when I heard a loud explosion. Almost simultaneously a rush of hot air blew me to the ground. Before I could get up, large chunks of what I later learned was sections of the ceiling, overhead piping, and ductwork all fell on top of me. I was somehow lucky enough to not get crushed by all of this debris and was able to free myself by wiggling out of the area in which I was trapped. Once I was free, I tried to stand only to realize my right ankle was injured. It would not bear any weight, forcing me to crawl under a handrail and out the door. Once outside I was greeted by Kevin O'Connor who helped me limp to the digester office located across the street. Andy Gierut was already on the phone with emergency personnel to report the explosion. I suffered a fractured right talus and a dislocated ankle.

I was working with operating engineer Kevin O'Connor on isolating the equipment necessary for the repair work that day. Pipefitter Steve Stanek was also standing near me while we began the isolation process. He was doing the paperwork necessary for the LOTO procedure required before any repair work is begun. It is my understanding that those two men were able to get clear of the room before the ceiling came down. I cannot account for any other personnel in the room at the time of the explosion. I was working on isolating some booster pumps and effluent water lines so the pipe fitters could perform their work.

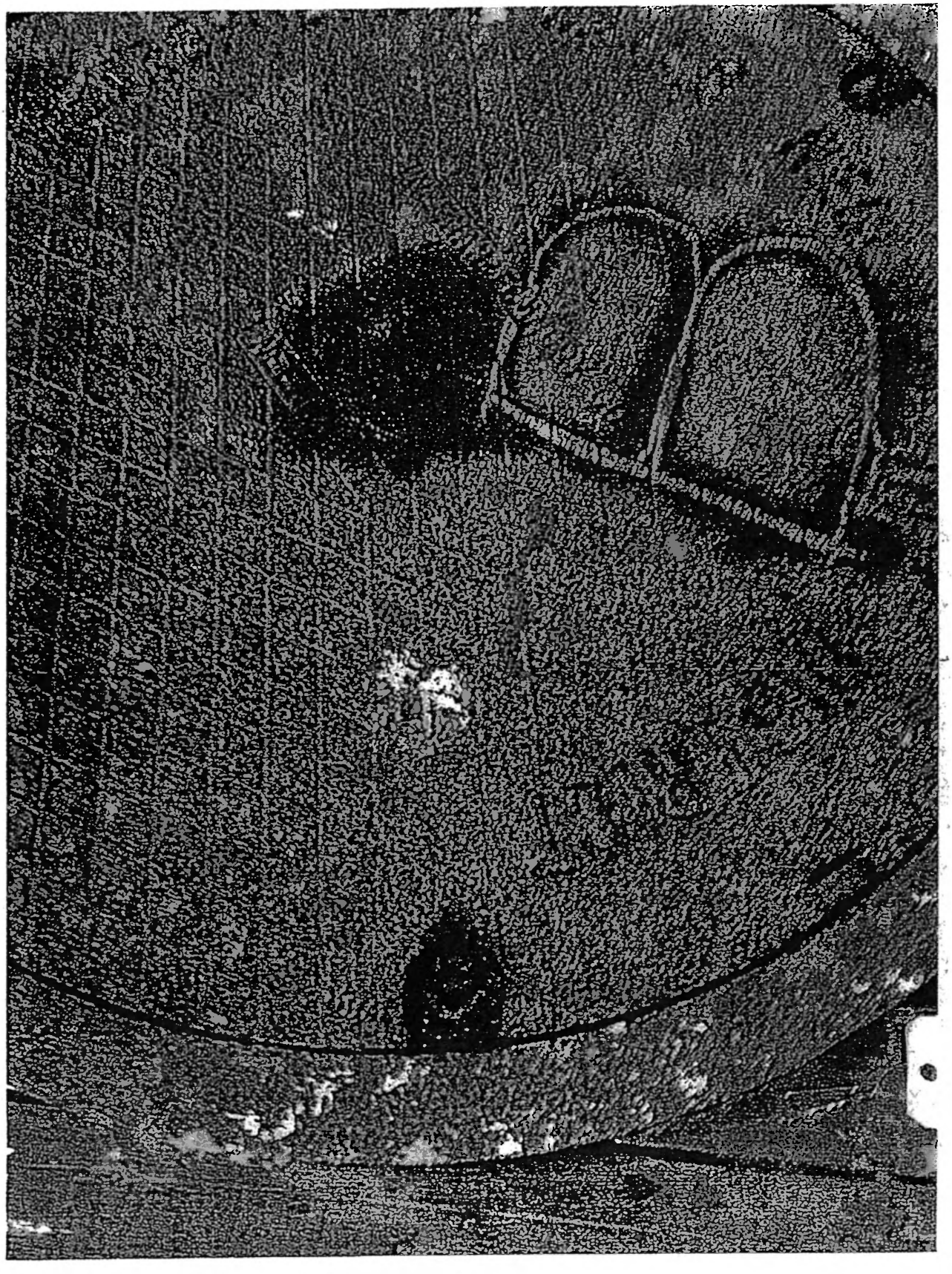
The time line I provided is as accurate as I can remember. I hope this provides a little clarity for the reason I was in the room at the time of the explosion.



9/16/18

Attachment 2

Manhole Cover Photos



Attachment 3

Hot Work Permit

METROPOLITAN WATER RECLAMATION DISTRICT of GREATER CHICAGO

HOT WORKS PERMIT

I. Worksite Information:

Date Issued: 8-30-18 Issued by: _____

Start-up date: 8-30-18 Start-up Time: 8:00 AM

Building: Cove Floor: 1ST Room(s): _____

Work to be done: Welding _____ Cutting ✓ Soldering _____ Other _____

ATMOSPHERIC TESTING - Before Beginning Work		JOB SITE PREPARATION	
%	TIME / INITIALS	☐ Pump Locked/Tagged Out	☐ Electrical G.F.C.I.
OXYGEN		☐ Electrical Locked/Tagged Out	☐ Flammables Removed
% LEL (<10%)		☐ Equipment Drained	☐ Fire Extinguisher(s)
TOXIC		☐ Safety & Procedures Meeting	
Special Gear Required:			

The location where this work will take place has **been examined before the start** of cutting/welding operations and all appropriate precautions have been taken.

Operator: Print: _____ **Signature :** _____ **ID #:** _____

Name & Signature of Person responsible for **FIRE WATCH**

Print: _____ **Signature :** _____ **ID# :** _____

FIRE WATCH & SAFETY CHECKLIST	YES/NO/NA
Is work area *clean* and *free of clutter, assuring* free access for emergency evacuation, ***and,*** is evacuation area clearly marked?	
Are special *precautionary* measures needed, such as for Confined Space Entry Procedures or Hazardous Work Area issues addressed?	
Is additional Fire Extinguishing Equipment needed or made available?	
Is Fall Protection Required?	
When welding, cutting, or heating is performed on walls, floors, and ceilings, since direct penetrations of sparks or heat transfer may introduce a fire hazard to an adjacent area, are the same precautions taken to the opposite side?	
Are permit entry personnel instructed as to the specific or anticipated hazards of the work site, including the use of fire fighting equipment?	
If applicable, will other means of exhaust, *smoke eaters*, or fans be utilized?	
Is Hot Works Permit posted at jobsite?	

Attachment 4

Gas Meter Sign Out Logs and Gas Meter Data Logging Results

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

Engineering Department - Construction Division SWRP

Gas Detector Bump Test and Sign-Out Log

Detector #	Make/Model	Date Due for Service at EIIMs	Date of Bump Test and Use	Bump Test Result	Signed Out By		Time Out	Time In
					ID No.	Initial		
349	4X		8/30/18	Pass	Dave M	Dave M	8/30/18	8/30/18
350	4X		8/30/18	Pass	Joe M		8/30/18	8/30/18
352	4X		8/30/18	Pass	Ray M		8/30/18	8/30/18
353	4X		8/30/18	Pass	Dave M		8/30/18	
342	4X		8/30/18	Pass	Chris C		8/30/18	8/31/18
355	4X		8/30/18	Pass	Carl T	Carl T	8/30/18	
356	4X		8/31/18	Pass	Dave	Dave M	8/31/18	9/4/18
350	4X		8/31/18	Pass	Joe		8/31/18	
349	4X		8/31/18	Pass	Brad C		8/31/18	8/31/18
352	4X		8/31/18	Pass	Chris C		8/31/18	8/31/18
349	4X		8/31/18	Pass	Pat E		8/31/18	
352	4X		8/31/18	Pass	Pat E		8/31/18	
362	4X		8/31/18	Pass	Dan E		8/31/18	
347	4X		8/31/18	Pass	John E		8/31/18	
367	4X		8/31/18	Pass	John E		8/31/18	
342	4X		8/31/18	Pass	Chris C		8/31/18	
349	4X		8/31/18	Pass	Bob C		8/31/18	
340	4X		8/31/18	Pass	Henry C		8/31/18	
347	4X		9/1/18	Pass	Jack E		9/1/18	
365	4X		9/1/18	Pass	Jack E		9/1/18	9/1/18
363	4X		9/1/18	Pass	Jack E		9/1/18	
361	4X		9/1/18	Pass	John		9/1/18	9/1/18
342	4X		9/1/18	Pass	Dave E		9/1/18	9/2/18
361	4X		9/1/18	Pass	John E		9/1/18	
344	4X		9/1/18	Pass	Bobby E		9/1/18	
310	5X	9/30/18	9/1/18	Pass	Lou T			6:45
306	5X	9-22-18	9-2-18	PASS	John M		9-2-18	6:45
353	4X	9-30-18	9-2-18	PASS	D [illegible]		9-2-18	6:45
342	4X	9-30-18	9-2-18	PASS	S. Kluge		9-2-18	6:45
354	4X	9-22-18	9-2-18	PASS	[illegible]		9-2	6:45
361	4X	9-22-18	9-2-18	PASS	[illegible]		9-2	6:45
310	5X	9-30-18	9-2-18	PASS	[illegible]		9-2	9:00
306	5X	9-22-18	9-2-18	PASS	[illegible]			6:45PM
341	4X	9-22-18	9-2-18	PASS	[illegible]		9/2	6:45PM
349	4X	9-7-18	9-2-18	PASS	[illegible]		9/2	7:00
354	4X	9-28-18	9-2-18	PASS	[illegible]		9/2	
354	4X	9-30-18	9-2-18	PASS	H Rod		9/2	7:00
360	4X	9-22-18	9-2-18	PASS				
364	4X	9-30-18	9-2-18	PASS	Dalton		9-2	6:45
362	4X						9-2	6:45

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

Engineering Department - Construction Division - SWRP

Tool / Crib

Gas Detector Bump Test and Sign-Out Log

Detector #	Make/Model	Date Due for Service at EITM	Date of Bump Test and Use	Bump Test Result	Signed Out By: ID No.	Signed Out By: Initials	Time Out	Time In
349	4X		8/20/18	Pass	John F2		8/20/18	8/21/18
350	4X		8/20/18	Pass	Bruce E2		8/20/18	8/20/18
347	[illegible]		8/21/18	Pass	Jason M2		8/21/18	8/21/18
350	4X		8/21/18	Pass	Roy M2		8/21/18	8/21/18
356	4X		8/21/18	Pass	Jason F2		8/21/18	8/21/18
354	4X		8/21/18	Pass	Mark M2		8/21/18	8/21/18
355	4X		8/22/18	Pass	Ken M2		8/22/18	8/22/18
350	4X		8/22/18	Pass	Joe M2		8/22/18	8/22/18
349	4X		8/22/18	Pass	Roy M2		8/22/18	8/22/18
347	4X		8/22/18	Pass	Vern F2		8/22/18	8/22/18
353	4X		8/22/18	Pass	Vern F2		8/22/18	8/22/18
350	4X		8/23/18	Pass	Joe M2		8/23/18	8/23/18
349	4X		8/23/18	Pass	Roy M2		8/23/18	8/23/18
356	4X		8/23/18	Pass	Steve F2		8/23/18	8/23/18
356	4X		8/23/18	Pass	Cris C2		8/23/18	8/23/18
354	4X		8/23/18	Pass	Cris C2		8/23/18	
353	4X		8/23/18	Pass	Antonio E2		8/23/18	8/23/18
349	4X		8/23/18	Pass	Mark M2		8/23/18	8/23/18
349	4X		8/24/18	Pass	Roy M2		8/24/18	8/24/18
352	4X		8/24/18	Pass	Joe M2		8/24/18	8/24/18
353	4X		8/24/18	Pass	Tim F2	Abe	8/24/18	8/24/18
306	5X		8/24/18	Pass	Vern F2		8/24/18	8/24/18
353	4X		8/24/18	Pass	Mark M2		8/24/18	8/24/18
356	4X		8/24/18	Pass	Ken M2		8/24/18	8/24/18
350	4X		8/27/18	Pass	Roy M2		8/27/18	8/27/18
349	4X		8/27/18	Pass	Joe M2		8/27/18	8/27/18
355	4X		8/27/18	Pass	Tony E2		8/27/18	
308	5X		8/27/18	Pass	Vern F2		8/27/18	8/27/18
356	4X		8/27/18	Pass	Bruce M2		8/27/18	8/27/18
353	4X		8/27/18	Pass	Keith F2		8/27/18	8/27/18
355	4X		8/28/18	PASS	ROY M2		8/28/18	8/28/18
356	4X		8/28/18	PASS	JOE M2		8/28/18	8/28/18
353	4X		8/28/18	PASS	DAN E2		8/28/18	8/28/18
347	4X		8/28/18	PASS	DANE M2		8/28/18	8/28/18
350	4X		8/28/18	PASS	TONY E2		8/28/18	8/28/18
349	4X		8/28/18	PASS	JASON F2		8/28/18	8/28/18
347	4X		8/28/18	PASS	CHRIS C2		8/28/18	8/28/18
349	4X		8/28/18	Pass	Bob C2		8/28/18	
350	5X		8/28/18	Pass	Bob C2		8/28/18	
354	4X		8/28/18	Pass	Steve Ann			

