



# Performance Based

FIRE PROTECTION ENGINEERING

## Portland Water Bureau Bull Run Filtration Facility

*Fire Protection & Life Safety  
Third-Party Consulting Review*

**Prepared For:**  
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**PORTLAND WATER BUREAU – BULL RUN FILTRATION FACILITY  
FIRE PROTECTION & LIFE SAFETY THIRD-PARTY REVIEW**

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## 1. INTRODUCTION

Performance Based Fire Protection Engineering (Consultant) was retained by Radler White Parks & Alexander LLP to serve as a third-party reviewer in regard to review of fire protection and life safety code compliance for the Portland Water Bureau Bull Run Filtration Facility. Of specific importance in our engagement was to review architectural code plans (life safety plans), fire suppression plans, and fire alarm plans from the Bid Documents drawing package dated April 2023. Our role was to ensure fire and life safety code and standard compliance was followed in the design of the multiple buildings throughout the proposed complex. The intent of this review was to confirm that the buildings are currently designed in accordance with the applicable codes and standards and follow industry best practices. We understand the Bid Documents package was submitted to the City of Gresham for building permit review and that review is currently in process. Our comments may assist the City of Gresham in completing their review.

In addition to the Bid Documents drawing review, the Consultant has performed a review of the Hazardous Materials Management Plan (HMMP) and Hazardous Materials Inventory Statement (HMIS). Similar to the review of the Bid Documents drawing package, review of the HMMP/HMIS was performed to ensure that materials were appropriately classified in accordance with the building and fire code, maximum allowable quantities were examined and in compliance, and determination of high-hazard occupancies assigned and utilized in the design of the facility.

Lastly, the Consultant has provided a review of the application of NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments* (2020 Edition). Multnomah Rural Fire Protection District 10 (RFPD10) raised several concerns during the current land use permitting process for the facility (December 2022 and June 2023), several of which cite the application of NFPA 1710, response times, and response resources. The Consultant has provided an overview of the applicability of NFPA 1710, as well as specific responses to the testimony submitted by RFPD10. In addition, historical response data to similar water treatment and wastewater treatment facilities has been provided as supporting information.

The following sections of this report document our review of the Bid Documents, HMMP/HMIS, and NFPA 1710 and fire department/emergency responses. Appendices are also attached to this report.

The applicable codes and standards for our review include, but may not be limited to, the following:

- 2019 Oregon Structural Specialty Code (OSSC); based on the 2018 International Building Code
- 2019 Oregon Fire Code (OFC); based on the 2018 International Fire Code
- 2021 Oregon Electrical Specialty Code; based on the 2020 Edition of NFPA 70, *National Electrical Code*
- NFPA 13, *Standard for the Installation of Sprinkler Systems* (2016 Edition)
- NFPA 14, *Standard for the Installation of Standpipe and Hose Systems* (2016 Edition)
- NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection* (2016 Edition)
- NFPA 72, *National Fire Alarm and Signaling Code* (2016 Edition)
- NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments* (2020 Edition)
- NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems* (2015 Edition)
- Factory Mutual Global (FMG) Data Sheets and Design Criteria



## 2. REVIEW OF BID DOCUMENTS

### 2.1. Architectural Code Analysis Plans (Life Safety Plans)

The Consultant performed a review of the provided architectural code plans (life safety plans) from the Bid Document set, which are contained within the “A” (architectural) series drawings dated April 10, 2023. The review included ensuring that each of the buildings meet the requirements of the OSSC, specifically Chapter 3, *Occupancy Classification and Use*; Chapter 5, *General Building Heights and Areas*; Chapter 6, *Types of Construction*; Chapter 7, *Fire and Smoke Protection Features*; Chapter 9, *Fire Protection and Life Safety Systems*, and Chapter 10, *Means of Egress*. The intent of this review was to ensure that the design team identified and designed each of the evaluated buildings appropriately, as they relate to high-level fire protection and life safety code requirements.

We did not identify any code issues or requirements which would result in a change in design approach, building use, size, or fire protection features. We did identify items which can be better represented on the Code Plans for clarity by reviewers, stakeholders, and authorities having jurisdiction (AHJs). These comments are applicable for building permit approval and issued-for-construction documents as well as the longevity of these documents through the life cycle of the buildings. We recommend the design team consider the recommended improvements and clarifications listed in Appendix A and incorporate the findings into issued-for-construction documents where necessary.

### 2.2. Fire Protection Drawings (Suppression)

The Consultant performed a review of the provided fire protection drawings (F Series) from the Bid Document set dated April 10, 2023. The review included ensuring that the buildings within the campus required to have a fire suppression system, as dictated by the code analysis sheets, were designed in accordance with the Oregon Structural Specialty Code and applicable NFPA standards. The buildings included in the review were Building 11-Administration, Building 12-Maintenance, Building 70-Chemical, and Building 81-Ozone Generation. Each of these four (4) buildings will be provided with an automatic sprinkler system. Additionally, each of the four (4) buildings have clean agent systems (NOVEC 1230) designed for specific locations. It is our understanding that the site will be provided with a vertical turbine fire pump, with a water supply provided from the clearwell (1,000,000-gallon capacity). The pump is expected to be 1,500 gpm at a discharge pressure of 110 psi. Hydraulic calculations were not provided or reviewed and will be the responsibility of the contractor to furnish with shop drawing submittal once construction is authorized.

The fire protection drawings meet the requirements of the building code and applicable NFPA standards. It is also important to note that FM Global (FMG) design criteria apply to this facility, and were met by the design team through our review of the design documents. FMG criteria are typically more stringent than NFPA, specifically NFPA 13, and should be considered as providing a higher level of safety for the sprinkler protected buildings. Our review was of the provided Bid Set documents. A review of complete contractor shop drawings was not performed as they will not be prepared until construction is authorized.

In general, we did not identify any code issues or requirements which would result in a change in design approach or basis of design for the fire protection systems. However, we did identify items that should be addressed and updated to provide improved clarity on the fire protection drawings. Appendix B provides our recommendations and findings.



### 2.3. Fire Alarm Drawings

The Consultant performed a review of the provided fire alarm drawings from the Bid Document set, which are contained within the Security Electronics (ES Series) dated April 10, 2023. The review included ensuring that the buildings within the campus required to have a fire alarm system, as dictated by the code analysis sheets, were designed in accordance with the OSSC and applicable NFPA standards, including NFPA 72. The following buildings were provided with either complete or partial fire alarm systems; however, it should be noted that the majority of the buildings do not require a fire alarm system based on the occupancy use. The provisions of the fire alarm systems exceed the code requirements and are considered an additional level of safety.

- 11 - Administration - Full Fire Alarm
- 12 - Maintenance - Sprinkler Monitoring Only
- 15 - Main Electrical Complex - Full fire alarm w/ detection throughout
- 16 - North Electrical Complex - Full fire alarm w/ detection throughout
- 30 - Treatment Process Complex - Notification on Gallery, Deck Levels. Partial detection.
- 40 - Finished Water - Full Fire Alarm - Manual w/ some detection
- 45 - Fire Pump Station - Drawings not in security set
- 65 - Mechanical Dewatering Building - Manual FA System
- 70 - Chemical Building - Full Fire Alarm
- 81 - Ozone Generation Building - Full Fire Alarm
- 93 - Overflow Basin Electrical Building - Full Fire Alarm

The provided fire alarm drawings meet the requirements of the building code and applicable NFPA standards. Our review was of the provided Bid Set documents. A review of complete contractor shop drawings was not performed as they will not be available until construction is authorized.

Our recommendations and findings are provided in Appendix C.

## 3. HAZARDOUS MATERIALS MANAGEMENT PLAN (HMMP) & HAZARDOUS MATERIALS INVENTORY STATEMENT (HMIS)

The Consultant was provided with the *Technical Memorandum – Hazardous Materials Management Plan* for the Bull Run Treatment Projects Filtration Project to review. This document, dated September 22, 2022, included the combination of the Hazardous Materials Management Plan (HMMP) with the Hazardous Materials Inventory Statement (HMIS). The Consultant reviewed these documents in accordance with applicable sections of the OSSC and OFC. The following subsections of this report will provide an overview of our findings. Of most importance, we determined that several materials were conservatively classified, specifically in regard to the classification of several materials as “corrosives,” where in our review they would not be considered corrosive per the applicable codes. It should be noted that the design team recently provided an amended version of the HMMP/HMIS, in a Technical Memorandum dated August 4, 2023; this updated document addressed our comments in regards to the classifications initially utilized as well as clarification of outside control areas.



### 3.1. **Material Classification Findings from the Consultant**

Throughout the HMMP report dated September 2022, there were several materials which, per the definitions of the code, were classified conservatively. Specifically, four (4) materials in the Chemical Building were listed as “Corrosive.” However, upon reviewing the Safety Data Sheets (SDS) for these materials, they are not considered corrosive per the definitions of the building and fire code.

The Oregon Structural Specialty Code defines a corrosive as:

*“A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the point of contact. A chemical shall be considered a corrosive if, when tested on the intact skin of albino rabbits by the method in DOTn 49 CFR, Part 173.137, such chemicals destroys or changes irreversibly the structure of the tissue at the point of contact following an exposure of 4 hours. This term does not refer to action on inanimate surfaces.”*

The materials conservatively classified as corrosive included:

1. Sodium Bisulfite (40%)
2. Soda Ash
3. Sodium Hypochlorite (0.8% solution will be made on site and stored)
4. Polyaluminum Chloride (50%)

Soda Ash was also listed as a toxic material, however, under the definition of Toxic per the Oregon Structural Specialty Code, Soda Ash is not a toxic material. To be deemed Toxic, materials must have a LD<sub>50</sub> between 50 and 500 mg orally; 200 to 1,000 mg in continuous contact for 24 hours; or LC<sub>50</sub> between 200 and 2,000 ppm when administered via inhalation for 1 hour to albino rats. As reported by the SDS, the LC<sub>50</sub> and LD<sub>50</sub> for Soda Ash are higher than these defined thresholds.

Table 1 of the HMIS provides the classifications assigned to all materials throughout the facility. The SDS for each of the identified four (4) materials above has been provided in Appendix E of this report; as previously noted, these materials are not considered corrosives, and in the case of Soda Ash, also not a Toxic. The SDS for Soda Ash and Sodium Hypochlorite were provided to us from the team for review, while the SDS for Sodium Bisulfite and Polyaluminum Chloride were obtained from industry suppliers who had the SDS readily available for review. It should be noted that the supplier represented may not be the same that will deliver the product to the facility; however, in review of multiple vendors, the SDS hazards are identical.