central control

Equipment Loan-Out Log

ASSET# or SERIAL#	Model (GT-402, MSA 4X OR 5X)	Date Due for Service at LTTM's (every 3 months)	Date of Bump Test and Use	Bump Test Result PASS/FAIL	Signed Out By: ID No.	Initials	Time Out	Time In
367	4X	9/22/18	8/27/18	[illegible]	[illegible]	[illegible]	1000	[illegible]
366	4X	9/7/18	8/29/18	pass	22838	MJ	1430	1900
363	4X	9/7/18	8/29/18	pass	22830	MM	1430	1900
369	4X	9-22-18	8-29-18	PASS	22999	RC	4:10P	10:15P
366	4X	9/7/18	8-30-18	pass	22837	MJ	1400	
369	4X	9/7/18	8-30-18	pass	22839	MJ	1400	
368	4X	8/27/18	8-31-18	PASS	22846	KG	0045	0610
369			8-31-18	PASS	22220	AD	1000	1200
367			8-31-18	PASS	22220	AD	1000	1200
368	4X		8/31/18	Pass	22301		1000	230
364	4X		8/31/18	Pass	22301		1000	
370	4X	9-31-18	8-31-18	PASS	4266	RV	236	910
367	4X	9-22-18	8-31-18	PASS	22937	AB	2:15	4:25
365	4X	9-30-18	9-1-18	PASS	22846	KG	0030	0605
365	4X	9-30-18	9-1-18	PASS	22999	RC	4:30P	6:05
368	4X	9-22-18	9-1-18	PASS	22999	RC	4:30P	6:05
363	4X	9-7-18	9-2-18	PASS	22846	KG	0030	0618
		"	"	Pass	[illegible]	[illegible]	7:50	7:30
365	4X	9-30-18	9-2-18	PASS	22999	RC	5:15	
368	4X	9-22-18	9-2-18	PASS	22999	RC	5:15	
[illegible]	4X	9-7-18	[illegible]		[illegible]	[illegible]	[illegible]	
363	4X	9-7-18	9-3-18	Pass	21255	LR	800	
367	4X	9-22-18	9-3-18	P	21255	LR	0800	

central control

Equipment Loan-Out Log

ASSET# or SERIAL#	Model (GT-402, MSA 4X OR 5X)	Date Due for Service at EITM's (every 3 months)	Date of Bump Test and Use	Bump Test Result PASS/FAIL	Signed Out By		Time Out	Time In
					ID No.	Initials		
366	4X	9/7/18	8/20/18	PASS	22838	MY	1715	1745
365	4X	9/7/18	8/20/18	pass	22838	MY	17:15	1745
365	4X	9/7/18	8/21/18	pass	22838	MY	1745	1715
366	4X	9/7/18	8/21/18	pass	22838	MY	1745	1715
[illegible]			8/[illegible]	[illegible]	[illegible]	[illegible]	9:05	11:50
320	5X	9/22/18	9-22-18	Pass	21666	RAG	10.15	1:00
364	4X	9/22/18	9-22-18	Pass	21666	RAG	10:15	1:00
365	4X	9/7/18	9-22-18	pass	22838	MY	1715	
366	4X	9/7/18	9-22-18	pass	22838	MY	1715	
365	4X	9-7-18	8-23-18	PASS	23306	SM	3:47	
366	4X	9-7-18	8-23-18	PASS	23306	SM	3:47	
366	4X	9-7-18	8-24-18	PASS	23306	SM	3:50	
365	4X	9-7-18	8-24-18	PASS	23306	SM	3:50	
366	4X	9-7-18	8-25-18	PASS	23306	SM	3:35	4:20
365	4X	9-7-18	8-25-18	PASS	23306	SM	3:35	4:20
365	4X	9-7-18	8-26-18	PASS	22827	RC	4:40	1600
366	4X	9-7-18	8-26-18	PASS	22827	RC	4:40	1600
366	4X	9-7-18	8-27-18	pass	22838	MY	1600	1700
365	4X	9-7-18	8-27-18	pass	22838	MY	1600	1700
		9-[illegible]-18	8-[illegible]-18					
365	4X	9-7-18	8-28-18	pass	22838	MY	1800	1430
366	4X	9-7-18	8-28-18	pass	22838	MY	1800	1430
[illegible]	4X	9-[illegible]-18	8/29/18				10:30	[illegible]

EITM

Equipment Loan-Out Log

ASSET# or SERIAL#	Model (GT-402, MSA 4X OR 5X)	Date Due for Service at EITM's (every 3 months)	Date of Bump Test and Use	Bump Test Result PASS/FAIL	Signed Out By: ID No.	Signed Out By: Initials	Time Out	Time In
347		8/10/18	8/6/18		2186	[illegible]	7:22	3:05
372		8/13/18	8/6/18		21189	[illegible]	7:23	
341	4X	9/22/18	8/31/18		2476	[illegible]	9:45	3:00
348	4X	9/22/18	8/31/18	P	2190	MC	9:45	20
362	4X	9/22/18	9/1/18	P	Brescia		9/1/18	9/1/18
346	4X	9/22/18	9/1/18	P	Brescia		9/1/18	
345	4X	9/22/18	9/1/18	P	Brescia		9/1/18	9/1/18
341	4X	9/22/18	9/1/18	P	Brescia		9/1/18	9/1/18
2x1	802		9-4-18	P	20570	[illegible]	12:48	2:00
350	4X	9-28-18	9-6-18	P	2273	TD	7:20	2:30

E.T.M

Equipment Loan-Out Log

ASSET# or SERIAL#	Model (GT-402, MSA 4X, OR 5X)	Date Due for Service at ETTM's (every 3 months)	Date of Bump Test and Use	Bump Test Result PASS/FAIL	Signed Out By		Time Out	Time In
					ID No.	Initials		
0345	4X	8-10-18	8-7-18	Pass	BH 5024	D.F.	7:50	2:40
0344	4X	9-1-18	8-14-18	P	22504	DR	8:14	2:45
0346	4X	9-4-18	8-17-18	P	22984	CS	7:15	
0341	4X	9-7-18	8-20-18	P	22984	CS	7:30	2:30
0342	4X	9-7-18	8-30-18	P	22984	CS	10:30	2:30
0347	4X	9-7-18	8-30-18	P	22984	CS	7:30	
0348	4X	9-22-18	8-28-18	P	22984	CS	8:00	2:30
0343	4X	9-22-18	8-28-18	P	22469	Chris B	12:50	2:00
0349	4X	9-22-18	8-29-18	P	22469	Chris B	12:50	2:00

sewer control

Equipment Loan-Out Log

ASSET# or SERIAL#	Model (GT-402, MSA 4X OR 5X)	Date Due for Service at EITM's (every 3 months)	Date of Bump Test and Use	Bump Test Result PASS/FAIL	Signed Out By: ID No.	Signed Out By: Initials	Time Out	Time In
321	5X	9-7-18	8-29-18	P	2257	[illegible]	7:00	
376	4X	9-7-18	8-29-18	P	2257	[illegible]	7:00	
378	4X	9-7-18	8-29-18	P	2257	[illegible]	7:00	
322	5X		8/29	P	21	HA	7AM	3PM
380	4X		"	"	"	"	"	"
379	4X		"	"	"	"	"	"
321	5X		8/30	P	21	HA	7AM	2:30
379	4X		"	"	"	"	"	"
376	4X		"	"	"	"	"	"
380	4X	9-7-18	8-30-18	P	2257	[illegible]	7:00	3:00
378	4X	9-7-18	8-30-18	P	2257	[illegible]	7:00	3:00
323	5X	9-7-18	8-30-18	P	2257	[illegible]	7:00	3:00
322	5X		8/31	P	21	HA	7AM	
379	4X		"	"	"	"	"	
380	4X		"	"	"	"	"	
325	5X	9-30-18	8-31-18	P	2257	[illegible]	7:00	3:00
374	4X	9-30-18	8-31-18	P	2257	[illegible]	7:00	3:00
370	4X	9-30-18	8-31-18	P	2257	[illegible]	7:00	3:00
322	5X	9-30-18	9-4-18	P	2257	[illegible]	7:00	3:00
379	4X	9-30-18	9-4-18	P	2257	[illegible]	7:00	3:00
370	4X	9-30-18	9-4-18	P	2257	[illegible]	7:00	3:00
325	5X	9-30-18	9-5-18	P	2257	[illegible]	7:00	
378	4X	9-30-18	9-5-18	P	2257	[illegible]	7:00	
370	4X	9-30-18	9-5-18	P	2257	[illegible]	7:00	

Service control

Equipment Loan-Out Log

ASSET# or SERIAL#	Model (GT-402, MSA 4X OR 5X)	Date Due for Service at EITM's (every 3 months)	Date of Bump Test and Use	Bump Test Result PASS/FAIL	Signed Out By: ID No.	Signed Out By: Initials	Time Out	Time In
322	5X		8/23	P	21	HA	7AM	3pm
376	4X		"	"	"	"	"	"
380	4X		"	"	"	"	"	"
323	5X	9-22-18	8-23-18	P	22571	L	7:00	3:00
370	4X	9-22-18	8-23-18	P	22571	L	7:00	3:00
378	4X	9-22-18	8-23-18	P	22571	L	7:00	3:00
323	5X	9-22-18	8-24-18	P	22571	L	7:00	3:00
370	4X	9-22-18	8-24-18	P	22571	L	7:00	3:00
378	4X	9-7-18	8-24-18	P	22571	L	7:00	3:00
322	5X		8/24	P	21	HA	7AM	3pm
376	4X	"	"	"	"	"	"	"
374	4X	"	"	"	"	"	"	"
322	5X	9-7-18	8-27-18	P	22571	JL	7:00	3:00
376	4X	9-7-18	8-27-18	P	22571	L	7:00	3:00
378	4X	9-7-18	8-27-18	P	22571	L	7:00	3:00
325	5X		8-27	P	21	HA	7AM	2PM
370	4X	"	"	"	"	"	"	"
380	4X	"	"	"	"	"	"	"
325	5X	9-7-18	8-28-18	P	22571	L	7:00	
378	4X	9-7-18	8-28-18	P	22571	L	7:00	
376	4X	9-7-18	8-28-18	P	22571	L	7:00	
321	5X		8/28	P	21	HA	7AM	3pm
374	4X	"	"	"	"	"	"	"
380	4X	"	"	"	"	"	"	"

[redacted]			5/1/2018 12:00:00 AM		[redacted]			10/30/2018 11:59:59 PM			
[redacted]			329178		[redacted]						
[redacted]					[redacted]						
[redacted]					[redacted]						
[redacted]			ALTAIR 4X								
[redacted]											
[redacted]											

Timestamp	Device Type	Serialnumber	Event Type	Gas	Gas Unit	Alarm Value	Username	Department	Date Entered
8/30/2018 5:53:00 AM	ALTAIR 4X	329182	Exposure Low Alarm	Hydrogen Sulfide	ppm	10.00	GASM0369	CWRPCC	8/31/2018 12:43:42 AM
8/30/2018 5:53:15 AM	ALTAIR 4X	329182	Exposure High Alarm	Hydrogen Sulfide	ppm	15.00	GASM0369	CWRPCC	8/31/2018 12:43:42 AM
8/30/2018 5:53:30 AM	ALTAIR 4X	329182	Exposure Peak	Hydrogen Sulfide	ppm	16.00	GASM0369	CWRPCC	8/31/2018 12:43:42 AM
8/30/2018 7:30:15 AM	ALTAIR 4X	329174	Exposure High Alarm	Hydrogen Sulfide	ppm	15.00	GASM0363	CWRPCC	8/30/2018 6:48:10 PM
8/30/2018 7:30:30 AM	ALTAIR 4X	329174	Exposure Peak	Hydrogen Sulfide	ppm	26.00	GASM0363	CWRPCC	8/30/2018 6:48:10 PM
8/30/2018 8:45:15 AM	ALTAIR 4X	329153	Exposure High Alarm	Carbon Monoxide	ppm	100.00	GASM0347	CWRPEITM	8/31/2018 12:39:48 PM
8/30/2018 8:45:15 AM	ALTAIR 4X	329153	Exposure Peak	Carbon Monoxide	ppm	121.00	GASM0347	CWRPEITM	8/31/2018 12:39:48 PM
8/30/2018 8:55:15 AM	ALTAIR 4X	329161	Exposure Low Alarm	Carbon Monoxide	ppm	25.00	GASM0353	CWRPTL CRIB	9/1/2018 7:31:52 AM
8/30/2018 8:55:30 AM	ALTAIR 4X	329161	Exposure Peak	Carbon Monoxide	ppm	45.00	GASM0353	CWRPTL CRIB	9/1/2018 7:31:52 AM
8/30/2018 9:03:00 AM	ALTAIR 4X	329186	Exposure Low Alarm	Hydrogen Sulfide	ppm	10.00	GASM0352	CWRPTL CRIB	8/31/2018 8:21:45 AM
8/30/2018 9:03:15 AM	ALTAIR 4X	329186	Exposure Peak	Hydrogen Sulfide	ppm	11.00	GASM0352	CWRPTL CRIB	8/31/2018 8:21:45 AM
8/30/2018 9:15:45 AM	ALTAIR 4X	329174	Exposure Low Alarm	Carbon Monoxide	ppm	25.00	GASM0363	CWRPCC	8/30/2018 6:48:10 PM
8/30/2018 9:15:45 AM	ALTAIR 4X	329174	Exposure Peak	Carbon Monoxide	ppm	60.00	GASM0363	CWRPCC	8/30/2018 6:48:10 PM
8/30/2018 9:34:45 AM	ALTAIR 4X	329161	Exposure Low Alarm	Carbon Monoxide	ppm	25.00	GASM0353	CWRPTL CRIB	9/1/2018 7:31:52 AM
8/30/2018 9:34:45 AM	ALTAIR 4X	329161	Exposure Peak	Carbon Monoxide	ppm	31.00	GASM0353	CWRPTL CRIB	9/1/2018 7:31:52 AM
8/30/2018 9:36:00 AM	ALTAIR 4X	329161	Exposure Low Alarm	Carbon Monoxide	ppm	25.00	GASM0353	CWRPTL CRIB	9/1/2018 7:31:52 AM
8/30/2018 9:36:00 AM	ALTAIR 4X	329161	Exposure Peak	Carbon Monoxide	ppm	40.00	GASM0353	CWRPTL CRIB	9/1/2018 7:31:52 AM