In conclusion, after reviewing the reported material classifications, we determined Aluminum Sulfate to be the only material to meet the definition of the building and fire code for a Corrosive material. Ultimately, this does not change the building classification, as the quantity of Aluminum Sulfate still exceeds the maximum allowable quantity of a corrosive without the occupancy being considered as a Group H, and therefore the Chemical building classification remains as a Group H-4 occupancy, as the design documents indicate. The current design of the H-4 occupancy meets all of the required design requirements, as specified in Section 415 of the OSSC. However, four (4) of the previously classified five (5) corrosive materials can be downgraded to irritants (a non-regulated category), thus demonstrating a lower overall risk to human health than the original HMMP/HMIS may convey.

Appendix D provides our recommendations and findings at the conclusion of our HMMP/HMIS review.



## 4. APPLICATION OF NFPA 1710 AND FIRE DEPARTMENT RESPONSE

The Consultant performed a review of Multnomah Rural Fire Protection District 10's (RFPD10) initial comments/testimony from December of 2022, and provided our responses to each appropriate comment within our area of expertise. In addition, we have reviewed the applicability and requirements of NFPA 1710 and reviewed historical data on responses to similar facilities.

### 4.1. RFPD10 Comments

RFPD10 provided initial resolution, report, and recommendations on December 30, 2022, to be considered in Multnomah County Land Use Planning's evaluation of the Portland Water Bureau Filtration Facility. In their document, they provided several general concerns in the main text of the letter, followed by twenty (20) "RFPD10 Findings." The Consultant has reviewed RFPD10's document and provided responses to comments within our area of expertise. The comments identified as being appropriate for a response from the Consultant are provided in Section 4.1.1. We have provided input and responses to Findings #3, 4, 5, 6, 7, 16, and 19.

#### 4.1.1. Specific Findings in RFPD10 Letter with Consultant's Responses

*#3. RFPD10 is able to staff 1 engine with 3 firefighters 24/7. Back up support for serious incidents or overlapping calls comes from GFES or Clackamas Fire stations. Distance from these stations competing calls increases response times.*

Response: Gresham Fire and Emergency Services (GFES) is contracted to staff Station 76, and therefore provide the manpower for RFPD10. RFPD10 themselves provide no volunteer staffing nor career staffing under their own payroll. Response issues to multiple incidents at once is a not a unique issue for Station 76, GFES, or any fire department. As will be noted in Section 4.2 of this report, NFPA 1710 does not require the Effective Response Force (ERF) to be achieved within a defined time period for specialty calls (Hazmat, Technical Rescue, large-scale incidents). Rather, 1710 allows for the use of automatic and mutual aid to support these incidents. For standard response types, such as fire alarms, medicals, outside fires, and citizen assist calls, unfortunately overlap incidents occur and yes, can lead to delayed responses. However, this is not a new issue specific to this new proposed facility.

In accordance with the City of Gresham 2022 *Community Risk Assessment and Standards of Coverage* Report, prepared by Fitch & Associates (hereon called *Standard of Coverage* document), Station 76 not only has the lowest call volume, but also the lowest probability of overlapped calls (8.5% compared to the next lowest of 21.1% for Station 31, up to 46.2% for Station 72). In addition, Station 76 has the highest Station Demand Zone Reliability of 90%; the authors of this report indicate that the 90<sup>th</sup> percentile is "considered best practice and the most reliable measure to perform."

In conclusion, Station 76 is able to appropriately handle its current call volume at the highest percentage of all stations within GFES. The anticipated call volume of this new proposed facility would be expected to track similarly, if not reduced, from that of the



existing *wastewater* treatment plant within the city limits; this facility averages 4.5 calls for service per year. More information on this topic is described under Section 4.3.1 of this report.

*#4. Firefighters at Station 76 are not trained or equipped to deal with specialty rescue and response services including (but not limited to) hazardous materials, and confined space rescue. These services must be dispatched from various Gresham fire stations which increases response times. Note: as of the date of this document, continued availability of HazMat response from GFES is uncertain due to budget restraints.*

Response: The training and equipment provided at the first due station is not applicable to an argument on response time. NFPA 1710, as will be noted in the following section of this report, does not require the complete hazardous materials or technical rescue response force to be readily available and on-scene within any response time metric. Rather, initial responders to a hazardous materials incident are expected to respond, arrive, identify the emergency, and operate in an NFPA 472 defined “Operations” role. NFPA 1710 allows outside resources to be identified and utilized to support special operational needs, provided processes are established to request these resources. This process is established by the State of Oregon and available to all State of Oregon fire departments and districts. In addition, it is identified within GFES Standard Operating Guideline 2.6.4, *HM-3 Operations* (Appendix F of this report). Regional Hazmat Response teams are available, including Response Team #3 which responds out of Gresham Station 72, approximately 16 minutes from the proposed project site.

In regard to the claimed budget constraints and the availability of the Hazmat response, this claim is unfounded. In a recent phone call with Mariah Rawlins, Assistant Chief Deputy of Emergency Response Services Division of the Oregon Office of the State Fire Marshal (OSFM), she stated that there is currently no plan to defund regional hazmat teams. In fact, the state plans to bolster the State Regional Response Team system by providing additional “support” teams. These support teams will be able to provide resources and responses to lower-level incidents so that the full regional teams (i.e., Hazmat Team #3) can remain in service. She also commented that, to her knowledge, GFES does not plan to downgrade their level of service. Regardless of the status of GFES serving as the main resource of Hazmat Team #3, even if they were disbanded or moved to another jurisdiction, NFPA 1710 still allows for the utilization of a regional response team (at no defined time threshold) to respond to a hazardous materials incident. For example, perhaps it would be Regional Team #4, out of Portland, approximately 35 minutes to the proposed project site.

The same approach applies for technical rescue calls, such as a trench rescue, high angle, confined space, or structural collapse. Although the state disbanded the regional technical rescue (USAR) teams in 2013, a recently passed State of Oregon House Bill (Bill 2484) has directed OSFM to reestablish the regional USAR teams. Although this process will take time, the support and funding to establish these teams is being re-introduced. Assistant Chief Deputy Rawlins also stated that most departments who were part of the previous regional teams still have and maintain existing equipment and will be looked at first to help re-introduce the program; one of these departments is GFES.



Regarding confined space rescue, the Water Bureau primarily has alternate entry confined spaces versus permit-required confined spaces. In the rare event of a permit-required confined space, the Water Bureau hires a rescue agency to support the work, reducing the need for a confined space entry response.

*#5. Growing financial shortfalls, flat staffing levels and escalating number of calls within the City of Gresham adds “unit availability” to “distance” as a potential cause of response time delays when GFES support is needed in the primary RFPD10 service area.*

Response: As referenced in our response to Comment #3, Station 76 has the highest response reliability of all stations within GFES/RFPD10. Although additional GFES units are busier and have less reliability, in reviewing the call volume of Station 76 and comparing to historical response data on similar facilities, the call volume at the Bull Run Facility itself (once constructed) is not expected to cause a significant demand on this station or mutual/auto aid partners.

*#6. Because of the large area (approx. 14 sq. mi.) serviced by Station 76, RFPD10 is unable to meet response time standards established by the NFPA.*

Response: If response times are already exceeded, the new proposed facility does not have an impact on this metric. In review of the *Standard of Coverage* document, an ERF Depth Chart heat map indicates that nearly 50% of Station 76’s district currently results in an ERF of 0-2 personnel at 8 minutes; since Station 76 is staffed with 3 personnel, this means that a significant portion of the district cannot be accessed within 8 minutes. The proposed Bull Run Facility will sit right at the threshold of the 8-minute response, with an expected arrival time between 7 to 8 minutes for Station 76 (considering time from dispatch to on scene), however over 50% of their district results in response times much greater than 8 minutes. These areas are more remote than the proposed Bull Run facility, indicating that other occupancies are at higher risk for less effective response forces than the proposed Bull Run Facility. In addition, when reviewing response data, Station 76 has responded to incidents in these more remote areas (i.e., greater than 8-minute responses), including response to hazardous materials incidents. The argument about response times seems to be unfounded considering the current response and staffing arrangement of this district. The Bull Run facility is approximately 2.6 miles from Station 76 based on road travel, and therefore provides a greater ERF than the majority of the remaining rural area, which is already under the district of RFPD10/GFES Station 76. Figure 1, below, re-represents the ERF heat map from the *Standard of Coverage* document.



Figure 8: GFES ERF Depth Chart

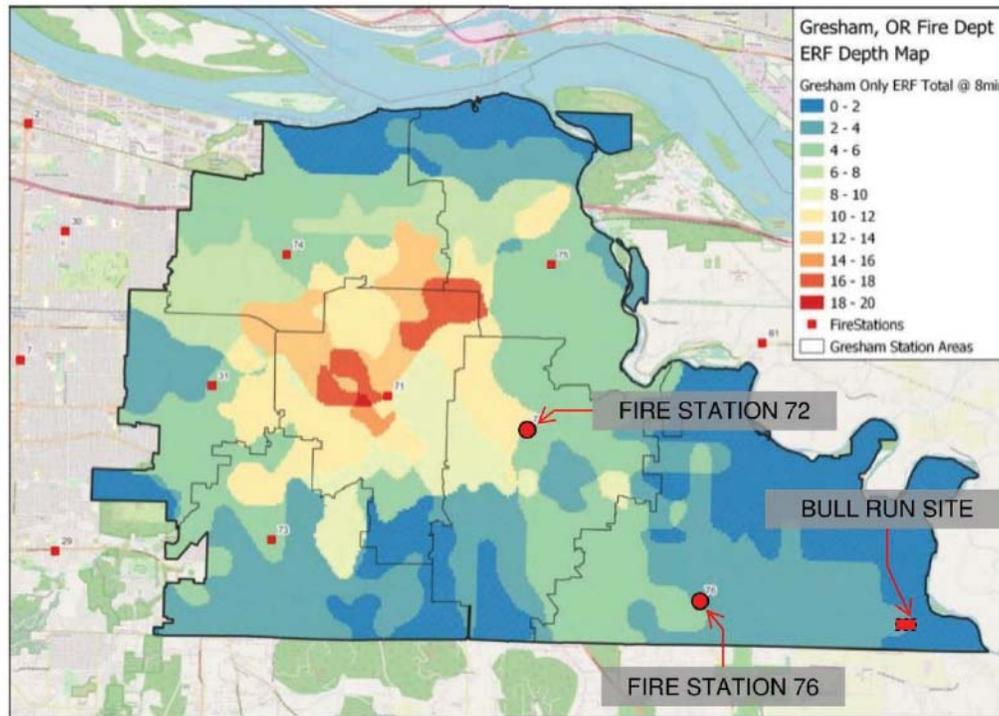


Figure 1. Heat Map From Standard of Coverage Document Providing ERF within 8 minutes

#7. Rural county roads provide the sole access routes to calls in RFP10's primary service area. Road and traffic conditions influence response times and also contribute to the number of emergency calls.

Response: The Consultant agrees that traffic conditions, specifically linked to construction, can increase response times. When traffic closures or reductions occur, these should be relayed to emergency services, alternative access and emergency routes provided, and clear and concise plans established to address these concerns.

The commentary on this page of RFPD10's responses, and the several preceding with supplemental information on road conditions, data on traffic incidents, and lack of funding are noted and understood. The Consultant's role is not to determine if the roadways are in suitable condition or recommend upgrades to the transportation division. However, in respect to fire department and emergency services response, road shutdowns and reductions (lane closures) are a common occurrence in all jurisdictions. When these reductions occur, 911 communications is typically notified of these closures and reductions and then relayed to emergency personnel via daily radio reports, station alerts, emails, and other avenues. In the event that a prolonged lane closure occurs, alternative routes and/or availability for emergency response through the closure are established.



We recommend that well-documented action plans be established prior to site work and construction, identifying an established approach to how roadway impacts will be relayed to all emergency responders. Additionally, if road closures result in shorter response times from neighboring mutual aid fire stations, a policy should be established to include those resources as automatic aid for calls in those restricted access areas of the response area.

*#16. Any increase in call load related to the construction or ongoing operation of the proposed filtration plant reduces the availability of limited Station 76 equipment and staff to respond to other calls for emergency services within RFPD10's primary service area or provide backup service in adjacent areas.*

Response: Station 76 protects a mostly rural response area compared to the other GFES stations. As a byproduct, the station consistently has the lowest call volume of all GFES stations, responding to between 500-600 calls for service per year. In addition, they maintained the highest response availability of all the stations in the department. The physical number of incidents related to construction have not been analyzed to date, however based on historical call data, Station 76, out of all of the stations within the response system, has availability for additional calls for service.

*#19. Hazardous materials will be utilized in large volumes on a 24/7/365 basis at the proposed plant. Hundreds of hazardous materials deliveries will be required annually in all weather conditions. The potential for release of hazardous materials exists during transport, off-loading, storage and feed equipment failure. Accidental release of hazardous materials represents an ongoing condition that cannot be eliminated through best management practices, regulations, training or technology.*

Response: The Consultant has reviewed the hazardous materials to be utilized on site in Section 3 of this report and provided our review of the HMMP and HMIS, as well as provided additional recommendations in Appendix D. In addition, although historical data cannot be utilized to rule out any possibility of a future hazardous materials incident, it should be noted that Section 4.3 of this report documents historical data on the existing wastewater treatment plant (WWTP) within Gresham city limits, which utilizes more hazardous materials and processes than expected at the Bull Run facility.

For example, per the WWTP Program Manager, two (2) 5,000-gallon containers of 12.5% Sodium Hypochlorite are present and utilized at this facility (Corrosive); this is compared to the 0.8% concentration of Sodium Hypochlorite (Non-Corrosive) at the proposed Bull Run facility. The wastewater facility had no documented hazardous materials incidents in the last 10 years.

In addition, further statewide historical data yielded very limited hazardous materials incidents at wastewater or water treatment facilities, the details of which are described in Section 4.3.3. The most significant incidents identified occurred when chlorine gas was utilized in processes; four (4) incidents from 1990 to 2020 were identified involving chlorine gas; chlorine gas will not be utilized at the Bull Run facility. The remainder of the



incidents were of smaller scale and resulted in no injuries, deaths, and minimal disruption to facility operations and the community.

RFPD10 raised concerns under this section by identifying numerous hazardous materials to be used and transported to the site. It should be noted that we reviewed the HMMP and HMIS (see Section 3 of this report) and provided clarity on several of these materials. In general, we found that four (4) of the five (5) previously classified corrosives are actually not considered corrosive per the definition of the building and fire code. Although the total quantity of the one remaining corrosive material still results in an H-4 classification, the number of unique materials classified as hazardous was previously over-reported, with only one material meeting the definition of corrosive. We recommend review of the referenced section of this report for additional information on the hazardous materials.

#### **4.1.2. Additional RFPD10 Testimony From June 26, 2023**

RFPD10 provided supplemental testimony on June 26, 2023 in a letter titled “T-3-2022-16220-Supplemental Testimony” and submitted to Multnomah County Land Use Planning. For the purpose of our review, we have provided additional responses herein; most of our responses will reference our findings in Section 4.1.1.

##### **#1. Section 1.A: Filtration Facility— Conditional Use Application Narrative Winterbrook Planning.**

Response: The overall comment by RFPD10 is that completion of the Fire Service Agency Review Form should not be construed as the sole requirement that adequate fire protection services are present in the existing area. The board stated “Subsequently, the Board of Directors submitted detailed comments related to the Applicant’s proposal that recommends denial of the Application T3-2022-16220 as RFPD10 cannot provide adequate services in light of what is proposed. An additional copy of those comments is attached.”

This comment is interpreted that RFPD10 is referencing the lack of capabilities to specific incident types (Hazardous Materials, Technical Rescue) and response time issues. Please reference our previous responses to comments #4 and #6 in Section 4.1.1

##### **#2. Responses to the May 8, 2023 memorandum from Winterbrook Planning regarding testimony previously submitted by RFPD10**

###### **Page 1 , Consultant Response to item 1 .a)**

Response: We recommend reviewing all of our previous comments within Section 4.1.1 of this report for our understanding of the available services, required level of service, and understanding of response times and automatic aid to the RFPD10 services areas.

###### **Page 1 , Consultant Response to item 1 .b)**

Response: We recommend reviewing all of our previous comments within Section 4.1.1, but specifically responses to original Comment #5, #6, and #16. One additional item we would note is in response to the RFPD10 statement that “First,



it assumes the RFPD10 relationship with Gresham Fire and Emergency Services (GFES) will last indefinitely when the continued relationship is based on the ability of both parties to successfully negotiate acceptable service agreements in the future.”

It should be noted that whether RFPD10 contracts with Gresham or not, either NFPA 1710 would still apply if RFPD10 hires their own career staff, or if volunteer service re-commences, NFPA 1720 would then apply. NFPA 1720 has near identical verbiage to NFPA 1710, including how an agency would handle an advanced service emergency scene such as a hazardous materials incident or technical rescue call.

An additional comment was “The RFPD10 Board has concluded that construction and operation of the proposed industrial-scale water treatment plant and associated raw and finished water pipelines will require emergency services other than those existing or programmed for the area.” Based on our review of historical data, as seen in Section 4.3, the increased call burden would not be expected to be significant.

Page 2, Consultant Response to item 1.c)

Response: In reference to RFPD10 statement “We are not staffed or equipped to respond to calls related to an industrial scale development or the massive amounts of traffic that its construction and operation will generate,” we reference our previous response to Comment #4 in Section 4.1.1, where it is not the intent of NFPA 1710 that the first due district would be able to handle one-hundred percent of the call types, specifically hazardous materials or technical rescue based.

Page 2, Consultant Response to item 2.a)

Response: We do not have a specific comment to the additional testimony RFPD10 provided in relation to this item. However, reference Section 3 and Appendix D of this report for our review of the HMIS and HMMP, including initial conservative classification of corrosive materials.

Page 3, Consultant Response to item 3), 3.a, 3.b, 3.c, and 3.d

Response: We do not have any comments to RFPD10’s additional testimony as these items relate to the County’s Comprehensive Plan and the project’s forecasted truck trips and are outside of the scope of our review.

Page 4, Consultant Response to item 3.e and 3.f)

Response: We do not have any comments to either RFPD10’s additional testimony or Winterbrook Planning’s response, with the exception of our recommendation to ensure road closure updates and alternative routes are maintained, as discussed in our previous response to Comment #7 in Section 4.1.1.



#### 4.2. NFPA 1710

NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*, contains minimum requirements relating to the organization and deployment of fire suppression and related emergency responses for career fire departments, and addresses and contains the following main three (3) scope items:

1. Address functions and performance objectives of fire department emergency service delivery, response capabilities, and resources.
2. Contains general requirements for managing resources and systems, such as health and safety, incident management, training, communications, and pre-incident planning.
3. Addresses the strategic and system issues involving the organization, operation, and deployment of a fire department and does not address tactical operations at a specific emergency incident.

The primary concern reported by RFPD10 was response to special operations incidents, specifically hazardous materials response and technical rescue/confined space incidents. Section 4.4 of NFPA 1710 addresses these items, through providing the following:

Section 4.4.2 states that *“The fire department organizational statement shall ensure that the fire department's hazardous materials response capability includes personnel, equipment, and resources to deploy at the first responder operational level as required by 29 CFR 1910.120.”*

Section 4.4.3 states that *“The fire department organizational statement shall ensure that the fire department's confined space response capability includes personnel, equipment, and resources to deploy at the confined space operational level as required by 29 CFR 1910.146.”*

As can be noted in the above, the first-arriving units and response from the jurisdiction are intended to provide “operations” level response to these incidents. It is not the intent of the standard that the first arriving units or even a certain jurisdiction can handle a complete complex incident holistically by themselves. Rather, the standard calls for the applicability of calling for additional resources to handle these more complex incidents; this includes the utilization of specialized teams such as the Water Bureau retaining a dedicated private rescue team when permit-required confined space entries are needed. Operations level response to a hazardous materials incident would result in emergency responders trained and certified to the “operations” level expected to do as much as possible to mitigate the incident without having to set foot inside the Hot Zone. The mission-specific responsibilities of first responders at the “operations” level include:

1. Assisting in controlling, and minimizing the spread, of the HazMat release.
2. Knowledge of defensive HazMat techniques such as absorption, damming, diverting, vapor dispersion and suppression.
3. Experience in basic air monitoring and technical and mess decontamination (i.e., use of their apparatus master stream or hose lines).
4. Established hazard zones and assisting with evacuation and victim rescue.