8/30/2018 9:38:00 AM	ALTAIR 4X	329161	Exposure Low Alarm	Carbon Monoxide	ppm	25.00	GASM0353	CWRPTL CRIB	9/1/2018 7:31:52 AM
8/30/2018 9:38:15 AM	ALTAIR 4X	329161	Exposure Peak	Carbon Monoxide	ppm	44.00	GASM0353	CWRPTL CRIB	9/1/2018 7:31:52 AM
8/30/2018 9:39:00 AM	ALTAIR 4X	329161	Exposure Low Alarm	Carbon Monoxide	ppm	25.00	GASM0353	CWRPTL CRIB	9/1/2018 7:31:52 AM
8/30/2018 9:39:00 AM	ALTAIR 4X	329161	Exposure High Alarm	Carbon Monoxide	ppm	100.00	GASM0353	CWRPTL CRIB	9/1/2018 7:31:52 AM
8/30/2018 9:39:30 AM	ALTAIR 4X	329161	Exposure Peak	Carbon Monoxide	ppm	115.00	GASM0353	CWRPTL CRIB	9/1/2018 7:31:52 AM
8/30/2018 10:47:15 AM	ALTAIR 4X	329174	Exposure Low Alarm	Carbon Monoxide	ppm	25.00	GASM0363	CWRPCC	8/30/2018 6:48:10 PM
8/30/2018 10:47:15 AM	ALTAIR 4X	329174	Exposure Peak	Carbon Monoxide	ppm	36.00	GASM0363	CWRPCC	8/30/2018 6:48:10 PM
8/30/2018 11:16:45 AM	ALTAIR 4X	329153	Exposure Low Alarm	Carbon Monoxide	ppm	25.00	GASM0347	CWRPEITM	8/31/2018 12:39:48 PM
8/30/2018 11:16:45 AM	ALTAIR 4X	329153	Exposure Peak	Carbon Monoxide	ppm	26.00	GASM0347	CWRPEITM	8/31/2018 12:39:48 PM
8/30/2018 11:17:00 AM	ALTAIR 4X	329153	Exposure Low Alarm	Carbon Monoxide	ppm	25.00	GASM0347	CWRPEITM	8/31/2018 12:39:48 PM
8/30/2018 11:17:00 AM	ALTAIR 4X	329153	Exposure Peak	Carbon Monoxide	ppm	39.00	GASM0347	CWRPEITM	8/31/2018 12:39:48 PM
8/30/2018 11:17:15 AM	ALTAIR 4X	329169	Exposure Low Alarm	Carbon Monoxide	ppm	25.00	GASM0356	CWRPTL CRIB	8/31/2018 7:29:14 AM
8/30/2018 11:17:15 AM	ALTAIR 4X	329169	Exposure Peak	Carbon Monoxide	ppm	27.00	GASM0356	CWRPTL CRIB	8/31/2018 7:29:14 AM
8/30/2018 11:43:30 AM	ALTAIR 4X	329186	Exposure Low Alarm	Carbon Monoxide	ppm	25.00	GASM0352	CWRPTL CRIB	8/31/2018 8:21:45 AM
8/30/2018 11:43:30 AM	ALTAIR 4X	329186	Exposure Peak	Carbon Monoxide	ppm	47.00	GASM0352	CWRPTL CRIB	8/31/2018 8:21:45 AM
8/30/2018 11:55:30 AM	ALTAIR 4X	329174	Exposure Low Alarm	Carbon Monoxide	ppm	25.00	GASM0363	CWRPCC	8/30/2018 6:48:10 PM
8/30/2018 11:55:30 AM	ALTAIR 4X	329186	Exposure Low Alarm	Carbon Monoxide	ppm	25.00	GASM0352	CWRPTL CRIB	8/31/2018 8:21:45 AM
8/30/2018 11:55:45 AM	ALTAIR 4X	329174	Exposure Peak	Carbon Monoxide	ppm	29.00	GASM0363	CWRPCC	8/30/2018 6:48:10 PM
8/30/2018 11:55:45 AM	ALTAIR 4X	329186	Exposure Peak	Carbon Monoxide	ppm	76.00	GASM0352	CWRPTL CRIB	8/31/2018 8:21:45 AM
8/30/2018 12:27:00 PM	ALTAIR 4X	329153	Exposure Low Alarm	Carbon Monoxide	ppm	25.00	GASM0347	CWRPEITM	8/31/2018 12:39:48 PM
8/30/2018 12:27:15 PM	ALTAIR 4X	329153	Exposure Peak	Carbon Monoxide	ppm	60.00	GASM0347	CWRPEITM	8/31/2018 12:39:48 PM

8/30/2018 12:27:15 PM	ALTAIR 4X	329153	Exposure Low Alarm	Carbon Monoxide	ppm	25.00	GASM0347	CWRPEITM	8/31/2018 12:39:48 PM
8/30/2018 12:27:30 PM	ALTAIR 4X	329153	Exposure Peak	Carbon Monoxide	ppm	39.00	GASM0347	CWRPEITM	8/31/2018 12:39:48 PM
8/30/2018 12:38:00 PM	ALTAIR 4X	329169	Exposure Low Alarm	Carbon Monoxide	ppm	25.00	GASM0356	CWRPTLCRIB	8/31/2018 7:29:14 AM
8/30/2018 12:38:15 PM	ALTAIR 4X	329169	Exposure Peak	Carbon Monoxide	ppm	34.00	GASM0356	CWRPTLCRIB	8/31/2018 7:29:14 AM
8/30/2018 12:38:45 PM	ALTAIR 4X	329169	Exposure Low Alarm	Carbon Monoxide	ppm	25.00	GASM0356	CWRPTLCRIB	8/31/2018 7:29:14 AM
8/30/2018 12:38:45 PM	ALTAIR 4X	329169	Exposure Peak	Carbon Monoxide	ppm	26.00	GASM0356	CWRPTLCRIB	8/31/2018 7:29:14 AM
8/30/2018 1:27:45 PM	ALTAIR 4X	329153	Exposure Low Alarm	Carbon Monoxide	ppm	25.00	GASM0347	CWRPEITM	8/31/2018 12:39:48 PM
8/30/2018 1:27:45 PM	ALTAIR 4X	329153	Exposure Peak	Carbon Monoxide	ppm	25.00	GASM0347	CWRPEITM	8/31/2018 12:39:48 PM
8/30/2018 1:54:15 PM	ALTAIR 4X	329169	Exposure Low Alarm	Carbon Monoxide	ppm	25.00	GASM0356	CWRPTLCRIB	8/31/2018 7:29:14 AM
8/30/2018 1:54:30 PM	ALTAIR 4X	329169	Exposure Peak	Carbon Monoxide	ppm	26.00	GASM0356	CWRPTLCRIB	8/31/2018 7:29:14 AM
8/30/2018 1:54:30 PM	ALTAIR 4X	329169	Exposure Low Alarm	Carbon Monoxide	ppm	25.00	GASM0356	CWRPTLCRIB	8/31/2018 7:29:14 AM
8/30/2018 1:54:30 PM	ALTAIR 4X	329169	Exposure Peak	Carbon Monoxide	ppm	74.00	GASM0356	CWRPTLCRIB	8/31/2018 7:29:14 AM
8/30/2018 1:54:45 PM	ALTAIR 4X	329169	Exposure Low Alarm	Carbon Monoxide	ppm	25.00	GASM0356	CWRPTLCRIB	8/31/2018 7:29:14 AM
8/30/2018 1:54:45 PM	ALTAIR 4X	329169	Exposure Peak	Carbon Monoxide	ppm	37.00	GASM0356	CWRPTLCRIB	8/31/2018 7:29:14 AM
8/30/2018 1:55:00 PM	ALTAIR 4X	329169	Exposure Low Alarm	Carbon Monoxide	ppm	25.00	GASM0356	CWRPTLCRIB	8/31/2018 7:29:14 AM
8/30/2018 1:55:00 PM	ALTAIR 4X	329169	Exposure Peak	Carbon Monoxide	ppm	80.00	GASM0356	CWRPTLCRIB	8/31/2018 7:29:14 AM
8/30/2018 1:55:00 PM	ALTAIR 4X	329169	Exposure Low Alarm	Carbon Monoxide	ppm	25.00	GASM0356	CWRPTLCRIB	8/31/2018 7:29:14 AM
8/30/2018 1:55:15 PM	ALTAIR 4X	329169	Exposure High Alarm	Carbon Monoxide	ppm	100.00	GASM0356	CWRPTLCRIB	8/31/2018 7:29:14 AM
8/30/2018 1:55:30 PM	ALTAIR 4X	329169	Exposure Peak	Carbon Monoxide	ppm	102.00	GASM0356	CWRPTLCRIB	8/31/2018 7:29:14 AM

Attachment 5

Affected Employee Safety Training Histories

Employee Number	First Name	Last Name	Certification/Training	Certification Date	Job Classification
21258	Matthew	Dillon	Aerial Lift Safety: General Procedures	8/21/2018	Elec Mech
21258	Matthew	Dillon	Arc Flash Awareness	2/7/2008	Elec Mech
21258	Matthew	Dillon	Asbestos Awareness	2/19/2013	Elec Mech
21258	Matthew	Dillon	Back Safety	9/22/2017	Elec Mech
21258	Matthew	Dillon	Bloodborne Pathogen Awareness	4/17/2018	Elec Mech
21258	Matthew	Dillon	Confined Space Entry Awareness	9/2/2010	Elec Mech
21258	Matthew	Dillon	Confined Space Entry Procedures Certification	11/17/2017	Elec Mech
21258	Matthew	Dillon	CPR Certification Course	11/17/2016	Elec Mech
21258	Matthew	Dillon	Dangers of Hazardous Atmospheres	4/19/2016	Elec Mech
21258	Matthew	Dillon	Disaster Preparedness	10/17/2017	Elec Mech
21258	Matthew	Dillon	District Safety Rules	6/14/2009	Elec Mech
21258	Matthew	Dillon	Electrical Hazard Awareness	8/15/2017	Elec Mech
21258	Matthew	Dillon	Excavation Safety Awareness	10/17/2017	Elec Mech
21258	Matthew	Dillon	Fall Protection	5/15/2015	Elec Mech
21258	Matthew	Dillon	Fire Safety - Prevention, Evacuation, FE use	4/18/2017	Elec Mech
21258	Matthew	Dillon	Floor Operated Overhead Crane Safety	8/16/2011	Elec Mech
21258	Matthew	Dillon	Fork Lift Operator Certification	4/11/2005	Elec Mech
21258	Matthew	Dillon	Gas Detection Instrument Operation & Procedures	9/23/2015	Elec Mech
21258	Matthew	Dillon	Hand Protection	5/13/2008	Elec Mech
21258	Matthew	Dillon	Hazard Communication Training	9/20/2016	Elec Mech
21258	Matthew	Dillon	Hazardous Waste Mgt-EPA	4/15/2008	Elec Mech
21258	Matthew	Dillon	Health & Wellness	2/21/2017	Elec Mech
21258	Matthew	Dillon	Hearing Protection	9/20/2017	Elec Mech
21258	Matthew	Dillon	Hearing Protection	9/20/2017	Elec Mech
21258	Matthew	Dillon	Hot Work Permitting Procedures	7/12/2011	Elec Mech
21258	Matthew	Dillon	Ladder Safety	1/16/2018	Elec Mech
21258	Matthew	Dillon	Lead Awareness	6/13/2006	Elec Mech
21258	Matthew	Dillon	Lockout/Tagout Procedures Certification	1/22/2018	Elec Mech
21258	Matthew	Dillon	Machine Safeguarding	8/17/2008	Elec Mech
21258	Matthew	Dillon	Medical Emergency Procedures	4/21/2015	Elec Mech
21258	Matthew	Dillon	NFPA 70E Arc Flash Hazard Awareness Certification	8/4/2015	Elec Mech
21258	Matthew	Dillon	Personal Protective Equipment	9/29/2017	Elec Mech
21258	Matthew	Dillon	Preventing Musculoskeletal Injury	1/19/2016	Elec Mech
21258	Matthew	Dillon	Preventing Slips, Trips and Falls	11/21/2017	Elec Mech
21258	Matthew	Dillon	Railway Safety--Amtrak	1/31/2012	Elec Mech
21258	Matthew	Dillon	Respirator: Air Purifying Cartridge	9/29/2017	Elec Mech
21258	Matthew	Dillon	Respirator: Filtering Face-piece (Dust Mask)	4/14/2009	Elec Mech
21258	Matthew	Dillon	Return to Work from a Lost Time Injury	11/30/2012	Elec Mech
21258	Matthew	Dillon	Safe Driving Habits	4/16/2013	Elec Mech
21258	Matthew	Dillon	Safe Rigging	5/17/2011	Elec Mech
21258	Matthew	Dillon	Safety Orientation	7/10/2010	Elec Mech
21258	Matthew	Dillon	Safety Shorts	12/4/2017	Elec Mech
21258	Matthew	Dillon	Spill Containment & Counter Measures	6/16/2015	Elec Mech
21258	Matthew	Dillon	Working Around Traffic	5/18/2010	Elec Mech
21258	Matthew	Dillon	Working Safely Around Bio-Solids	9/19/2017	Elec Mech
21258	Matthew	Dillon	Workplace Environmental Hygiene	12/19/2017	Elec Mech
21258	Matthew	Dillon	zz-Accident Awareness	2/13/2007	Elec Mech
21258	Matthew	Dillon	zz-Confined Space Entry Procedures-UPDATE	2/7/2012	Elec Mech
21258	Matthew	Dillon	zz-Eye and Face Protection	4/15/2008	Elec Mech
21258	Matthew	Dillon	zz-Fire Extinguisher Education	9/13/2011	Elec Mech
21258	Matthew	Dillon	zz-Flu Information & Prevention	2/20/2018	Elec Mech
21258	Matthew	Dillon	zz-Head protection	4/12/2011	Elec Mech
21258	Matthew	Dillon	zz-Homeland Security Protection	10/13/2009	Elec Mech
21258	Matthew	Dillon	zz-Insect Bites, Precautions, First Aid	4/3/2012	Elec Mech
21258	Matthew	Dillon	zz-Plant Orientation	2/8/2005	Elec Mech
21258	Matthew	Dillon	zz-Workplace Violence Awareness	3/18/2008	Elec Mech