Section 4.8 of the standard discusses intercommunity organizations. 4.8.1 states that *“Mutual aid, automatic aid, and fire protection agreements shall be through a written intergovernmental agreement...”*



*including the resources to be made available, availability of interoperable communications, and the designation of the incident commander.”* Adding on to the above description of the first arriving unit(s) operating as operations-level responders, the 1710 Standard allows for the use of mutual and automatic aid to mitigate a large-scale incident outside of the capabilities of the initial arriving unit. These aid requests could be as simple as an additional station from the jurisdiction, Station 72 for Hazmat #3, or through a more robust response from a multi-unit regional response team utilizing resources available from across the State.

Section 5.4 of NFPA 1710, *Special Operations Response*, discusses that response to special operations incidents shall be organized to ensure that the fire department’s special operations capability includes members, equipment, and resources to deploy the initial arriving company and additional alarm assignments providing such services. The very next sub section allows for the fire department to use established automatic aid or mutual aid agreements to comply with the requirements of Section 5.4. In addition to this, Section 5.4.6 states that *“If a higher level of emergency response is needed beyond the capability of the fire department for special operations, the fire department shall determine the availability of outside resources that deploy these capabilities and the procedures for initiating their response.”* and Section 5.4.7, *“The fire department shall limit its activities to only those specific special operations functions for which its members have been trained and are correctly equipped”*.

RFPD10, via GFES, has established procedures and policies for when a higher level of response is required. This would apply to incidents such as large-scale hazardous materials incidents, technical rescue incidents, or large fires. It is not the intent of NFPA 1710 to dictate that all resources need to be within the first-due response company’s area of expertise, or within any dedicated or required response times. As can be seen through various repetitive sections of NFPA 1710, it is very clear that when the magnitude of an incident exceeds the capabilities of a response district or first-arriving units, additional support is allowed to be utilized to respond to these incidents. The GFES staffs and operates the regional hazardous materials response team out of Station 72. However, the hazardous materials unit can also operate as a local resource, outside of the state response system, when requested by other first-due GFES units upon identification of a hazardous material incident. If the incident exceeds the capabilities of the GFES hazardous materials personnel or equipment, the policy for activating additional resources from the State is well documented.

### **4.3. Historical Data**

Historical data by itself is not used to demonstrate that a specific emergency or hazard will never be expected at a facility. However, it can be utilized to understand overall risk and specifically to expected call volume and call-types. For our analysis and review, we examined responses to the existing City of Gresham Wastewater Treatment Plant, as well as historical data to wastewater treatment plants and water treatment facilities across the entire State of Oregon from 1985 through present day. An overview of our findings is provided in the following subsections.

#### **4.3.1. Responses to Gresham WWTP**

A public records request was submitted to the GFES for historical data on incidents at the WWTP, located within city limits at 20015 NE Sandy Blvd. Ten (10) years of response data was provided, yielding 46 incidents (4.6 incidents per year). The majority of these incidents were responded to by Gresham Fire Station 74.



Table 1 provides an overview of the call types by number of total incidents responded to at this address. The coding, as exported from the National Fire Incident Reporting System (NFIRS), is generalized into four (4) typical call types; Emergency Medical Services (EMS), False Alarms/Good Intent, Fire calls (outside fire/prescribed/non-structure), and Hazmat/Tech Rescue. Complete determinate coded calls are provided in Appendix G of this report.

Nearly 74% of all incidents were false alarms or good intent; fire calls followed, with 50% of the fire calls being authorized controlled burns. EMS calls accounted for nearly 10% of the call volume. **There were 0 hazardous materials or technical rescue calls responded to during the 10 years of provided data.**

**Table 1. Historical Response Data to Gresham WWTP (10 years)**

Call Type	# of Incidents	%
EMS	4	9%
False Alarms/Good Intent	34	74%
Fire Call (Non-Structure)	8	17%
Hazmat/Tech Rescue	0	0%

Although the Consultant recognizes and agrees that historical data cannot by itself rule out a future specific incident type, hazard, or concern, the above data is reflective of a facility and processes that are well established, controlled, and operated in a safe and effective manner. It should also be noted that the existing WWTP utilizes processes and materials which would be expected to be more hazardous than those for the proposed Bull Run facility. For example, Sodium Hypochlorite will be mixed on-site at Bull Run, from raw salt material; in its stored form it will be at a 0.8% concentration, a non-hazardous concentration. At the existing City of Gresham WWTP, Sodium Hypochlorite is stored at 12.5% concentration.

**4.3.2. Responses to Columbia Blvd WWTP (City of Portland)**

Emergency responses were also examined for the Columbia Blvd Wastewater Treatment Plant in Portland, located at 5001 N. Columbia Boulevard. From January 1, 2013 through July 1, 2023, the City of Portland Fire Department was dispatched to 60 incidents.

Table 1 provides an overview of the call types by number of total incidents responded to at this address. The coding used in the table below was generalized in the same manner as Table 1; EMS, False Alarms/Good Intent, Fire calls (outside fire/prescribed/non-structure), and Hazmat/Tech Rescue. Complete determinate coded calls are provided in Appendix G of this report.

False alarm/good intent as well as EMS calls accounted for 40% and 42% of the call volume respectively; fire calls (non-structure) resulted in the remaining 18% of the call volume. **There were 0 hazardous materials or technical rescue calls responded to during the 10 years of provided data.**



**Table 2. Historical Response Data to Portland WWTP (10 years)**

Call Type	# of Incidents	%
EMS	25	42
False Alarms/Good Intent	24	40
Fire Call (Non-Structure)	11	18
Hazmat/Tech Rescue	0	0%

**4.3.3. Responses to Additional Wastewater and Water Treatment Plants**

Additional data was provided by Tualatin Valley Fire & Rescue for response information to the following facilities within their jurisdiction:

- a) Wilsonville Wastewater Treatment Plant
- b) Lake Oswego/Tigard Water Treatment Plant
- c) Newberg Water Treatment Plant
- d) Clean Water Services-Durham Water Resource Recovery Facility
- e) Clean Water Services-Rock Creek Water Resource Recovery Facility

The data for the above facilities was again provided from January 1, 2013 through July 31, 2023. The response data and statistics track similar to those provided in the previous two sub-sections of this report. There was one (1) swift water emergency in 2016 at the Wilsonville WWTP. The specifics of this incident were not provided. The complete call history is provided in Appendix G of this report.

**4.3.4. State Historical Response Data to Wastewater or Water Treatment Facilities**

Hazardous materials incidents reported to the Oregon Office of the State Fire Marshal (OSFM) from 2010 to current year are available at the following link:

<https://www.oregon.gov/osp/programs/sfm/Pages/Hazardous-Incident-Information.aspx>

We reviewed the as-reported incidents from 2010 through 2023 and specifically focused on incidents which occurred at a wastewater or water treatment facility. This was conducted through sorting “Property Types” and examining “water-utility,” “water-other,” “sanitation utility,” and “industrial” facilities; keyword searches for “wastewater” and “water treatment” were also performed in case the submitting agency coded the property type incorrectly. Seven incidents were identified:

1. May 11, 2012 – 150 to 200 gallons of 12.5% Sodium Hypochlorite was leaked from a 1,000-gallon tank at wastewater treatment facility; chemical supplier was able to secure leak and contain 75% of the leaked liquid, with remaining leaking to soil. (Seaside F&R)
2. November 12, 2012 – Odor of hydrocarbons in the water being treated itself at an unknown water utility site. Incident source unfounded. (Albany FD)



3. September 12, 2014 – Leaking chlorine gas at wastewater treatment facility; building was negatively pressurized with no leak to atmosphere. Hazmat Team #3 entered and secured the leaking regulators. (Clackamas)
4. May 9, 2015 – Investigation of odor of propane in yard of Tualatin Valley Water District. Responders found nothing, good intent. (Tualatin)
5. October 27, 2016 – Sodium Hydroxide at 2% concentration was leaking from a broken pipe at water treatment facility. Hazmat Team #9 determined no active leak after arrival and scene was safe for facility to perform cleanup. (Forest Grove F&R)
6. December 6, 2017 – Chlorine gas leak at water treatment facility; a 1-ton cylinder had an active leak and Hazmat Team #11 mitigated the leak. (City of Astoria)
7. December 1, 2021 – Water treatment facility staff entered a sump area not typically accessed; they noticed a “fog” at the bottom and began to feel sick. Hazmat Team #5 and local responders determined no known source or leak present. The incident was turned over back to the facility. (Monroe)

Incidents from 1985 through 2010 are available through OSFM through a separate historical database at the following link:

[http://www.sfm.state.or.us/CR2K\\_IncDB/Incident\\_Search.html](http://www.sfm.state.or.us/CR2K_IncDB/Incident_Search.html)

We reviewed the as-reported incidents sorted as a fire-order by “fixed-facilities” from 1985 to 2010, and then manually searching for similar keywords to those listed above. Through this search, four (4) incidents that occurred at wastewater or water treatment facilities were identified. All four (4) incidents occurred in the 1990’s (1991, 1992, 1996, and 1999). Two (2) of the incidents were the result of a diesel fuel spill (<55 gallons), and two (2) were chlorine (gas) related; one of the chlorine incidents resulted in the hazmat team confirming that the valve was shut by staff (confirmed), and the other resulted in the hazmat team securing a valve themselves. It should be noted that chlorine gas will not be utilized at the Bull Run facility, as identified through review of the HMIS.

## 5. CONCLUSION

The Consultant served as a third-party reviewer in regard to review of fire protection and life safety code compliance for the Portland Water Bureau Bull Run Filtration Facility. Of specific importance in our engagement was to review architectural code plans (life safety plans), fire suppression plans, and fire alarm plans from the Bid Documents drawing package dated April 2023. In addition to the Bid Documents drawing review, the Consultant has performed a review of the Hazardous Materials Management Plan (HMMP) and Hazardous Materials Inventory Statement (HMIS). Lastly, the Consultant has provided a review of the application of NFPA 1710, an overview of the applicability of NFPA 1710, as well as specific responses to previous testimony submitted by RFPD10.

Through our analysis and issuance of this report, the Consultant has provided an un-biased review of the design as it relates to fire protection and life safety, hazardous materials, and fire department response to this facility. This report is not intended to be construed to indicate our judgment on approval of the land use permit application for this proposed facility, but rather for stakeholders who view this report to be provided with specific code and standard references as well as our professional understanding of fire department response to incident types of concern for the Bull Run Facility and similar occupancies.