Employee Number	First Name	Last Name	Certification/Training	Certification Date	Job Classification
21434	Hollis	Hall	Aerial Lift Safety: General Procedures	8/21/2018	Truck Driver
21434	Hollis	Hall	Asbestos Awareness	8/23/2005	Truck Driver
21434	Hollis	Hall	Back Safety	11/20/2012	Truck Driver
21434	Hollis	Hall	Bloodborne Pathogen Awareness	4/17/2018	Truck Driver
21434	Hollis	Hall	Cold Weather Hazard Awareness	1/20/2017	Truck Driver
21434	Hollis	Hall	Confined Space Entry Procedures Certification	11/19/2013	Truck Driver
21434	Hollis	Hall	CPR Certification Course	7/20/2017	Truck Driver
21434	Hollis	Hall	Dangers of Hazardous Atmospheres	8/19/2014	Truck Driver
21434	Hollis	Hall	Disaster Preparedness	10/17/2017	Truck Driver
21434	Hollis	Hall	District Safety Rules	11/17/2015	Truck Driver
21434	Hollis	Hall	Electrical Hazard Awareness	8/15/2017	Truck Driver
21434	Hollis	Hall	Excavation Safety Awareness	10/17/2017	Truck Driver
21434	Hollis	Hall	Fire Safety - Prevention, Evacuation, FE use	4/18/2017	Truck Driver
21434	Hollis	Hall	Floor Operated Overhead Crane Safety	12/12/2006	Truck Driver
21434	Hollis	Hall	Gas Detection Instrument Operation & Procedures	5/19/2015	Truck Driver
21434	Hollis	Hall	Hand Protection	3/14/2006	Truck Driver
21434	Hollis	Hall	Hazard Communication Training	6/19/2018	Truck Driver
21434	Hollis	Hall	Health & Wellness	2/21/2017	Truck Driver
21434	Hollis	Hall	Hearing Protection	9/20/2017	Truck Driver
21434	Hollis	Hall	Hearing Protection	9/20/2017	Truck Driver
21434	Hollis	Hall	Hot Weather Hazard Awareness	5/15/2018	Truck Driver
21434	Hollis	Hall	Hot Work Permitting Procedures	1/30/2013	Truck Driver
21434	Hollis	Hall	IDOT Flagger Training	6/11/2012	Truck Driver
21434	Hollis	Hall	Ladder Safety	8/15/2006	Truck Driver
21434	Hollis	Hall	Lead Awareness	6/13/2006	Truck Driver
21434	Hollis	Hall	Medical Emergency Procedures	3/15/2016	Truck Driver
21434	Hollis	Hall	Personal Protective Equipment	6/27/2017	Truck Driver
21434	Hollis	Hall	Power Landscape Equipment Hazards	6/29/2017	Truck Driver
21434	Hollis	Hall	Preventing Musculoskeletal Injury	3/20/2018	Truck Driver
21434	Hollis	Hall	Preventing Slips, Trips and Falls	11/21/2017	Truck Driver
21434	Hollis	Hall	Return to Work from a Lost Time Injury	8/12/2013	Truck Driver
21434	Hollis	Hall	Safe Driving Habits	9/1/2010	Truck Driver
21434	Hollis	Hall	Safety Orientation	10/7/2005	Truck Driver
21434	Hollis	Hall	Spill Containment & Counter Measures	7/21/2015	Truck Driver
21434	Hollis	Hall	Working Around Traffic	10/12/2010	Truck Driver
21434	Hollis	Hall	Working Safely Around Bio-Solids	9/19/2017	Truck Driver
21434	Hollis	Hall	Workplace Environmental Hygiene	12/19/2017	Truck Driver
21434	Hollis	Hall	zz-Accident Awareness	11/1/2010	Truck Driver
21434	Hollis	Hall	zz-Confined Space Entry Procedures-UPDATE	3/13/2012	Truck Driver
21434	Hollis	Hall	zz-Eye and Face Protection	3/31/2009	Truck Driver
21434	Hollis	Hall	zz-Fire Extinguisher Education	9/12/2006	Truck Driver
21434	Hollis	Hall	zz-Fire Prevention and Education	11/8/2009	Truck Driver
21434	Hollis	Hall	zz-Flu Information & Prevention	2/20/2018	Truck Driver
21434	Hollis	Hall	zz-Healthy Heart Maintenance Information	5/29/2009	Truck Driver
21434	Hollis	Hall	zz-Homeland Security Protection	4/17/2012	Truck Driver
21434	Hollis	Hall	zz-Insect Bites, Precautions, First Aid	5/16/2006	Truck Driver
21434	Hollis	Hall	zz-Job Safety Analysis Procedures	7/2/2013	Truck Driver
21434	Hollis	Hall	zz-Plant Orientation	10/7/2005	Truck Driver

Employee Number	First Name	Last Name	Certification/Training	Certification Date	Job Classification
22170	Carl	Malinowski	Aerial Lift Safety: General Procedures	8/21/2018	Struc Irnwkr
22170	Carl	Malinowski	Back Safety	1/20/2015	Struc Irnwkr
22170	Carl	Malinowski	Bloodborne Pathogen Awareness	3/28/2017	Struc Irnwkr
22170	Carl	Malinowski	Cold Weather Hazard Awareness	1/20/2017	Struc Irnwkr
22170	Carl	Malinowski	Confined Space Entry Awareness	12/4/2009	Struc Irnwkr
22170	Carl	Malinowski	Confined Space Entry Procedures Certification	11/19/2013	Struc Irnwkr
22170	Carl	Malinowski	CPR Certification Course	10/9/2017	Struc Irnwkr
22170	Carl	Malinowski	Dangers of Hazardous Atmospheres	4/19/2016	Struc Irnwkr
22170	Carl	Malinowski	Disaster Preparedness	10/17/2017	Struc Irnwkr
22170	Carl	Malinowski	Electrical Hazard Awareness	8/15/2017	Struc Irnwkr
22170	Carl	Malinowski	Excavation Safety Awareness	10/17/2017	Struc Irnwkr
22170	Carl	Malinowski	Fire Safety - Prevention, Evacuation, FE use	10/18/2016	Struc Irnwkr
22170	Carl	Malinowski	Fork Lift Operator Certification	4/14/2014	Struc Irnwkr
22170	Carl	Malinowski	Gas Detection Instrument Operation & Procedures	9/1/2011	Struc Irnwkr
22170	Carl	Malinowski	Hazard Communication Training	6/19/2018	Struc Irnwkr
22170	Carl	Malinowski	Health & Wellness	2/21/2017	Struc Irnwkr
22170	Carl	Malinowski	Hearing Protection	9/20/2017	Struc Irnwkr
22170	Carl	Malinowski	Hearing Protection	9/20/2017	Struc Irnwkr
22170	Carl	Malinowski	Hot Weather Hazard Awareness	5/16/2017	Struc Irnwkr
22170	Carl	Malinowski	Hot Work Permitting Procedures	1/30/2013	Struc Irnwkr
22170	Carl	Malinowski	Ladder Safety	1/16/2018	Struc Irnwkr
22170	Carl	Malinowski	Lockout/Tagout Procedures Certification	2/21/2018	Struc Irnwkr
22170	Carl	Malinowski	Medical Emergency Procedures	3/15/2016	Struc Irnwkr
22170	Carl	Malinowski	Personal Protective Equipment	6/21/2016	Struc Irnwkr
22170	Carl	Malinowski	Preventing Musculoskeletal Injury	3/20/2018	Struc Irnwkr
22170	Carl	Malinowski	Preventing Slips, Trips and Falls	11/15/2016	Struc Irnwkr
22170	Carl	Malinowski	Return to Work from a Lost Time Injury	6/11/2010	Struc Irnwkr
22170	Carl	Malinowski	Safe Operation of 3 & 4 Wheeled Carts	6/8/2017	Struc Irnwkr
22170	Carl	Malinowski	Safety Orientation	2/19/2016	Struc Irnwkr
22170	Carl	Malinowski	Spill Containment & Counter Measures	4/15/2014	Struc Irnwkr
22170	Carl	Malinowski	Working Around Traffic	10/12/2010	Struc Irnwkr
22170	Carl	Malinowski	Working Safely Around Bio-Solids	9/19/2017	Struc Irnwkr
22170	Carl	Malinowski	Workplace Environmental Hygiene	12/19/2017	Struc Irnwkr
22170	Carl	Malinowski	zz-Accident Awareness	11/1/2010	Struc Irnwkr
22170	Carl	Malinowski	zz-Confined Space Entry Procedures-UPDATE	3/13/2012	Struc Irnwkr
22170	Carl	Malinowski	zz-Eye and Face Protection	3/31/2009	Struc Irnwkr
22170	Carl	Malinowski	zz-Fire Prevention and Education	11/8/2009	Struc Irnwkr
22170	Carl	Malinowski	zz-Flu Information & Prevention	2/20/2018	Struc Irnwkr
22170	Carl	Malinowski	zz-Healthy Heart Maintenance Information	5/29/2009	Struc Irnwkr
22170	Carl	Malinowski	zz-Homeland Security Protection	4/17/2012	Struc Irnwkr
22170	Carl	Malinowski	zz-Insect Bites, Precautions, First Aid	4/30/2009	Struc Irnwkr
22170	Carl	Malinowski	zz-Job Safety Analysis Procedures	7/2/2013	Struc Irnwkr
22170	Carl	Malinowski	zz-Respiratory Equipment Training	8/5/2013	Struc Irnwkr

Employee Number	First Name	Last Name	Certification/Training	Certification Date	Job Classification
22449	Paul	Sullivan	Bloodborne Pathogen Awareness	2/11/2015	Asst Chief Oper Engr
22449	Paul	Sullivan	Cold Weather Hazard Awareness	1/16/2014	Asst Chief Oper Engr
22449	Paul	Sullivan	Dangers of Hazardous Atmospheres	5/13/2016	Asst Chief Oper Engr
22449	Paul	Sullivan	Fire Safety - Prevention, Evacuation, FE use	10/16/2014	Asst Chief Oper Engr
22449	Paul	Sullivan	Gas Detection Instrument Operation & Procedures	5/13/2015	Asst Chief Oper Engr
22449	Paul	Sullivan	Hazard Communication Training	9/7/2016	Asst Chief Oper Engr
22449	Paul	Sullivan	Health & Wellness	2/8/2017	Asst Chief Oper Engr
22449	Paul	Sullivan	Hearing Protection	9/20/2017	Asst Chief Oper Engr
22449	Paul	Sullivan	Hearing Protection	9/20/2017	Asst Chief Oper Engr
22449	Paul	Sullivan	Hot Weather Hazard Awareness	5/7/2012	Asst Chief Oper Engr
22449	Paul	Sullivan	Lockout/Tagout Procedures Certification	1/22/2018	Asst Chief Oper Engr
22449	Paul	Sullivan	Medical Emergency Procedures	5/13/2015	Asst Chief Oper Engr
22449	Paul	Sullivan	Personal Protective Equipment	9/22/2017	Asst Chief Oper Engr
22449	Paul	Sullivan	Preventing Musculoskeletal Injury		Asst Chief Oper Engr
22449	Paul	Sullivan	Preventing Slips, Trips and Falls	12/1/2011	Asst Chief Oper Engr
22449	Paul	Sullivan	Safety Orientation	11/12/2015	Asst Chief Oper Engr
22449	Paul	Sullivan	Safety Shorts	7/18/2017	Asst Chief Oper Engr
22449	Paul	Sullivan	Safety Training for Supervisors	1/19/2016	Asst Chief Oper Engr
22449	Paul	Sullivan	Spill Containment & Counter Measures	9/28/2017	Asst Chief Oper Engr
22449	Paul	Sullivan	Working Safely Around Bio-Solids	5/2/2011	Asst Chief Oper Engr
22449	Paul	Sullivan	Workplace Environmental Hygiene	4/3/2018	Asst Chief Oper Engr
22449	Paul	Sullivan	zz-Confined Space Entry Procedures-UPDATE	3/27/2012	Asst Chief Oper Engr
22449	Paul	Sullivan	zz-Homeland Security Protection	4/19/2012	Asst Chief Oper Engr