At the conclusion of our review, we determined that the Bid Documents are quite thorough and demonstrate that requirements from applicable code and standards are met. The following provides an overview of our findings:

1. We did not identify any code or standard requirements which were not achieved within the Bid Documents that would result in a change in design basis, maximum building height and area allowance, or required fire protection features. We did identify items which can be better represented on the Code Plans for clarity by reviewers, stakeholders, and authorities having jurisdiction (AHJs), and these have been provided in the various Appendices of this report. This includes our review of the architectural code plans, fire suppression, and fire alarm.
2. After reviewing the HMMP/HMIS, we determined Aluminum Sulfate to be the only material to meet the definition of a Corrosive material. Four (4) of the previously classified five (5) corrosive materials can be downgraded to irritants (a non-regulated category), thus demonstrating a lower overall risk to human health than the original HMMP/HMIS may convey.
3. The frequency of calls for emergency services from this proposed facility would not be expected to be a large burden on the current emergency services provided for the area. Similar existing facilities in the jurisdiction and nearby (Gresham WWTP and Portland WWTP) result in 4.6 and 6 calls per service per year, respectively, and each had 0 hazardous materials or technical rescue incidents over the last 10 years.
4. The applicability of NFPA 1710 does not infer that RFPD10, GFES Station 76, or any first arriving responder can handle all call-types at this or any facility, specifically in regards to hazardous materials and technical rescue calls. Standard Operating Guidelines are in place and a state response system available for calls of that technical level.

Sincerely,

Prepared By:

*David F. Stacy*

David Stacy  
Fire Protection / Life Safety Consultant  
dstacy@pbfpe.com

Professional Qualifications provided in Appendix H



## **APPENDIX A- Recommended Improvements and Clarifications to Architectural Code Plans**



## Appendix A - Recommended Improvements and Clarifications to Architectural Code Plans

1. General Comment-All Code Plans. A *Fire Protection Elements* table should be provided for each building to provide clarity on the need or omission of fire suppression and fire alarm systems for each building. This is provided for some building Code Plans, but not all.
2. On Sheet 11-A-102, *Administration Building Code Plan-2*, within the *Occupancy and Use* table Group B occupancy should also be listed as one of the two nonseparated mixed-uses, not just the A-3 assembly.
3. On Sheet 11-A-102, *Administration Building Code Plan-2*, the door swing by BTS/IT is into the corridor. When the door is fully open, it would encroach significantly enough to reduce the minimum corridor width (44" per Table 1020.2 of the OSSC) by more than 7". The door swing should be reversed or offset to not encroach on egress path.
4. On Sheet 11-A-102, *Administration Building Code Plan-2*, the *Building Height and Area* table should include the maximum allowed for the Group B occupancy as well.
5. On Sheet 11-A-103, *Administration Building Code Plan-3*, under *Other Egress Requirements* table, we recommend adding the maximum dead-end corridor allowances for Group A occupancy (20 feet per Section 1024.4 of the OSSC).
6. On Sheet 11-A-103, *Administration Building Code Plan-3*, under the *Means of Egress* section and table, the maximum allowable travel distances and common path should be provided for the Group B occupancy in addition to the main occupancy type.
7. On Sheet 11-A-103, *Administration Building Code Plan-3*, we recommend adding that the two (2) unenclosed stairs from the Second Floor are open exit access stairs provided in accordance with Section 1019.3(1) of the OSSC. This provides direct code guidance in regard to why they are not enclosed.
8. On Sheet 12-A-102, *Maintenance Building Code-1*, as the main occupancy type for the nonseparated mixed-use is Business, the occupant load should be based on a gross area of the entire building (subtracting out the accessory spaces). This will result in corridors and other spaces being calculated as part of the occupant load. This should not affect egress capacity and is recommended to be reflected correctly on the plans.
9. On Sheet 12-A-102, *Maintenance Building Code-1*, a common path of travel issue will develop if the plan south double doors from the "Small Parts" room are not shown as an exit. Once these exterior doors are shown as an exit, the number of exits listed in *Building Exits* table should be updated to reflect "2" from the S-1 space.
10. On Sheet 15-A-102, *Main Electrical Complex Code Information and Tables-1*, ensure that the minimum clear width from the exit doors of the Electrical Room are 32 in. (Section 1010.1.1 of the OSSC).
11. On Sheet 15-A-102, *Main Electrical Complex Code Information and Tables-1*, the *Accessory Spaces* table lists the accessory space as "F-1"; it should be S-1.
12. On Sheet 15-A-102, *Main Electrical Complex Code Information and Tables-1* and Sheet 16-A-102, *North Electrical Complex Code Information and Tables-1*, verify if electrical engineer and NFPA 70, *National Electric Code*, that the correct number of exits, required sizes, and spacing are appropriate based on any specialized equipment or voltages.
13. On Sheet 30-A-102, *Treatment Process Complex Code Sheet-1*, the building size of "128,831 sf gross of the site" under *Building Description* section is not clearly understood by the reviewer. Recommend providing physical building area in addition to the site area, if this was intended to represent areas under covered portions or similar. In addition, commentary on



- the unlimited area of a F-2 occupancy based on appropriate public way may be required to justify the total square footage of the building.
14. On Sheet 30-A-103, *Treatment Process Complex Code Sheet-2*, a reference to Section 907.2.17.1 is provided in the *Fire Protection Elements* table. This section applies to underground buildings with smoke control; confirm the code section intended to be utilized here, and if smoke detection and smoke control is required.
  15. On Sheet 30-A-103, *Treatment Process Complex Code Sheet-2*, within the *Mixed Use Occupancy* table, the allowable areas listed are for fully sprinkler protected buildings.
  16. On Sheet 30-A-103, *Treatment Process Complex Code Sheet-2*, within the *Mixed Use Occupancy* table, the actual area calculations should follow Section 506.2.4; it is unclear how the currently represented actual areas of 6,550 sq. ft. and 579 sq. ft. for F-1 and F-2 respectively were determined.
  17. On Sheet 30-A-103, *Treatment Process Complex Code Sheet-2*, within the *Other Egress Requirements* table, the common path of travel is 75 ft. for Group F occupancies in non-sprinkler protected buildings.
  18. On Sheet 40-A-102, *Finished Water Code Sheet-1*, the common path of travel (75 feet) is exceeded for occupants on the mezzanine level. Occupants on mezzanines shall be provided with two independent means of egress when the common path of travel exceeds the limitations of Table 1006.2.1.
  19. On Sheet 40-A-103, *Finished Water Code Sheet-2*, a reference to Section 907.2.17.1 is provided in the *Fire Protection Elements* table. This section applies to underground buildings with smoke control; confirm the code section intended to be utilized here, and if smoke detection and smoke control is required.
  20. On Sheet 40-A-103, *Finished Water Code Sheet-2*, the *Building Exits (Per 1006)* table indicates 1 exit required from the mezzanine. In reference to comment #18, 2 exits are required based on common path of travel.
  21. On Sheet 40-A-103, *Finished Water Code Sheet-2*, the *Building Exits (Per 1006)* table indicates one exit is provided from Level 1. The plans indicate 2 exits are provided.
  22. On Sheet 40-A-103, *Finished Water Code Sheet-2*, the *Mezzanines* table indicates that the mezzanine shall not exceed  $\frac{1}{2}$  of the area of the story below per Section 502.2.1.1 Exception 1. That exception actually indicates that it shall not exceed  $\frac{2}{3}$  of the area of the story below;  $\frac{1}{2}$  is for Exception 2 (buildings with a sprinkler system and emergency voice/alarm system).
  23. On Sheet 40-A-103, *Finished Water Code Sheet-2*, within the *Allowable Area* table, the allowable areas listed are for fully sprinkler protected buildings. In addition, the actual areas do not match those listed on Code Sheet-1.
  24. On Sheet 70-A-103, *Chemical Building Code Information and Tables-2*, the *Fire Protection Elements* table indicates that a Class I standpipe is required; this appears to be in excess of the code required, as the floor/story elevation is within the maximum allowable height to not require a standpipe system.



## **APPENDIX B- Recommended Improvements and Clarifications to the Fire Protection Drawings**



### **Appendix B - Recommended Improvements and Clarifications to the Fire Protection Drawings**

1. On Sheet Gen-F-100, *Clean Agent Schedule*, the Ozone Building is incorrectly labeled as Building 80; it should be Building 81.
2. On Sheet Gen-F-100, *Sprinkler Criteria Schedule (Building 12-Maintenance)*, ESFR design guidance is provided for the rack storage arrangement; however, this guidance is incomplete. The required k-factor, temperature, and orientation should be provided for the ESFR sprinklers in addition to just the required number of sprinklers operating (12) at 35 psi. The mentioned additional information is necessary in the selection of the ESFR design criteria from either FMG data sheets or NFPA 13.
3. On Sheet 11-F-303, *Administration Building Second Floor-Offices*, it should be confirmed and clearly stated if combustible concealed spaces are present above finished and/or drop ceilings. The building is of combustible construction, and therefore concealed combustible spaces would need sprinkler protection.
4. On Sheet 12-F-301, *Maintenance Building Floor Plan – Fire Protection*, it should be confirmed and clearly stated if combustible concealed spaces are present above finished and/or drop ceilings. The building is of combustible construction, and therefore concealed combustible spaces would need sprinkler protection.
5. NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems*, is referenced as an applicable standard due to the NOVEC 1230 clean agent systems to be provided; however, an edition for this standard was not provided. It is anticipated that it would be the 2015 Edition, based on the building code of record.



## **APPENDIX C- Recommended Improvements and Clarifications to the Fire Alarm Drawings**



**Appendix C - Recommended Improvements and Clarifications to the Fire Alarm Drawings**

1. Recommend adding fire alarm details for the Fire Pump Station/Room. It is anticipated that various flow switches, tamper switches, and run status monitor modules of the fire pump will be required for a code compliant system.



## **APPENDIX D- Recommended Improvements and Changes to the HMMP & HMIS**



#### Appendix D - Recommended Improvements and Changes to the HMMP & HMIS

1. The building label tags (building numbering) in Figure 2 of the HMMP are difficult to read; recommend revising for clarity. *[this was corrected in the updated version dated August 4, 2023]*
2. The Chemical Building in Figure 2 of the HMMP appears to be labeled as Building 20; the legend indicates Building 70. Recommend updating for clarity, for the correct building number matching the drawings (Building 70). *[this was corrected in the updated version dated August 4, 2023]*
3. The HMMP shall include a complete floor plan of each building, with specific requirements as referenced in Section H101.3 Part C of Appendix H of the Fire Code. It is our understanding that for security purposes, complete floor plans of each occupancy were not included within the HMMP for the purpose of the land use application. Through project progression up to occupancy of the building, it shall be ensured that the complete HMMP is submitted to the authorities having jurisdiction as well as retained by operational staff to be available for emergency responder use. The floor plans need to be formatted in accordance with all applicable requirements of Section H101.3 at that time.
4. Table 4 of Attachment C of the HMMP provides the maximum allowable quantities for each building/control area. The MAQ's listed for the Chemical building (without considering it a high hazard) should be doubled as the building is sprinkler protected. Therefore, Corrosives solids could be stored to a maximum of 10,000 lbs, while liquids would be 1,000 gallons. Class I oxidizing liquids would be unlimited in a sprinkler protected building, and toxic solids could raise to 1,000 lbs. These increases do not change the final determination of a H-4 occupancy classification but should be presented appropriately. Similarly, the oxidizing gas maximum allowable quantity for the Ozone Generation Building can be increased to 3,000 lbs.
5. Table 4 of Attachment C of the HMMP describes "Control Area 1 (Oxygen/Carbon Dioxide Storage Area)" as containing cryogenic oxidizing liquids. Through discussions with stakeholders, it was verified that this is an outside storage area. The area should be re-named to Outside Area, as "control area" implies an interior control area. In addition, the maximum allowable quantity should be updated to reflect that of which for an outside storage area. *[this was corrected in the updated version dated August 4, 2023]*
6. Table 4 of Attachment C of the HMMP lists 24,500 gallons of combustible liquids within F-1 (Main Electrical Complex); this also applies to the North Electrical Complex. The maximum allowable quantity listed is 120 gallons. The design team has indicated that the storage of the diesel fuel is outdoors, adjacent to the Group F-1 occupancy; under this approach, it is not an internal control area, and then 120 gallon limit does not apply. *[this was corrected in the updated version dated August 4, 2023, however a maximum allowable quantity of 120 gallons was still listed.]*
7. Attachment E of the HMMP provides the complete Appendix H of the OFC. Including the template Appendix H is not necessary, unless specifically requested by a reviewer or AHJ. Of particular importance, Figure 1 within the template Appendix H is misleading, as this is a complete blank HMMP provided as an example. Within this Figure are example materials and classifications which do not apply to this facility. *[this was corrected in the updated version dated August 4, 2023, and the complete Appendix H from the OFC was removed]*
8. Closed- and Open-use amounts shall be provided for each of the materials stored and used throughout the facility. Similar to storage amounts, use amounts are also limited per control area. These should be provided with the maximum allowable quantity tables as well.



## APPENDIX E-Safety Data Sheets for Specific Materials





A Division of Appropriate Chemical International Ltd.

120 Stronach Crescent, London, ON, N5V 3A1  
 1-800-387-9799 or 519-451-1614  
 www.anchemsales.com

## MATERIAL SAFETY DATA SHEET

**PRODUCT NAME: Poly Aluminum Chloride**

**PO100-00**

### SECTION 01: PRODUCT INFORMATION AND COMPANY INFORMATION

**MANUFACTURER:** Same as above  
**PREPARED BY:** Production Department  
**VERSION DATE:** 26-Apr-16  
**TELEPHONE NO.:** (519) 451-1614  
**EMERGENCY PHONE NO.:** (613) 996-6666  
**CHEMICAL FAMILY:** Aluminum Chloride      **CHEMICAL FORMULA:** Not Applicable  
**MOLECULAR WEIGHT:** Not Applicable      **MATERIAL USE:** Drinking water treatment  
**SYNONYMS:** Aluminum Hydroxide Chloride Solution;  
 Anfloc 50: Polyaluminum Chloride.

### SECTION 02: COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Ingredients	Conc. Approx. %	C.A.S. #	LD/50 (RTE/SPEC)	LC/50 (RTE/SPEC)	TLV
Poly Aluminum Chloride	25-40	1327-41-9	N.Av.	N.Av.	2mg/m3

### SECTION 03: HAZARD IDENTIFICATION

#### ROUTE OF ENTRY

**Eyes:** Product is an irritant. Discomfort, tearing and blurring of vision may occur.  
**Skin:** Severe skin irritant. Discomfort and rash may occur.  
**Inhalation:** Harmful if inhaled. May irritate mouth, nose, and throat. May cause irritation of upper respiratory tract.  
**Ingestion:** Harmful if swallowed.

### SECTION 04: FIRSTAID

**Skin Contact:** Flush skin with water. Wash contaminated clothing before reuse.  
**Eye Contact:** In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.  
**Inhalation, Acute:** Remove person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, get immediate medical attention.  
**Ingestion:** Never give anything by mouth if victim is rapidly losing consciousness, unconscious or convulsing.  
**Notes to physician:** Treatment based on sound judgment of physician and individual reactions of patient.

### SECTION 05: FIRE EXPLOSION HAZARD AND FIRE FIGHTING MEASURES

**FLAMMABLE?** No  
**IF YES, UNDER WHICH CONDITIONS?** N. App.

<b>FLASH POINT (TCC) (C):</b>	N. App.
<b>FLAMMABLE LIMITS:</b>	<b>LEL(% BY VOL.):</b> N. App. / <b>UEL(% BY VOL.):</b> N. App.
<b>AUTO IGNITION TEMPERATURE (C)</b>	N. App.
<b>EXTINGUISHING MEDIA</b>	Use extinguishing media appropriate for surrounding fire. Fire fighters should wear full protective clothing, including self-contained breathing equipment.
<b>SPECIAL PROCEDURES:</b>	N. App.
<b>HAZARDOUS COMBUSTION PRODUCTS:</b>	N. App.
<b>UNUSUAL FIRE AND EXPLOSION HAZARDS</b>	N. App.
<b>SENSITIVITY TO STATIC DISCHARGE</b>	N. App.
<b>SENSITIVITY TO MECHANICAL IMPACT:</b>	N. App.

#### SECTION 06: ACCIDENTAL RELEASE MEASURES

**Leak and Spill Procedure:** Personal Precautionary Measures: Wear appropriate protective equipment.  
 Environmental Precautionary Measures: Prevent entry into sewers or streams, dike if needed. Consult local authorities.  
 Procedure for Clean Up: Contain spill by diking. Neutralize with lime slurry, limestone, or soda ash. This will generate carbon dioxide, so additional ventilation must be necessary. Maximize recovery for recycling or reuse. Floor may be slippery; use care to avoid falling. Will give a strong astringent taste to water supply. High concentration may increase lead content of water if lead supply pipes are used.

#### SECTION 07: HANDLING AND STORAGE

##### Handling Procedures and Storage Requirements

Handling: Handle in containers, piping and pumps made of stainless steel, fibreglass or plastic. Avoid prolonged contact with eyes or prolonged skin contact.

Storage: Do not store in aluminum, aluminum alloys, copper and copper alloys. Store in accordance with good industrial practices.

#### SECTION 08: PERSONAL PROTECTIVE EQUIPMENT / EXPOSURE CONTROLS

<b>GLOVES/TYPE:</b>	Impervious chemical resistant gloves. Not leather.
<b>RESPIRATOR/TYPE:</b>	If exposure exceeds occupational exposure limits, use an appropriate NIOSH- approved respirator. Use an approved dust and mist respirator with acid mist if necessary.
<b>EYE/TYPE:</b>	Chemical goggles; also wear a face shield if splashing hazard exists.
<b>OTHER/TYPE:</b>	Ensure that eyewash stations and safety showers are proximal to the work-station location. When cleaning, decontaminating or performing maintenance on tanks, containers, piping systems and accessories and in any other situations where airborne contaminants and/or dust could be generated, use protective equipment to protect against ingestion or inhalation. HEPA or air supplied respirator, full Tyvek coveralls with head cover, gloves and boots or chemical suits are suggested.

**ENGINEERING CONTROL** Local exhaust ventilation as necessary to maintain exposures to within applicable limits.

#### SECTION 09: PHYSICAL AND CHEMICAL PROPERTIES

<b>PHYSICAL STATE/APPEARANCE:</b>	Liquid (Colorless to faint yellow)		
<b>ODOUR:</b>	Odorless	<b>ODOUR THRESHOLD:</b>	N. Av.
<b>VAPOUR PRESSURE (mm Hg @ 20C):</b>	N. Av.	<b>VAPOUR DENSITY (Air=1):</b>	N. Av.
<b>EVAPORATION RATE (Ether = 1):</b>	N. Av.	<b>SPECIFIC GRAVITY:</b>	1.20- 1.26
<b>BOILING POINT (C):</b>	90 C	<b>FREEZING POINT (C)</b>	<0
<b>Ph (% SOLUTION):</b>	2.2 - 2.8	<b>% VOLATILE (WT):</b>	N. Av.
<b>SOLUBILITY IN WATER (% W/W)</b>	Hydrolyses		

#### SECTION 10: STABILITY AND REACTIVITY

**CHEMICALLY STABLE?** Yes

**IF NO, UNDER WHICH CONDITIONS?** N. App.

**INCOMPATIBILITY WITH OTHER SUBSTANCES** Yes

**IF YES, WITH WHICH ONES:** Strong bases. Alkalies. Hydroreactive materials (e.g. Oleum)

**SPECIAL REACTIVITY AND UNDER WHAT CONDITIONS** Moderately acidic and slowly corrodes steel. Do not store in containers made of aluminum, magnesium, zinc or copper alloys.

**HAZARDOUS DECOMPOSITION PRODUCTS:** When boiled to dryness or heated above 200 C. May liberate: Oxides of sulfur. Oxides of aluminum. Hydrochloric acid.

**SECTION 11: TOXICOLOGICAL INFORMATION**

**EXPOSURE LIMIT OF MATERIAL** N. Av.  
**LC 50 OF MATERIAL, SPECIES AND ROUTE** See Sec. 2  
**LD 50 OF MATERIAL, SPECIES AND ROUTE** See Sec. 2  
**CARCINOGENICITY OF MATERIAL** N. Av.  
**REPRODUCTIVE EFFECTS:** N. Av.  
**IRRITANCY OF MATERIAL** N. Av.  
**SENSITIZING CAPABILITY OF MATERIAL** N. Av.  
**SYNERGISTIC MATERIALS** N. Av.

**SECTION 12: ECOLOGICAL INFORMATION**

**AQUATIC TOXICITY** N. Av.

**SECTION 13: DISPOSAL CONSIDERATIONS**

**WASTE DISPOSAL:** Disposal of Waste Method: Disposal of all wastes must be done in accordance with municipal, provincial and federal regulations.  
 Contaminated Packaging: Empty containers should be recycled or disposed of through an approved waste management facility.