Employee Number	First Name	Last Name	Certification/Training	Certification Date	Job Classification
22502	Timothy	Moore	Aerial Lift Safety: General Procedures	8/21/2018	Elec Mech
22502	Timothy	Moore	Asbestos Awareness	2/19/2013	Elec Mech
22502	Timothy	Moore	Back Safety	10/13/2017	Elec Mech
22502	Timothy	Moore	Bloodborne Pathogen Awareness	4/17/2018	Elec Mech
22502	Timothy	Moore	Cold Weather Hazard Awareness	1/20/2017	Elec Mech
22502	Timothy	Moore	Confined Space Entry Procedures Certification	12/5/2017	Elec Mech
22502	Timothy	Moore	CPR Certification Course	11/17/2016	Elec Mech
22502	Timothy	Moore	Dangers of Hazardous Atmospheres	4/19/2016	Elec Mech
22502	Timothy	Moore	Disaster Preparedness	10/17/2017	Elec Mech
22502	Timothy	Moore	Electrical Hazard Awareness	8/15/2017	Elec Mech
22502	Timothy	Moore	Excavation Safety Awareness	10/17/2017	Elec Mech
22502	Timothy	Moore	Fall Protection	6/17/2014	Elec Mech
22502	Timothy	Moore	Fire Safety - Prevention, Evacuation, FE use	10/18/2016	Elec Mech
22502	Timothy	Moore	Gas Detection Instrument Operation & Procedures	9/23/2015	Elec Mech
22502	Timothy	Moore	Hazard Communication Training	9/20/2016	Elec Mech
22502	Timothy	Moore	Health & Wellness	2/21/2017	Elec Mech
22502	Timothy	Moore	Hearing Protection	9/2/2015	Elec Mech
22502	Timothy	Moore	Hot Weather Hazard Awareness	5/15/2018	Elec Mech
22502	Timothy	Moore	Ladder Safety	1/16/2018	Elec Mech
22502	Timothy	Moore	Lead Awareness	1/8/2014	Elec Mech
22502	Timothy	Moore	Lockout/Tagout Procedures Certification	1/22/2018	Elec Mech
22502	Timothy	Moore	Medical Emergency Procedures	3/15/2016	Elec Mech
22502	Timothy	Moore	NFPA 70E Arc Flash Hazard Awareness Certification	6/28/2016	Elec Mech
22502	Timothy	Moore	Personal Protective Equipment	6/27/2017	Elec Mech
22502	Timothy	Moore	Preventing Musculoskeletal Injury	3/20/2018	Elec Mech
22502	Timothy	Moore	Preventing Slips, Trips and Falls	11/21/2017	Elec Mech
22502	Timothy	Moore	Respirator: Air Purifying Cartridge	3/16/2017	Elec Mech
22502	Timothy	Moore	Return to Work from a Lost Time Injury	10/11/2017	Elec Mech
22502	Timothy	Moore	Safe Driving Habits	4/16/2013	Elec Mech
22502	Timothy	Moore	Safety Orientation	11/9/2012	Elec Mech
22502	Timothy	Moore	Spill Containment & Counter Measures	6/16/2015	Elec Mech
22502	Timothy	Moore	Working Safely Around Bio-Solids	4/15/2014	Elec Mech
22502	Timothy	Moore	Workplace Environmental Hygiene	12/19/2017	Elec Mech
22502	Timothy	Moore	zz-Flu Information & Prevention	2/20/2018	Elec Mech

Employee Number	First Name	Last Name	Certification/Training	Certification Date	Job Classification
22538	Steven	Stanek	Aerial Lift Safety: General Procedures	8/21/2018	Pipefitter
22538	Steven	Stanek	Back Safety	1/20/2015	Pipefitter
22538	Steven	Stanek	Bloodborne Pathogen Awareness	4/17/2018	Pipefitter
22538	Steven	Stanek	Cold Weather Hazard Awareness	1/20/2017	Pipefitter
22538	Steven	Stanek	Confined Space Entry Procedures Certification	2/25/2013	Pipefitter
22538	Steven	Stanek	CPR Certification Course	9/21/2017	Pipefitter
22538	Steven	Stanek	Dangers of Hazardous Atmospheres	10/17/2017	Pipefitter
22538	Steven	Stanek	Disaster Preparedness	10/17/2017	Pipefitter
22538	Steven	Stanek	District Safety Rules	11/17/2015	Pipefitter
22538	Steven	Stanek	Electrical Hazard Awareness	8/15/2017	Pipefitter
22538	Steven	Stanek	Excavation Safety Awareness	10/17/2017	Pipefitter
22538	Steven	Stanek	Fire Safety - Prevention, Evacuation, FE use	10/18/2016	Pipefitter
22538	Steven	Stanek	Gas Detection Instrument Operation & Procedures	5/19/2015	Pipefitter
22538	Steven	Stanek	Hand Protection	4/25/2013	Pipefitter
22538	Steven	Stanek	Hazard Communication Training	6/19/2018	Pipefitter
22538	Steven	Stanek	Health & Wellness	2/21/2017	Pipefitter
22538	Steven	Stanek	Hearing Protection	9/20/2017	Pipefitter
22538	Steven	Stanek	Hearing Protection	9/20/2017	Pipefitter
22538	Steven	Stanek	Hot Weather Hazard Awareness	5/15/2018	Pipefitter
22538	Steven	Stanek	Ladder Safety	1/16/2018	Pipefitter
22538	Steven	Stanek	Lockout/Tagout Procedures Certification	2/21/2018	Pipefitter
22538	Steven	Stanek	Medical Emergency Procedures	3/15/2016	Pipefitter
22538	Steven	Stanek	Personal Protective Equipment	9/29/2017	Pipefitter
22538	Steven	Stanek	Preventing Musculoskeletal Injury	3/20/2018	Pipefitter
22538	Steven	Stanek	Preventing Slips, Trips and Falls	11/21/2017	Pipefitter
22538	Steven	Stanek	Respirator: Air Purifying Cartridge	10/17/2017	Pipefitter
22538	Steven	Stanek	Respirator: Filtering Face-piece (Dust Mask)	10/17/2017	Pipefitter
22538	Steven	Stanek	Safety Orientation	2/12/2013	Pipefitter
22538	Steven	Stanek	Safety Shorts	12/4/2017	Pipefitter
22538	Steven	Stanek	Spill Containment & Counter Measures	10/17/2017	Pipefitter
22538	Steven	Stanek	Working Around Traffic	9/26/2013	Pipefitter
22538	Steven	Stanek	Working Safely Around Bio-Solids	9/19/2017	Pipefitter
22538	Steven	Stanek	Workplace Environmental Hygiene	12/19/2017	Pipefitter
22538	Steven	Stanek	zz-Flu Information & Prevention	2/20/2018	Pipefitter
22538	Steven	Stanek	zz-Respiratory Equipment Training	12/4/2013	Pipefitter

Employee Number	First Name	Last Name	Certification/Training	Certification Date	Job Classification
22683	Kevin	O'Connor	Back Safety	1/8/2015	Oper Engr I
22683	Kevin	O'Connor	Cold Weather Hazard Awareness	12/8/2016	Oper Engr I
22683	Kevin	O'Connor	Dangers of Hazardous Atmospheres	8/7/2014	Oper Engr I
22683	Kevin	O'Connor	Electrical Hazard Awareness	8/9/2017	Oper Engr I
22683	Kevin	O'Connor	Fire Safety - Prevention, Evacuation, FE use	10/6/2016	Oper Engr I
22683	Kevin	O'Connor	Gas Detection Instrument Operation & Procedures	6/4/2015	Oper Engr I
22683	Kevin	O'Connor	Hazard Communication Training	6/7/2018	Oper Engr I
22683	Kevin	O'Connor	Health & Wellness	4/9/2015	Oper Engr I
22683	Kevin	O'Connor	Hearing Protection	9/20/2017	Oper Engr I
22683	Kevin	O'Connor	Hearing Protection	9/20/2017	Oper Engr I
22683	Kevin	O'Connor	Hot Weather Hazard Awareness	5/11/2017	Oper Engr I
22683	Kevin	O'Connor	Ladder Safety	1/17/2018	Oper Engr I
22683	Kevin	O'Connor	Lockout/Tagout Procedures Certification	2/21/2018	Oper Engr I
22683	Kevin	O'Connor	Medical Emergency Procedures	3/2/2016	Oper Engr I
22683	Kevin	O'Connor	Personal Protective Equipment	6/16/2016	Oper Engr I
22683	Kevin	O'Connor	Preventing Musculoskeletal Injury	3/14/2018	Oper Engr I
22683	Kevin	O'Connor	Preventing Slips, Trips and Falls	11/16/2016	Oper Engr I
22683	Kevin	O'Connor	Safety Orientation	7/10/2014	Oper Engr I
22683	Kevin	O'Connor	Safety Shorts	10/5/2017	Oper Engr I
22683	Kevin	O'Connor	Spill Containment & Counter Measures	7/9/2015	Oper Engr I
22683	Kevin	O'Connor	Workplace Environmental Hygiene		Oper Engr I
22683	Kevin	O'Connor	zz-Flu Information & Prevention	2/15/2018	Oper Engr I

Employee Number	First Name	Last Name	Certification/Training	Certification Date	Job Classification
22880	Nicholas	Andronis	Accident Reporting Procedures for Supervisors	1/17/2017	Elec Mech
22880	Nicholas	Andronis	Aerial Lift Safety: General Procedures	8/20/2018	Elec Mech
22880	Nicholas	Andronis	Bloodborne Pathogen Awareness	4/17/2018	Elec Mech
22880	Nicholas	Andronis	Cold Weather Hazard Awareness	11/15/2016	Elec Mech
22880	Nicholas	Andronis	Confined Space Entry Procedures Certification	12/7/2017	Elec Mech
22880	Nicholas	Andronis	CPR Certification Course	4/21/2016	Elec Mech
22880	Nicholas	Andronis	Dangers of Hazardous Atmospheres	2/14/2017	Elec Mech
22880	Nicholas	Andronis	Fire Safety - Prevention, Evacuation, FE use	8/16/2016	Elec Mech
22880	Nicholas	Andronis	Fork Lift Operator Certification	9/29/2016	Elec Mech
22880	Nicholas	Andronis	Gas Detection Instrument Operation & Procedures	1/25/2016	Elec Mech
22880	Nicholas	Andronis	Hazard Communication Training	6/19/2018	Elec Mech
22880	Nicholas	Andronis	Health & Wellness	3/14/2017	Elec Mech
22880	Nicholas	Andronis	Hearing Protection	9/9/2016	Elec Mech
22880	Nicholas	Andronis	Hot Weather Hazard Awareness	5/15/2018	Elec Mech
22880	Nicholas	Andronis	Ladder Safety	1/16/2018	Elec Mech
22880	Nicholas	Andronis	Lockout/Tagout Procedures Certification	2/21/2018	Elec Mech
22880	Nicholas	Andronis	Medical Emergency Procedures	2/16/2016	Elec Mech
22880	Nicholas	Andronis	NFPA 70E Arc Flash Hazard Awareness Certification	6/28/2016	Elec Mech
22880	Nicholas	Andronis	Preventing Musculoskeletal Injury	3/20/2018	Elec Mech
22880	Nicholas	Andronis	Preventing Slips, Trips and Falls	11/21/2017	Elec Mech
22880	Nicholas	Andronis	Respirator: Air Purifying Cartridge	11/28/2017	Elec Mech
22880	Nicholas	Andronis	Safe Driving Habits	10/18/2016	Elec Mech
22880	Nicholas	Andronis	Safety Orientation	1/25/2016	Elec Mech
22880	Nicholas	Andronis	Transferred Employee Orientation	10/25/2017	Elec Mech
22880	Nicholas	Andronis	Workplace Environmental Hygiene	12/19/2017	Elec Mech
22880	Nicholas	Andronis	zz-Flu Information & Prevention	2/20/2018	Elec Mech

Attachment 6

Hot Work Permit Program

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

HOT WORK PERMIT STANDARD OPERATING PROCEDURE

I. DEPARTMENTS AND PERSONNEL AFFECTED

This policy applies to all Metropolitan Water Reclamation District of Greater Chicago departments and employees who perform any electric/gas welding and cutting. This policy also applies to all Metropolitan Water Reclamation District of Greater Chicago departments and employees who oversee contractors that perform welding and cutting. Unless otherwise specified, the following are mandatory guidelines and shall be adhered to.

II. DEFINITIONS

Affected Personnel – Includes all operators; supervisors and Fire Watch personnel.

Combustibles – Gases, liquids or solids material that will ignite in the continued presence of an ignition source.

Designated Hot Work Area – Any area where Hot Work is being performed on a regular basis. This area is exempt from permitting. Designated areas must meet certain criteria found later in this document.

Designated Occasional Hot Work Area – Any area where Hot Work is performed periodically or for extended periods of time. Permitting is required for this area but may be issued for specific time periods not to exceed 1 year. Designated areas must meet certain criteria found later in this document.

Fire Watch – The process of observing an operation for any safety violations, maintaining a constant vigil for a fire caused by sparking or open flame during welding or cutting operations, and the responsibility for emergency extinguishment of any fire caused by the operation. ***The fire watcher shall not be assigned other duties during the operation and will continue the fire watch for 30 minutes after the operation is completed.***

Hazardous Location – An area, by nature, which presents an unsafe working condition that, could result in a catastrophic ignition of material in the area. Such areas include, but are not limited to:

- Explosive material use or storage areas.
- Highly toxic material use or storage areas.
- Flammable storage or handling areas.
- Confined Spaces (see "Confined Space Entry program").

- Any container which contains or has contained flammable or combustible liquids.
- High angle work performed on scaffolding, roof or other location over 6 feet high in which a fall hazard exists.
- Any other area, which by nature of the material stored or used, could result in a fire or explosion due to the heat or sparks produced by the welding or cutting operation.

Hot Tap – A procedure used in the repair maintenance and service which involves welding on a piece of equipment (pipelines, vessels or tanks) under pressure, in order to install connections or appurtenances. Commonly used to replace or add sections of pipeline without the interruption of service of air, gas, steam and flammable chemical distribution systems.