**SECTION 14: TRANSPORT INFORMATION**

**TDG CLASSIFICATION** Class 8, Corrosive Liquid, N.O.S. (Aluminum Chloride Hydroxide)

**UN NUMBER:** 1760

**PACKING GROUP:** II

**Special Provisions for Transport**

**SECTION 15: REGULATORY INFORMATION**

**WHMIS CLASSIFICATION** E  
 E CORROSIVE MATERIAL

**SECTION 16: OTHER INFORMATION**

**ABBREVIATIONS USED:** N.Av. = Not Available  
 N.App. / N.Ap. = Not Applicable

**DISCLAIMER:** Although the information herein is to the best of our knowledge accurate, no guarantee expressed or implied, is made regarding the information or the performance of any product. We assume no liability for incidental or direct damages of any kind, no matter what, including negligence.

**SOURCES:** Supplier MSDS

**For updated copies of an MSDS, please contact Anchem Sales at the address/phone number on Page 1 or fax the MSDS Co-ordinator at (519) 451-4593.**

**LAST PAGE**

Form 074 Revised Aug 2016

## SAFETY DATA SHEET

### Sodium Carbonate, Anhydrous

SDS #: 497-19-8  
Revision date: 2015-04-30  
Format: NA  
Version 5.01

# TRONOX

## 1. PRODUCT AND COMPANY IDENTIFICATION

### Product Identifier

**Product Name** Soda Ash

### Other means of identification

**Product Code(s)** 497-19-8

**Synonyms** Sodium carbonate, anhydrous; Carbonic acid, disodium salt; Disodium carbonate

**Chemical Family** Alkali salt

### Recommended use of the chemical and restrictions on use

**Recommended Use:** Glass manufacture , Personal care, Detergent, Water treatment chemical, Chemical processing

**Restrictions on Use:** See section 16 for more information

### Manufacturer Address

Tronox Alkali Wyoming Corporation  
1735 Market Street  
Philadelphia, PA 19103  
Tel: +1 877-362-2248 or +1 215-299-6904  
www.tronox.com

### Emergency telephone number

1 307 / 872 2452 (Plant - Green River, WY)  
1 303/ 389-1409 (Medical - U.S. - Call Collect)

For leak, fire, spill or accident emergencies, call:  
1 800 / 424 9300 (CHEMTREC - U.S.A.)  
1 703 / 527 3887 (CHEMTREC - Collect - All Other Countries)

## 2. HAZARDS IDENTIFICATION

### Classification

#### OSHA Regulatory Status

This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Serious eye damage/eye irritation	Category 2
-----------------------------------	------------

**Sodium Carbonate, Anhydrous**

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**GHS Label elements, including precautionary statements****EMERGENCY OVERVIEW****Warning****Hazard Statements**

H319 - Causes serious eye irritation

**Precautionary Statements - Prevention**

P264 - Wash face, hands and any exposed skin thoroughly after handling

P280 - Wear eye protection/ face protection

**Precautionary Statements - Response**

P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing

P337 + P313 - If eye irritation persists: Get medical advice/ attention

**Hazards not otherwise classified (HNOC)**

No hazards not otherwise classified were identified.

**Other Information**

May be harmful if swallowed.

**3. COMPOSITION/INFORMATION ON INGREDIENTS**

Chemical Family Alkali salt.  
 Formula  $\text{Na}_2\text{CO}_3$

Chemical name	CAS-No	Weight %
Sodium carbonate	497-19-8	100

Synonyms are provided in Section 1.

**4. FIRST AID MEASURES**

<b>Eye Contact</b>	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. If symptoms persist, call a physician.
<b>Skin Contact</b>	Wash off with warm water and soap. Get medical attention if irritation develops and persists. Remove and wash contaminated clothing before re-use.
<b>Inhalation</b>	Remove person to fresh air. If signs/symptoms continue, get medical attention.

**Sodium Carbonate, Anhydrous**

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<b>Ingestion</b>	Never give anything by mouth to an unconscious person Get medical attention if symptoms occur
<b>Most important symptoms and effects, both acute and delayed</b>	Causes serious eye damage / eye Irritation.
<b>Indication of immediate medical attention and special treatment needed, if necessary</b>	Treat symptomatically.

**5. FIRE-FIGHTING MEASURES**

<b>Suitable Extinguishing Media</b>	Use extinguishing agent suitable for type of surrounding fire.
<b>Specific Hazards Arising from the Chemical</b>	Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes
<b>Hazardous Combustion Products</b>	Fumes of sodium oxide. Carbon oxides (COx).
<b><u>Explosion data</u></b>	
<b>Sensitivity to Mechanical Impact</b>	Not sensitive.
<b>Sensitivity to Static Discharge</b>	Not sensitive.
<b>Protective equipment and precautions for firefighters</b>	As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

**6. ACCIDENTAL RELEASE MEASURES**

<b>Personal Precautions</b>	Avoid dust formation. Sweep up to prevent slipping hazard.
<b>Other</b>	For further clean-up instructions, call Emergency Hotline number listed in Section 1 "Product and Company Identification" above.
<b>Environmental Precautions</b>	Do not flush into surface water or sanitary sewer system.
<b>Methods for Containment</b>	Prevent large quantities of this product from contacting vegetation or waterways. Cover with plastic sheet to prevent spreading. Pick up and transfer to properly labeled containers. Keep in suitable and closed containers for disposal.
<b>Methods for cleaning up</b>	Pick up and transfer to properly labeled containers. Keep in suitable and closed containers for disposal. Dispose of waste as indicated in Section 13.

**7. HANDLING AND STORAGE**

<b>Handling</b>	Use air conveying/mechanical systems for bulk transfer to storage. Provide appropriate exhaust ventilation at places where dust is formed. In case of insufficient ventilation, wear suitable respiratory equipment if release of airborne dust is expected.
<b>Storage</b>	Store in original container. Keep in properly labeled containers. Keep container tightly closed.
<b>Incompatible products</b>	Aluminium. Powdered aluminum. Acids

**8. EXPOSURE CONTROLS/PERSONAL PROTECTION****Control parameters**

This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies Local nuisance dust standards apply

**Sodium Carbonate, Anhydrous**

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**Appropriate engineering controls**

**Engineering measures** Where reasonably practicable this should be achieved by the use of local exhaust ventilation and good general extraction.

**Individual protection measures, such as personal protective equipment**

**Eye/Face Protection** Tightly fitting safety goggles.

**Skin and Body Protection** Wear suitable protective clothing. Protective shoes or boots.

**Hand Protection** Nitrile rubber, Neoprene gloves

**Respiratory Protection** In case of inadequate ventilation wear respiratory protection.

**Hygiene measures** Handle in accordance with good industrial hygiene and safety practice.

**General information** These recommendations apply to the product as supplied

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Information on basic physical and chemical properties**

<b>Appearance</b>	Granules
<b>Physical State</b>	Solid
<b>Color</b>	White
<b>Odor</b>	odorless
<b>Odor threshold</b>	Not applicable
<b>pH</b>	11.4 (1% solution in water)
<b>Melting point/freezing point</b>	851 °C
<b>Boiling Point/Range</b>	No information available
<b>Flash point</b>	Not applicable
<b>Evaporation Rate</b>	No information available
<b>Flammability (solid, gas)</b>	Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes
<b>Flammability Limit in Air</b>	
<b>Upper flammability limit:</b>	No information available
<b>Lower flammability limit:</b>	No information available
<b>Vapor pressure</b>	No information available
<b>Vapor density</b>	No information available
<b>Density</b>	No information available
<b>Specific gravity</b>	2.52
<b>Water solubility</b>	212.5 g/L @ 20 °C
<b>Solubility in other solvents</b>	No information available
<b>Partition coefficient</b>	No information available
<b>Autoignition temperature</b>	No information available
<b>Decomposition temperature</b>	400 °C
<b>Viscosity, kinematic</b>	No information available
<b>Viscosity, dynamic</b>	No information available
<b>Explosive properties</b>	Not explosive
<b>Oxidizing properties</b>	Non-oxidizing
<b>Molecular weight</b>	105.99
<b>Bulk density</b>	0.86 - 1.12 g/cm <sup>3</sup> (Dense grades) 0.70 - 0.90 g/cm <sup>3</sup> (Light Grades)
<b>K<sub>st</sub></b>	0 bar m/s

## 10. STABILITY AND REACTIVITY

**Reactivity** None under normal use conditions.

**Chemical Stability** Stable. Decomposes by reaction with strong acid.

**Possibility of Hazardous Reactions** None under normal processing.

**Sodium Carbonate, Anhydrous**

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**Hazardous polymerization** Hazardous polymerization does not occur.

**Conditions to avoid** Exposure to air or moisture over prolonged periods.

**Incompatible materials** Aluminium. Powdered aluminum. Acids.

**Hazardous Decomposition Products** Sodium oxides. Carbon oxides (COx).

**11. TOXICOLOGICAL INFORMATION****Product Information**

**LD50 Oral** 2,800 mg/kg (rat)  
**LD50 Dermal** > 2,000 mg/kg (rabbit)  
**LC50 Inhalation** 2.3 mg/L (rat)

**Eye Contact** Irritating to eyes.  
**Skin Contact** Non-irritating  
**Sensitization** Patch test on human volunteers did not demonstrate sensitization properties.

**Information on toxicological effects**

**Symptoms** No information available.

**Delayed and immediate effects as well as chronic effects from short and long-term exposure**

**Chronic toxicity** No known effect.  
**Mutagenicity** No information available  
**Carcinogenicity** Not recognized as carcinogenic by Research Agencies (IARC, NTP, OSHA, ACGIH).  
**Reproductive toxicity** No information available.  
**STOT - single exposure** No information available.  
**STOT - repeated exposure** No information available.  
**Aspiration hazard** No information available.

**12. ECOLOGICAL INFORMATION****Ecotoxicity**

<b>Sodium carbonate (497-19-8)</b>				
Active Ingredient(s)	Duration	Species	Value	Units
Sodium Carbonate	96 h LC50	Bluegill sunfish	300	mg/L
Sodium Carbonate	48 h EC50	Ceriodaphnia	200-227	mg/L

**Persistence and degradability** Biodegradability does not pertain to inorganic substances.

**Bioaccumulation** Does not bioaccumulate.

**Mobility** Dissociates into ions.

**Other Adverse Effects** None known.

**13. DISPOSAL CONSIDERATIONS**

**Waste disposal methods** This material, as supplied, is not a hazardous waste according to Federal regulations (40 CFR 261). Dispose of in accordance with local regulations.

**Sodium Carbonate, Anhydrous**

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**Contaminated Packaging** Dispose of in accordance with local regulations.