Hot Work – Work involving gas or electric welding, cutting, burning, brazing, soldering or similar flame or spark-producing operations. Examples of Hot Work activities are, but not limited to:

- Any new construction, renovation/alteration or maintenance procedure that requires heat or open flame to complete.
- Electric or gas cutting/welding.
- Brazing/soldering.
- Thawing pipes/sweating pipes.

MWRDGC - Metropolitan Water Reclamation District of Greater Chicago.

Operator – The individual who actually conducts the welding, cutting, or burning operation.

Permit (see attachment) – A checklist/tracking device used to authorize all Hot Work operations. Permits shall be issued on all Hot Work operations.

Shielding – A non-combustible material, such as a welding curtain or other means of placing a non-combustible barrier between the welding operation and any combustible/flammables, or other materials with the propensity for burning.

Special Hazard Occupancies – Any area containing flammable liquids, dust accumulation, gases, plastics, rubber and wood products.

Supervisor – One who has authority over another.

Welding – A general term used to describe the joining of metal by fusing the pieces together utilizing heat. It often is used to describe brazing, cutting and soldering operations.

Welding/Cutting Area – *SEE DESIGNATED HOT WORK AREA*

III. TRAINING (MANDATORY)

1. Hot Work Permitting system and procedures.
2. Responsibilities.
    - Supervisors - shall ensure that all persons engaging in welding and cutting operations are trained adequately to perform the tasks undertaken and are aware of all safety precautions.
    - Hot Work Operator (HWO).
    - Fire Watch.
        a. Duties.
        b. When to terminate the watch.
        c. Review of fire extinguisher use.
    - Contractors.
3. Documentation.
4. PPE – additional training may also be necessary in the proper selection and use of personal protective equipment.
5. Fire extinguisher training.
6. Training in confined space entry is necessary before working in such areas.

IV. RESPONSIBILITIES

1. It is the responsibility of each Metropolitan Water Reclamation District of Greater Chicago employee engaged in Hot Work to implement controls that will eliminate, prevent or greatly reduce the hazards generated by their work.
2. It is the responsibility of each **supervisor**, whose employee(s) engage in Hot Work, to insure that the guidelines in this **POLICY** are implemented and hazards are controlled so as not to present an exposure to Metropolitan Water Reclamation District of Greater Chicago employees and visitors. It is also the responsibility of the **supervisor** to insure the employee(s) they designated to perform Hot Work, utilizes the necessary procedures and equipment, so as to minimize that employee's own exposure to the hazard generated.
3. All Metropolitan Water Reclamation District of Greater Chicago departments and employees who are responsible for contracting with outside entities to perform

Hot Work shall have the responsibility to ensure that the contractors comply with the provisions of this program.

4. Supervisors.
   a. Issue Hot Work Permits for each job performed outside of a permanent area.
   b. Obtain material safety data sheets (MSDS) for each metal or metal alloy being used.
   c. Identify all work activities where there is airborne contaminant exposure or potential for exposure to hazardous fumes, gases, radiation or dust and determine controls methods.
   d. Any deviation or violation shall be brought to the attention the Safety department for review.

V. WELDING AND HOT WORK FIRE PREVENTION MEASURES

1. A designated welding area should be established to meet the following requirements:
   - Floors swept and clean of combustibles within 35 feet of work area.
   - Flammable and combustible liquids and materials will be kept 35 feet from work area.
   - Adequate ventilation shall be present.
   - At least one 10-lb. dry chemical fire extinguisher should be within access of the 35 feet of work area.
   - Protective dividers such as welding curtains or non-combustible walls shall be provided to contain sparks and slag of the combustible free area.
2. Requirements for welding conducted outside the designated welding area.
   - Portable welding curtains or shields must be used to protect other workers in the welding areas.
   - A **Hot Work Permit** must be completed prior to the welding operation and posted.
   - Fire watch shall be provided as needed for the appropriate Hot Work operations.
   - Fire extinguisher shall be considered standard equipment to each welding cart.

VI. VENTILATION AND ATMOSPHERIC TESTING

1. Hot Work should not be conducted in the presence of flammable gases, vapors, liquids, or dusts (where an explosive concentration can develop).

2. Atmospheric testing prior to work commencement, and periodically there after, should be conducted if the atmosphere in the work area has the potential to become hazardous.
3. Ventilation of the work site, either through local or general exhaust ventilation, should be adequate for the work performed.

VII. PERSONAL PROTECTIVE EQUIPMENT (PPE)

1. Personal protective equipment specifically designed for Hot Work should be provided to and used by workers. The potential for toxic fume emissions from the material being worked on or surface coatings should be considered and appropriate steps should be taken to provide for respiratory protection.
2. If supervisors have questions concerning the proper PPE selection they should consult the local Safety Department.

VIII. HOT WORK PROCEDURES (IN-HOUSE)

1. The supervisor will issue the Hot Work Permit to his/her own employee(s). Each permit is job specific. The supervisor is then responsible for notifying the local Master Mechanic having the date and time of the job put in the Hot Work logbook, prior to commencing work. At the end of the job, the supervisor is to send the expired permit to the local Master Mechanic's office. This permit will be kept on file for a period of not less than one year.
2. The local Safety Office shall also be notified of the welding/cutting prior to commencement of work.
3. The employee(s) assigned to perform the Hot Work is to **post** the Hot Work Permit at the job site.
4. Where practicable all combustibles shall be relocated at least 35 feet from the work site. Where relocation is impractical, combustibles shall be protected with flameproof covers, shielded with metal, guards, curtains, or wet down material to help prevent ignition of material.
5. Ducts, conveyors systems, and augers that may carry sparks to distant combustibles **shall be protected or shut down.**
6. Where cutting or welding is done near walls, partitions, ceilings, or a roof of combustible construction, fire-resistant shields or guards shall be provided to prevent ignition.
7. If welding is to be done on a metal wall, partition, ceiling, or roof, precautions shall be taken to prevent ignition of combustibles on the other side, due to conduction or radiation of heat. **Where combustibles cannot be relocated on**

the opposite side of the work, a fire watch person shall be provided on the opposite side of the work.

8. Welding shall not be attempted on a metal partition, wall ceiling or roof having a covering nor on walls having combustible sandwich panel construction.
9. In areas where there is a large amount of dust accumulation within 35 feet of the area where welding/Hot Work will be conducted. *All dust accumulation shall be cleaned up following the housekeeping program of the facility before welding/Hot Work is permitted.*
10. Cutting or welding on pipes or other metal in contact with combustible walls, ceilings, partitions or roofs shall not be undertaken if the work is close enough to cause ignition by combustibles.
11. Suitable fire extinguishers shall be provided and maintained ready for instant use.
12. A fire watch person shall be provided **during and for 30 minutes past the completion of the welding project.**
13. The fire watch person shall inspect the work area and all adjacent areas to which sparks and heat might spread including floors above and below and on opposite sides of the walls.
14. A cutting/welding permit will be issued on all welding or cutting outside of the designated welding area.
15. Cutting or welding shall not be permitted in the following situations:
    - In areas not authorized by management.
    - In sprinkled buildings while such protection is impaired.
    - In the presence of potentially explosive atmospheres, e.g. flammable.
    - In areas near the storage of large quantities of exposed, readily ignitable materials.
16. Upon completion of the work, the person designated as **Fire Watch** shall sign the Hot Work permit verifying that the work area is fire safe and forward it immediately to his/her supervisor for closing of the permit.
17. Once the completed Hot Work permit is given to the supervisor he/she shall forward the permit immediately to the plant Master Mechanic's office.
18. The Master Mechanic's office shall log all Hot Work permits in a Hot Work Permit logbook and keep the log for not less then one (1) year.
19. Under no circumstances will fire protection systems be shut down unless coordinated though the local Safety Coordinator. Projects, which have shut down fire protection systems without such approval, are subjected to **immediate** work stoppage.
20. All work sites are subject to inspection at any time.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

HOT WORK PERMIT STANDARD OPERATING PROCEDURE

IX. HOT WORK PROCEDURES (CONTRACTORS)

1. Access to the Metropolitan Water Reclamation District of Greater Chicago's Hot Work Permit should be provided to all outside contractors that will engage in Hot Work on all Metropolitan Water Reclamation District of Greater Chicago properties.
2. Prior to beginning any Hot Work on MWRDGC property, the contractor's representative shall contact the Resident Engineer overseeing their contract and arrange for the issuance of a Hot Work Permit.
3. The Resident engineer shall verify ALL required personnel and equipment are on site, and document the contractor's compliance.
4. Once issued, the permit must be displayed on the job site.
5. **The contractor's personnel are expected to adhere to ALL GUIDE LINES set forth in this Policy and make a reasonable effort to insure the health and safety of MWRDGC employees and visitors**.
6. The contractor's designated Fire Watch shall be **provided during and for 30 minutes past the completion of the Hot Work project** when necessary.
7. Upon completion of work, the contractor's designated Fire Watcher shall sign the Hot Work permit verifying that the work area is fire safe and forward it immediately to the Resident Engineer who in turn will forward it to the Master Mechanic's office.

Revised/Reviewed:

02/16/16 JLK
03/15/06 JHC

METROPOLITAN WATER RECLAMATION DISTRICT of GREATER CHICAGO

HOT WORKS PERMIT

I. Worksite Information:

Date Issued: _____ Issued by: _____

Start-up date: _____ Start-up Time: _____

Building: _____ Floor: _____ Room(s): _____

Work to be done: Welding _____ Cutting _____ Soldering _____ Other _____

ATMOSPHERIC TESTING - Before Beginning Work			JOB SITE PREPARATION	
%	TIME	INITIAL	☐ Pump Locked/Tagged Out	☐ Electrical G.F.C.I
OXYGEN			☐ Electrical Locked/Tagged Out	☐ Flammables Removed
% LEL (<10%)			☐ Equipment Drained	☐ Fire Extinguisher(s)
TOXIC			☐ Safety & Procedures Meeting	
Special PPE Required:				

The location where this work will take place has **been examined before the start** of cutting/welding operations and all appropriate precautions have been taken.

Operator: Print: _____ **Signature :** _____ **ID #:** _____

Name & Signature of Person responsible for **FIRE WATCH**

Print: _____ **Signature :** _____ **ID# :** _____

FIRE WATCH & SAFETY CHECKLIST	YES/NO/NA
Is work area *clean* and *free of clutter, assuring* free access for emergency evacuation, ***and,*** is evacuation area clearly marked?	
Are special *precautionary* measures needed, such as for Confined Space Entry Procedures or Hazardous Work Area issues addressed?	
Is additional Fire Extinguishing Equipment needed or made available?	
Is Fall Protection Required?	
When welding, cutting, or heating is performed on walls, floors, and ceilings, since direct penetrations of sparks or heat transfer may introduce a fire hazard to an adjacent area, are the same precautions taken to the opposite side?	
Are permit entry personnel instructed as to the specific or anticipated hazards of the work site, including the use of fire fighting equipment?	
If applicable, will other means of exhaust, *smoke eaters*, or fans be utilized?	
Is Hot Works Permit posted at jobsite?	

FIRE WATCH & SAFETY CHECKLIST	YES/NO/NA
Additional comments or instructions?:	

The work area and all adjacent areas to which sparks and heat might have spread (including floors above and below and on opposite side of walls) **were inspected 30 minutes after** the cutting and or welding operations ceased for the day and were found to fire safe.

Fire Watcher: Print: _____ **Signature:** _____ **ID # :** _____

Permit Closed By:

Print: _____ **Signature:** _____ **ID#:** _____ **Date:** _____

Attachment 7

Hot Work Program Memo

Interoffice Memorandum
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

DEPARTMENT: General Administration Date: May 6, 2004

TO: Thomas K. O'Connor
Chief of Maintenance and Operations

FROM: Edmund J. Cook
Deputy Chief Engineer

SUBJECT: Hot Work Permit

To comply with OSHA regulations the Safety Section has developed a Hot Work Permit for jobs that involve cutting and welding.

The Hot Work Permit does not apply for work performed in a welding area or in areas where a fire hazard from welding and brazing does not exist. There are no major procedural changes required by this Hot Work Permit; employees will now be required to fill out a Permit form.

With your cooperation and support, this Hot Work Permit should be immediately implemented throughout the District.

EJC:ZZ:nlr

Attachment

Attachment 8

GBT Work Orders

Maintenance Work Order

Work Order: C99274

Date: 9/18/2018 08:48:41

Project ID:		RIME Priority:	8
Slot Number:		Safety:	N
Asset Number:	BLDG0007	Asset Type:	Equipment
CFR Tracking:	AUDIT TRAIL ACTIVE	Resident Code:	1MD6EI
Asset Location:	227:CON:0:0	Trade Codes:	
Asset Short Desc:	BUILDING/STRUC ALL CON	Origination Date:	8/30/2018 09:51
Chg CC-Lab Acct:	3912-LABOR	Due Date:	9/13/2018 09:51
Originator:	SULLIVAN, PAUL 22449	Schedule Date:	
Section - Phone:	834 / 63872	Completion Date:	
Work Group:	824	Work Area:	A
Supervisor ID:		Fault Code:	F223
Assigned To:		Work Type:	OPER
Scheduled To:		Status:	AWM
Planner:	SULLIVAN, PAUL	Compliance Type:	

Work Requested: Remove various manhole covers in GBT room

ABC Job: Meter Reading: _____

CORRECTIVE ACTION

_____

_____

_____

_____

_____

Completed By: _____ Completed Date: ____/____/____

SIGN OFF: Production ____/____/____ ___:___ Maintenance: ____/____/____ ___:___

Signed: _____ Signed: _____

STATUS CHANGES

Status: _____ Date: ___/___/___ Time: ___:___ Status: _____ Date: ___/___/___ Time: ___:___

LABOR

Employee Id	Activity Code	Craft	Hours	Type

MATERIAL

Stock No	Qty	Account

Preventive Maintenance Work Order

Work Order: P571473
PM ID Number: 404
Project ID:
Slot Number:
Asset Number: EFAN0255
CFR Tracking: AUDIT TRAIL ACTIVE
Asset Location: 227:CON:008:-001.0
Asset Short Desc: FAN EXH OZONE VXF-1 FLOT'N CON
Chg CC-Lab Acct: 3941-
Originator: Dalton, John 1920
Section - Phone:
Work Group: 824
Supervisor ID:
Assigned To:
Scheduled To:
Planner: MARDOIAN, MILTON

Frequency Code: M6 Last PM Usage: 0
Work Requested: DO PROC 203 STEPS 1,2,5 6M BELT CHECK/ADJUST/REPLC

Date: 9/18/2018 08:51:51
RIME Priority: 12
Safety: Y
Asset Type: Equipment
Resident Code: 1ME9EI
Trade Codes: M2
Origination Date: 5/27/2018 07:16
Due Date: 6/6/2018
Schedule Date:
Completion Date:
Work Area:
Fault Code: F161
Work Type: T-PM
Status: DO
Compliance Type:
Last PM Date: 12/08/2017

ABC Job: Meter Reading: _____

CORRECTIVE ACTION

_____

_____

_____

_____

_____

Completed By: _____ Completed Date: ____/____/____

SIGN OFF: Production ____/____/____ ____:____ Maintenance: ____/____/____ ____:____

Signed: _____ Signed: _____

STATUS CHANGES

Status: _____ Date: ____/____/____ Time: ____:____ Status: _____ Date: ____/____/____ Time: ____:____

LABOR

Employee Id	Activity Code	Craft	Hours	Type

MATERIAL

Stock No	Qty	Account

PROC NO: 203 EQUIPMENT: EFAN
CODE : DRAWING NO: MCGANN & JBS
DATE : 07/26/95 APPROVED BY: WLM

OZONE AXIAL EFAN CON/DIG

THIS PM PROCEDURE IS FOR: 6 EFANS FOR PLANT OZONATION SYSTEMS @ CON & DIG
ITEMS: (EFAN0255, 0256, 0257, 0258 @ CON) & (EFAN0808,0809 @ DIG)

---

1. CHECK WITH OPERATIONS FOR RELEASE OF FANS BEFORE PERFORMING PM.....[ ]

2. 180 DAYS - MACHINIST - DO THE FOLLOWING*
*CHECK BELT CONDITION FOR WEAR, CRACKS OR GLAZING AND REPORT NEED FOR REPLACEMENT.....[ ]
*CHECK/ADJUST DRIVE BELT TENSION.....[ ]
*TURN FAN BY PULLING BELT TO CHECK FOR FREE ROTATION AND ANY BEARING NOISE OR BINDING.....[ ]
*VISUALLY CHECK/REPORT ANY LACK OF LUBRICATION OR PROBLEMS.....[ ]
*CHECK/REPORT ANY BROKEN SUPPORTS OR DAMAGE.....[ ]
*REPORT ANY PROBLEMS OBSERVED AND OVERALL FAN CONDITION.....[ ]

BAD-[ ] _____ OK-[ ]

_____

_____

MATERIALS/TOOLS: STEPLADDER CREW: 2 CRAFT: M2 HOURS: 6.0

3. YEARLY - ELECTRICIAN*
*CLEAN MOTOR-PURGE BEARINGS WITH SDC 73.....[ ]
*CHECK/CLEAN/TIGHTEN LOCAL ELECTRICAL CONNECTIONS AS NEEDED.....[ ]
*CHECK/REPORT ANY VIBRATION OR OTHER PROBLEMS.....[ ]

MATERIALS/TOOLS: STEPLADDER CREW: 2 CRAFT: E2 HOURS: 6.0

4. YEARLY - ELECTRICIAN - CHECK/CLEAN/LUBE DIG OZONE FAN ROOM WEST WALL EFAN0809 AND NORTH WALL VENT, MAKE MINOR REPAIRS AND REPORT PROBLEMS. [ ]

CREW: 2 CRAFT: E2 HOURS: 1.0

5. NOTIFY OPERATIONS OF COMPLETION OF MAINTENANCE.....[ ]

NOTES AND/OR RECOMMENDED CHANGES TO PM PROCEDURE.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
DELIVER COMPLETED WORK ORDER TO OFFICE

TOTAL HOURS: 13.0

Maintenance Work Order

Work Order: C98953

Date: 9/18/2018 08:53:46

Project ID:	
Slot Number:	
Asset Number:	VFDX0515
CFR Tracking:	AUDIT TRAIL ACTIVE
Asset Location:	227:CON:107:+014.0
Asset Short Desc:	VFD FOR CON TANK FEED PUMP #1 CON
Chg CC-Lab Acct:	3111-LABOR
Originator:	LANNAN, THOMAS
Section - Phone:	834 / 63680
Work Group:	824
Supervisor ID:	
Assigned To:	
Scheduled To:	
Planner:	

RIME Priority:	64
Safety:	N
Asset Type:	Equipment
Resident Code:	1MD6EI
Trade Codes:	
Origination Date:	7/9/2018 12:37
Due Date:	7/10/2018 11:36
Schedule Date:	
Completion Date:	9/10/2018
Work Area:	A
Fault Code:	F057
Work Type:	MAINT
Status:	CLO
Compliance Type:	

Work Requested: COOLING SYSTEM is not functioning temp @ 108 degrees

ABC Job: Meter Reading: _____

CORRECTIVE ACTION

UNSPECIFIED

Completed By: _____ Completed Date: ____/____/____

SIGN OFF: Production ____/____/____ ____:____ Maintenance: ____/____/____ ____:____

Signed: _____ Signed: _____

STATUS CHANGES

Status: _____ Date: ___/___/___ Time: ____:____ Status: _____ Date: ___/___/___ Time: ____:____

LABOR

Employee Id	Activity Code	Craft	Hours	Type

MATERIAL

Stock No	Qty	Account

Maintenance Work Order

Work Order: C99264

Date: 9/18/2018 08:57:16

Project ID:		RIME Priority:	64
Slot Number:		Safety:	N
Asset Number:	PIPE0142	Asset Type:	Equipment
CFR Tracking:	AUDIT TRAIL ACTIVE	Resident Code:	1ME9EI
Asset Location:	227:CON:0:0	Trade Codes:	
Asset Short Desc:	PIPING EFFLUENT WATER CON	Origination Date:	8/29/2018 07:38
Chg CC-Lab Acct:	3925-LABOR	Due Date:	8/30/2018 07:38
Originator:	BATCHELOR, GERALD 21937	Schedule Date:	
Section - Phone:	834 / 63872	Completion Date:	9/13/2018
Work Group:	824	Work Area:	A
Supervisor ID:		Fault Code:	F227
Assigned To:		Work Type:	OPER
Scheduled To:		Status:	CLO
Planner:		Compliance Type:	

Work Requested: the check valves on the effluent flushing water for the GBTs are damaged, please replace as needed

ABC Job: Meter Reading: _____

CORRECTIVE ACTION

AMM SB 9-13-18 Cancelling work order due to building collapse. NO ACTION TAKEN

Completed By: _____ Completed Date: ____/____/____

SIGN OFF: Production ____/____/____ ____:____ Maintenance: ____/____/____ ____:____

Signed: _____ Signed: _____

STATUS CHANGES

Status: _____ Date: ____/____/____ Time: ____:____ Status: _____ Date: ____/____/____ Time: ____:____

LABOR

Employee Id	Activity Code	Craft	Hours	Type

MATERIAL

Stock No	Qty	Account

Maintenance Work Order

Work Order: C98953

Date: 9/7/2018 09:58:32

Project ID:		RIME Priority:	64
Slot Number:		Safety:	N
Asset Number:	VFDX0515	Asset Type:	Equipment
CFR Tracking:	AUDIT TRAIL ACTIVE	Resident Code:	1MD6EI
Asset Location:	227:CON:107:+014.0	Trade Codes:	
Asset Short Desc:	VFD FOR CON TANK FEED PUMP #1 CON	Origination Date:	7/9/2018 12:37
Chg CC-Lab Acct:	3111-LABOR	Due Date:	7/10/2018 11:36
Originator:	LANNAN, THOMAS	Schedule Date:	
Section - Phone:	834 / 63680	Completion Date:	
Work Group:	824	Work Area:	A
Supervisor ID:		Fault Code:	F057
Assigned To:		Work Type:	MAINT
Scheduled To:		Status:	DO
Planner:		Compliance Type:	

Work Requested: COOLING SYSTEM is not functioning temp @ 108 degrees

ABC Job: Meter Reading: _____

CORRECTIVE ACTION

_____

_____

_____

_____

_____

Completed By: _____ Completed Date: ____/____/____

SIGN OFF: Production ____/____/____ ____:____ Maintenance: ____/____/____ ____:____

Signed: _____ Signed: _____

STATUS CHANGES

Status: _____ Date: ____/____/____ Time: ____:____ Status: _____ Date: ____/____/____ Time: ____:____

LABOR

Employee Id	Activity Code	Craft	Hours	Type

MATERIAL

Stock No	Qty	Account

PLANNED ACTIVITIES

Work Order: C98953

9/7/2018 09:58:33

Activity Code	Predecessor	Activity Short Description	Work Group	Work Requested	Activity Sched Date	Completion Date
MAINT		MAINTENANCE				

LABOR

Craft Code		Actual Hours	Completion Date
E2	ELECTRICAL MECHANIC	0.00	
F2	PIPEFITTER	0.00	

Maintenance Work Order

Work Order: C99264

Date: 9/7/2018 09:58:56

Project ID:		RIME Priority:	64
Slot Number:		Safety:	N
Asset Number:	PIPE0142	Asset Type:	Equipment
CFR Tracking:	AUDIT TRAIL ACTIVE	Resident Code:	1ME9EI
Asset Location:	227:CON:0:0	Trade Codes:	
Asset Short Desc:	PIPING EFFLUENT WATER CON	Origination Date:	8/29/2018 07:38
Chg CC-Lab Acct:	3925-LABOR	Due Date:	8/30/2018 07:38
Originator:	BATCHELOR, GERALD 21937	Schedule Date:	
Section - Phone:	834 / 63872	Completion Date:	
Work Group:	824	Work Area:	A .
Supervisor ID:		Fault Code:	F227
Assigned To:		Work Type:	OPER
Scheduled To:		Status:	DO
Planner:		Compliance Type:	

Work Requested: the check valves on the effluent flushing water for the GBTs are damaged, please replace as needed

ABC Job: Meter Reading: _____

CORRECTIVE ACTION

_____

_____

_____

_____

_____

Completed By: _____ Completed Date: ____/____/____

SIGN OFF: Production ____/____/____ ____:____ Maintenance: ____/____/____ ____:____

Signed: _____ Signed: _____

STATUS CHANGES

Status: _____ Date: ____/____/____ Time: ____:____ Status: _____ Date: ____/____/____ Time: ____:____

LABOR

Employee Id	Activity Code	Craft	Hours	Type

MATERIAL

Stock No	Qty	Account

PLANNED ACTIVITIES

Work Order: C99264 9/7/2018 09:58:56

Activity Code	Predecessor	Activity Short Description	Work Group	Work Requested	Activity Sched Date	Completion Date
MAINT		MAINTENANCE				

LABOR

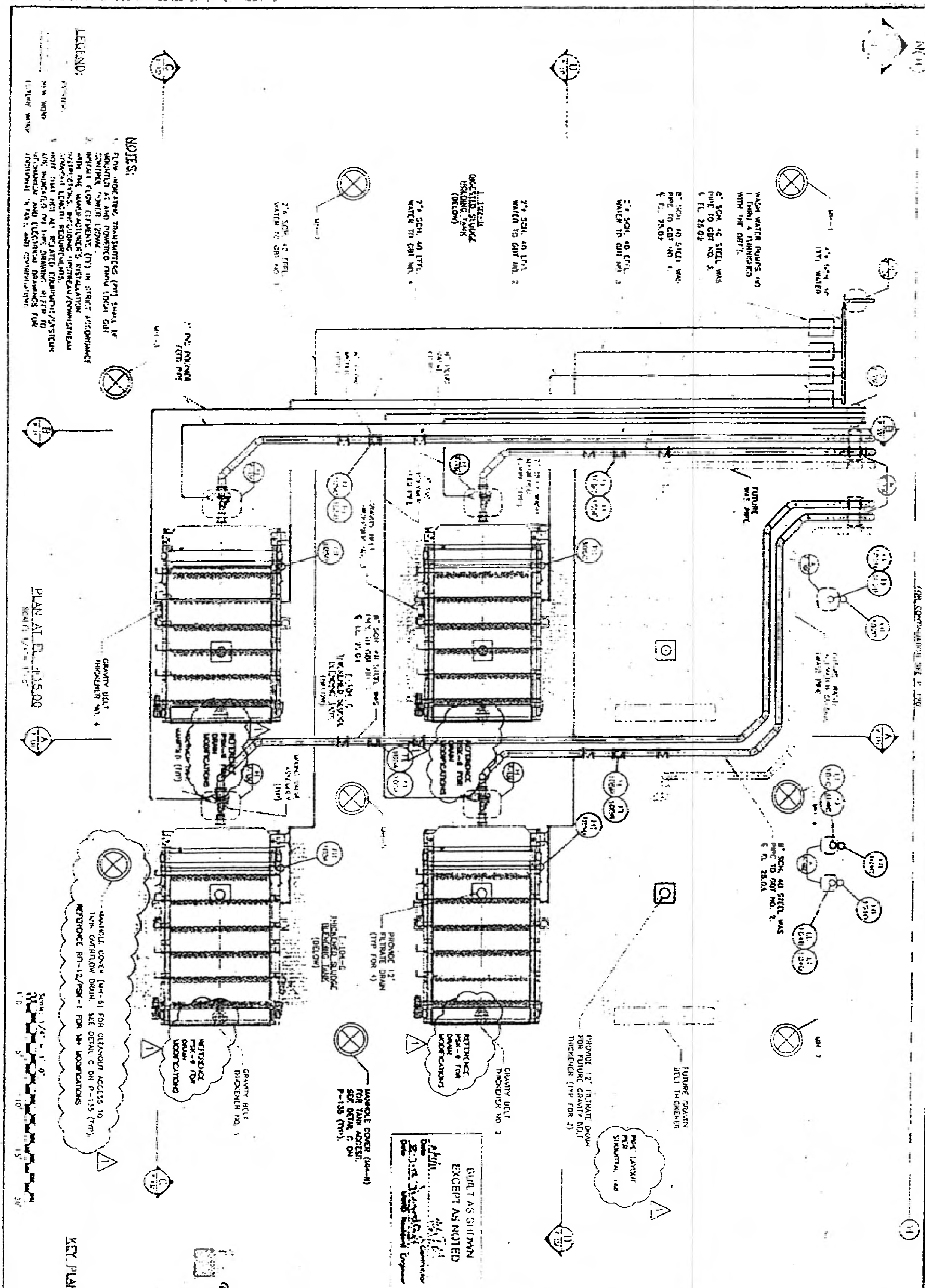
Craft Code		Actual Hours	Completion Date
F2	PIPEFITTER	0.00	

MATERIALS

Description	Stock Number	Qty Needed	Unit of Measure	Actual Qty	Craft
TEE,REDU,MI,GALV,150LB,2"X 2"X 1"	106135	3.0000	EA	3.0000	
UNION,MI,GALV,150LB,2"	106337	8.0000	EA	8.0000	
VALVE,BALL,SCREW,FULL PORT,BRNZ,2"	106403	6.0000	EA	6.0000	
VALVE,CHECK SWING,HORIZ,BRNZ,200LB,2"	106454	1.0000	EA	3.0000	
VALVE,GATE,SLDWDG,BRNZ,150LB,2",SE	115871	4.0000	EA	4.0000	

Attachment 9

GBT Building Diagram



CALUMET WATER RECLAMATION PLANT
CONTRACT 96-251-2P
SLUDGE THICKENING FACILITIES

PLAN – NEW WORK, GRAVITY BELT THICKENER (GBT) ROOM AT EL. +15.0

Sheet Number: P-129
Page Number:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

Designed by: CAK	Checked by: SP	Date: AUG 2009	Correct: Engineer of Process Design
Drawn by: CAK	Reviewed by: MA	Scale: AS NOTED	Approved: Assistant Director of Engineering
Drawing code:			

Rev	Description	Appr.	Date
	AS-BUILT		

Attachment 10

District's Portable Gas Meter Program

Standard Operating Procedure for MWRD Portable 4-Way Gas Meters

Overview:

1. Definitions
2. Manufacturer Information
3. Gas Meter Distribution
4. Gas Meter Use
5. Gas meter Bump Testing
6. Bump Test Locations
7. Gas Meter Repair and Calibration by EITM's (District Electrical Instrument Testing Mechanics)
8. Gas Meter Data Logging
9. Gas Meter Replacement

Summary:
Portable gas meters are used to determine if hazardous atmospheres are present in work environments that have the potential to have low or enriched oxygen levels, high levels of flammable gases, hydrogen sulfide, or carbon monoxide. The meters are assigned to groups rather than individuals to better utilize the meters and reduce costs. Personnel that need a meter for their shift or job will check out the meter for their use and return it when they no longer need it or at the end of their shift. Supervisors are responsible for ensuring that the meters are returned to the pooled meter location so that they may be used by other personnel/shifts.

The meters shall be bump tested at least once per day, normally by the first person to check out the meter for the day starting at the midnight shift. The bump test consists of exposing the MSA Altair 4X (passive) and MSA Altair 5X (pump driven) meters to a known concentration of test gas to assure that the meters are calibrated and reading accurately. This procedure is intended to ensure the accuracy of the meters being used and to better utilize the equipment.

1. Definitions
    a. Portable meter- Any battery operated, non-hardwired portable four way gas meter, including but not limited to: the GT-402, MSA Altair 4X and MSA Altair 5X.
    b. Docking Station (MSA Galaxy GX2) – A station primarily used for bump testing and calibrating MSA Altair 4X and 5X type meters (GT-402 meters are not bump tested). Each type of meter has its own type of bump test stand. Some locations have multi-dock charging stands connected to the bump stations.
    c. Bump Test – The process of exposing a MSA Altair 4X and 5X type gas meter(s) to a known concentration of gas to assure that the meter(s) is/are calibrated accurately.

2. Manufacturer Information: Reference as needed
www.msasafety.com

3. Gas Meter Distribution – Gas meters are distributed based on need. Meters are not distributed to individuals, but rather, meters are assigned to the work groups that need them frequently, in performing their assignments. The number of meters assigned is based on group size and anticipated need.

   Employees must exercise responsible care for the gas meters and must ensure that the meters are returned after use.

   Supervisors, or their designee(s), will account for the meters, to ensure that they are returned to the docking stations following each shift.

   An Equipment Loan-out Log (as shown on the next page) must be utilized by supervisors to track the meters. Safety will ensure that supervisors are utilizing the Equipment Loan-out Log.

SEE NEXT PAGE

Equipment Loan-Out Log

ASSET# or SERIAL#	Model (GT-402, MSA 4X OR 5X)	Date Due for Service at EITM's (every 3 months)	Date of Bump Test and Use	Bump Test Result PASS/FAIL	Signed Out By:		Time Out	Time In
					ID No.	Initials		

4. Gas Meter Use - Portable gas meters are to be used for determination of acceptable atmospheres. Locations where gas meter use is required, includes, but is not limited to: confined spaces, specific structures within the wastewater treatment plant indicated by posted warnings, and other occasions or locations as determined by supervisors and/or safety.

   The meter shall always be used in accordance with the device manufactures' recommendations and instructions.

   Employees must exercise responsible care for the gas meters and must ensure that the meters are returned to the Docking Station after use. Any problem issues with meters used, must be reported to the Supervisor. The Supervisor will return the meter to the EITM's for inspection, if needed.

   User information/training for each type of meter is available, upon request, from the local Safety Office.

5. Gas Meter Bump Testing – At the beginning of each work day any portable gas meter (with the exception of the GT-402) shall be bump tested at one of the following MSA GX2 bump test locations to assure that the meter is functioning properly.

   The User first must check the cylinder holder to ensure that the cylinder has gas and is functioning properly ("GREEN" on the display holder). If the cylinder holder is found to be in "YELLOW or RED," contact the EITM's for replacement of the gas cylinder.

   Next, turn on the MSA Altair 4X or 5X meter (CENTER button). After the meter goes through its initial warm-up (5-minutes) and shows readings for the four gases and no "ERROR" messages are displayed, insert it into the corresponding station (each type of meter has its own slot). If the meters do not display all four gas readings or show an "ERROR" message, DO NOT USE THE METER, bring it to the EITM shop for inspection.

   The bump test is administered by placing the meter in the appropriate slot on the bump test stand. After the bump test/calibration, the station will then give an indication of "PASS (green screen)" or "FAIL (red screen)." After the "PASS" light is shown the meter is ready for use. If the meter does not go into "PASS," or, "FAIL" is indicated on the screen: DO NOT USE THE METER. The meter must be taken to the local EITM shop for repair/replacement.

6. Bump Test Locations & Types of Meters at each location:
    a. North West WRP's:
        i. Kirie WRP - TPO Control Room
            1. MSA ALTAIR 5X GAS METERS (3 Meters)
            2. MSA ALTAIR 4X GAS METERS (6 Meters)
        ii. Egan WRP – TPO Control Room
            1. MSA ALTAIR 5X GAS METERS (3 Meters)
            2. MSA ALTAIR 4X GAS METERS (6 Meters)
        iii. Hanover Park WRP - TPO Control Room
            1. MSA ALTAIR 5X GAS METERS (3 Meters)
            2. MSA ALTAIR 4X GAS METERS (6 Meters)
    b. O'Brien WRP:
        i. P&B Bldg – Control Room
            1. MSA ALTAIR 5X GAS METERS (3 Meters)
            2. MSA ALTAIR 4X GAS METERS (4 Meters)
        ii. Service Bldg – Tool Crib
            1. MSA ALTAIR 5X GAS METERS (7 Meters)
            2. MSA ALTAIR 4X GAS METERS (9 Meters)
        iii. Process Control Bldg – TPO Control Room Office
            1. MSA ALTAIR 5X GAS METERS (3 Meters)
            2. MSA ALTAIR 4X GAS METERS (4 Meters)

iv. Administration Bldg – IWD Storage Room

1. MSA ALTAIR 5X GAS METERS (3 Meters)
2. MSA ALTAIR 4X GAS METERS (5 Meters)

c. Stickney WRP's:

i. Concentration Control Room

1. MSA ALTAIR 5X GAS METERS (0 Meters)
2. MSA ALTAIR 4X GAS METERS (2 Meters)

ii. West Digesters Control Room

1. MSA ALTAIR 5X GAS METERS (1 Meter)
2. MSA ALTAIR 4X GAS METERS (2 Meters)

iii. East Digesters Control Room

1. MSA ALTAIR 5X GAS METERS (1 Meter)
2. MSA ALTAIR 4X GAS METERS (2 Meters)

iv. West Side Pump Station (Bldg.# 150)

1. MSA ALTAIR 5X GAS METERS (1 Meter)
2. MSA ALTAIR 4X GAS METERS (4 Meters)

v. Pump & Blower Bldg. (Glass House)

1. MSA ALTAIR 5X GAS METERS (0 Meters)
2. MSA ALTAIR 4X GAS METERS (2 Meters)

vi. Pre-Centrifuge/Central Heat Control Room

1. MSA ALTAIR 5X GAS METERS (0 Meters)
2. MSA ALTAIR 4X GAS METERS (3 Meters)

vii. Post-Centrifuge Control Room

1. MSA ALTAIR 5X GAS METERS (0 Meters)
2. MSA ALTAIR 4X GAS METERS (2 Meter)

viii. Sewer Control Area (Office)

1. MSA ALTAIR 5X GAS METERS (9 Meters)
2. MSA ALTAIR 4X GAS METERS (9 Meters)

ix. Engineering Center/Local Sewer Offices

1. MSA ALTAIR 5X GAS METERS (2 Meters)
2. MSA ALTAIR 4X GAS METERS (4 Meters)

x. Mainstream Control Room

1. MSA ALTAIR 5X GAS METERS (1 Meter)
2. MSA ALTAIR 4X GAS METERS (2 Meters)

xi. Racine Avenue Pump Station

1. MSA ALTAIR 5X GAS METERS (1 Meter)
2. MSA ALTAIR 4X GAS METERS (2 Meters)

xii. Tool Crib

1. MSA ALTAIR 5X GAS METERS (0 Meters)
2. MSA ALTAIR 4X GAS METERS (2 Meters)

xiii. EITM Gas Meter Room

1. MSA ALTAIR 5X GAS METERS (24 Meters)
2. MSA ALTAIR 4X GAS METERS (29 Meters)

xiv. OSS Bldg. - Central Control Room

1. MSA ALTAIR 5X GAS METERS (3 Meters)
2. MSA ALTAIR 4X GAS METERS (7 Meters)

xv. Safety Office

1. MSA ALTAIR 5X GAS METERS (2 Meters)
2. MSA ALTAIR 4X GAS METERS (2 Meters)

xvi. Engineering Center/Construction

1. MSA ALTAIR 5X GAS METER (1 Meter)
2. MSA ALTAIR 4X GAS METERS (2 Meters)

xvii. LASMA Construction/Engineering Trailer

1. MSA ALTAIR 5X GAS METERS (4 Meters)

xviii. Engineering Lagrange

1. MSA ALTAIR 5X GAS METER (1 Meter)
2. MSA ALTAIR 4X GAS METERS (4 Meters)
3.

d. Calumet WRP:

i. Central Control Room

1. MSA ALTAIR 5X GAS METERS (7 Meters)
2. MSA ALTAIR 4X GAS METERS (10 Meters)

ii. Tool crib

1. MSA ALTAIR 5X GAS METERS (5 Meters)
2. MSA ALTAIR 4X GAS METERS (8 Meters)

iii. EITM Shop

1. MSA ALTAIR 5X GAS METERS (5 Meters)
2. MSA ALTAIR 4X GAS METERS (9 Meters)

iv. Sewer Control

1. MSA ALTAIR 5X GAS METERS (5 Meters)
2. MSA ALTAIR 4X GAS METERS (8 Meters)

v. Lemont WRP

1. MSA ALTAIR 5X GAS METERS (2 Meters)
2. MSA ALTAIR 4X GAS METERS (4 Meters)

7. Gas Meter Repair and Calibration - The EITM's repair and calibrate all gas detection equipment every three months. Always check the calibration date, displayed on the sticker on the meter, to ensure that the EITM's have inspected the meter. If the meter is "Past Due" the inspection date, RETURN THE METER TO THE EITM'S. If any issue is encountered with the meter, RETURN THE METER TO THE EITM's for inspection. Supervisors must report missing or lost meters to the EITM's.

8. Gas Meter Data Logging – The bump test stations log data from bump tests/calibrations and store it. This information is reviewed by the Safety Department.

9. Gas Meter Replacement – Gas meters will be replaced on a schedule to be determined on life expectancy projections from the manufacturer, EITM's and determination of need, by the Gas Meter Committee.

10. On a monthly basis, the Safety Department will conduct an audit of the gas meters. Attempts will be made to locate the meters initially. If unsuccessful in locating the meters, a report will be sent to the Director of M&O.

Revised/Reviewed:

11/8/2016 JLK
11/4/2015 JLK
11/30/2012 JLK