**14. TRANSPORT INFORMATION**

**DOT** NOT REGULATED

**TDG** NOT REGULATED

**ICAO/IATA** NOT REGULATED

**IMDG/IMO** NOT REGULATED

**15. REGULATORY INFORMATION****U.S. Federal Regulations****SARA 313**

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

**SARA 311/312 Hazard Categories**

<b>Acute health hazard</b>	Yes
<b>Chronic health hazard</b>	No
<b>Fire hazard</b>	No
<b>Sudden release of pressure hazard</b>	No
<b>Reactive Hazard</b>	No

**Clean Water Act**

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

**CERCLA**

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

**US State Regulations****California Proposition 65**

This product does not contain any Proposition 65 chemicals.

**U.S. State Right-to-Know Regulations**

This product does not contain any substances regulated by state right-to-know regulations

**International Inventories**

Component	TSCA (United States)	DSL (Canada)	EINECS/ELI NCS (Europe)	ENCS (Japan)	China (IECSC)	KECL (Korea)	PICCS (Philippines)	AICS (Australia)
Sodium carbonate 497-19-8 ( 100 )	X	X	X	X	X	X	X	X

**Mexico - Grade**

Moderate risk, Grade 2

## Sodium Carbonate, Anhydrous

SDS #: 497-19-8  
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### WHMIS Hazard Class

D2B - Toxic materials, Eye irritation  
 Class E : Corrosive to aluminum. Not corrosive to animal skin or carbon steel.



D2B - Toxic



E - Corrosive

### 16. OTHER INFORMATION

NFPA	Health Hazards 2	Flammability 0	Instability 0	Special Hazards -
HMIS	Health Hazards 2	Flammability 0	Physical hazard 0	Personal Protection X

NFPA/HMIS Ratings Legend      Severe = 4; Serious = 3; Moderate = 2; Slight = 1; Minimal = 0

### Product Certifications

This product meets the chemical testing specifications defined in the Food Chemicals Codex (FCC), 8th Edition.

This product is certified to NSF/ANSI Standard 60 for use in drinking water treatment at the specified maximum use limit. The MUL (maximum use level) for sodium carbonate, anhydrous is 150 mg/L under NSF/ANSI Standard 60.



OU Kosher Certification



## American Water Works Association

Revision date: 2015-04-30  
 Revision note: Minor change

### Disclaimer

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### Prepared By:

Tronox Limited

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**End of Safety Data Sheet**

## Safety Data Sheet

### PSI Water Technologies, Inc.

#### SECTION 1: IDENTIFICATION

<b>Product Name</b>	Sodium hypochlorite solution, 0.8%
<b>Synonyms</b>	Antiformin, bleach, Carrel-Dakin solution
<b>CAS Number</b>	7681-52-9
<b>Manufacturer's Information</b>	PSI Water Technologies, Inc. 550 Sycamore Dr. Milpitas, CA 95035
<b>Company Phone Number</b>	1 (408) 370-6540
<b>24-hour Emergency Phone Number</b>	1 (408) 370-6540
<b>Recommended Use(s)</b>	Water disinfectant

#### SECTION 2: HAZARD(S) IDENTIFICATION


**Pictogram**
**Signal Word**

WARNING.

**Hazard Statements**

H303	May be harmful if swallowed.
H316	Causes mild skin irritation.
H320	Causes eye irritation.
H402	Harmful to aquatic life.

**Precautionary Statements**

P264	Wash skin thoroughly after handling.
P273	Avoid release to the environment.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P301+P330+P331	If SWALLOWED: Rinse mouth. Do not induce vomiting
P302+P362+P353	If ON SKIN: Take off contaminated clothing and wash before reuse. Rinse skin with water/shower.
P304+P340	If INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305+P351+P338	If IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P313	Get medical advice/attention.
P391	Collect spillage.
P501	Dispose of content/container to an approved waste disposal plant

**Other Hazards**

None



## NFPA Rating

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### SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

---

<u>Chemical Name</u>	<u>CAS Number</u>	<u>Mass %</u>
Water	7732-18-5	≥ 98.2
Sodium Hypochlorite	7681-52-9	≤ 1.0
Sodium Chloride	7647-14-5	≤ 0.8
Other impurities	N/A	Trace

**Trade Secret Statement:** The exact percentage of each component has been withheld as this is highly dependant on water quality and salt quality (both used in synthesis) which can lead to small variances.

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### SECTION 4: FIRST-AID MEASURES

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<b>Inhalation</b>	If chlorine vapors are inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, provide oxygen and get medical attention immediately.
<b>Ingestion</b>	If swallowed, do not induce vomiting. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
<b>Skin Contact</b>	Immediately remove clothing from affected area and wash skin with flowing water. Clothing should be discarded or washed before reuse. Obtain medical attention if irritation persists. Do not instruct person to neutralize affected skin area.
<b>Eye Contact</b>	Immediately flush eyes with plenty of water for several minutes, while holding eyes open. Contacts should be removed before or during flushing. Do not instruct person to neutralize. Get medical attention if irritation persists.
<b>Note to Physician</b>	Dilute sodium hypochlorite solutions such as these products are mildly alkaline but potentially corrosive to the digestive tract. For exposure by ingestion, do not use emesis, lavage, or acid antidotes. Dilute immediately by giving milk, melted ice cream, beaten egg white, starch paste or antacids such as milk of magnesia, aluminum hydroxide gel, or magnesium trisilicate gel. Avoid sodium bicarbonate because of carbon dioxide release. Sodium thiosulfate solution may prove beneficial by reducing unreacted material.




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## SECTION 5: FIRE-FIGHTING MEASURES

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<b>Fire Fighting Procedures</b>	Use self-contained breathing apparatus and full protective equipment. Acid contamination will produce irritating chlorine fumes.
<b>Fire and Explosion Hazards</b>	This product is non-flammable and non-combustible. Vigorous reaction is possible with organic materials or strong reducing agents that may result in fire.
<b>Hazardous Products of Thermal Decomposition</b>	Oxygen and chlorine are hazardous products of decomposition of sodium hypochlorite.
<b>Special Information</b>	If the solution is accidentally mixed with strong acids, chlorine vapors will be released.

---

## SECTION 6: ACCIDENTAL RELEASE MEASURES

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Collect liquid in an appropriate container or absorb with an inert material (i.e. dry sand, vermiculite, earth). Ventilate area of leak or spill and prevent contact with incompatibles. Clean up spills immediately and wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible, and dispose of in compliance with all Federal, Local, and Provincial laws and regulations (Regulations may vary in different locations). Do not allow to enter streams, rivers, lakes, or similar bodies of water. Chlorine content of the product can be neutralized by sprinkling sodium metabisulfite or sodium bisulfite on the spilled material.

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## SECTION 7: HANDLING & STORAGE

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<b>Handling</b>	Wear appropriate protective equipment. Avoid contact with materials that are incompatible or prone to corrosion. Avoid breathing vapor, mist, or gas. Prevent contact with eyes, on skin, or on clothing. Do not ingest or inhale. Use with adequate ventilation.
<b>Storage</b>	Store in a cool, dry, well-ventilated area away from incompatible substances. Do not store near chemicals that may react if spillage/leakage occurs. Keep container tightly closed.
<b>Other Comments</b>	This substance can decompose on heating or contact with acids or reducing materials, producing corrosive gases including chlorine. This substance is a strong oxidant.

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## SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

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<b>Exposure Limits</b>	No exposure limits have been developed for sodium chloride or sodium hypochlorite.
<b>Personal Respirator</b>	Non required under normal use conditions. Use NIOSH/MSHA approved organic vapor-acid-gas respirator with filter (qualified to wear respirator) during large spill clean-up or other conditions that might produce irritating chlorine-like fumes (e.g. reactions with incompatibles).
<b>Skin Protection</b>	Wear latex, neoprene, or rubber gloves and other protective clothing as



<b>Eye Protection</b>	appropriate to prevent skin contact.
<b>Ventilation Protection</b>	Safety glasses with face shield are recommended.
<b>Other Protection</b>	Use local exhaust at points of vapor emission.
	Safety showers and eye wash fountains, or other means of washing eyes with a gentle flow of cool to tepid tap water should be readily available in all areas where this material is handled or stored.

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## SECTION 9: PHYSICAL & CHEMICAL PROPERTIES

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<b>State</b>	Liquid
<b>Appearance</b>	Slight yellow tint, transparent
<b>Odor</b>	Chlorine-like
<b>Lower Flammability Limit (LFL)</b>	Not applicable.
<b>Lower Explosive Limit (LEL)</b>	Not applicable.
<b>Upper Flammability Limit (UFL)</b>	Not applicable.
<b>Upper Explosive Limit (UEL)</b>	Not applicable.
<b>Vapor pressure</b>	17.3 mm Hg (20°C)
<b>pH</b>	8 – 11
<b>Relative density (specific gravity)</b>	1.02 (meas.)
<b>Melting/freezing point</b>	~32°F
<b>Solubility</b>	29.3 g/100mL (0°C)
<b>Initial boiling point/range</b>	~212°F
<b>Flash point</b>	Not available.
<b>Evaporation rate</b>	Not available.
<b>Partition coefficient: n-octanol/water</b>	-3.42 (68°F) [European Chemicals Agency]
<b>Auto-ignition temperature</b>	Not applicable.
<b>Decomposition temperature</b>	230°F
<b>Viscosity</b>	Not applicable (approx. that of water).

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## SECTION 10: STABILITY & REACTIVITY

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<b>Stability</b>	Stable under normal pressures and temperatures. Slowly decomposes on contact with air. Decomposition rate increases with concentration, decreased pH, and elevated temperature. Exposure to sunlight and heavy metals also accelerates decomposition.
<b>Hazardous Decomposition Products</b>	Oxygen and Chlorine gas.
<b>Hazardous Polymerization</b>	None expected.
<b>Incompatibilities</b>	This material is incompatible with strong oxidizing agents, acids, heavy metals, reducing agents, organics, ether, and ammonia. Extended exposure to the product causes corrosion of many metals including stainless steel.
<b>Conditions to Avoid</b>	Avoid using combustible material to absorb large spills. Avoid excessive heat or light exposure and contact with incompatibles. Avoid mixing with acids, lowering the pH of the solution may result in release of chlorine vapors.




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**SECTION 11: TOXICOLOGICAL INFORMATION**


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<b>Inhalation:</b>	<b>Acute</b>	Inhalation of chlorine vapors causes coughing and choking, burning sensation, labored breathing, shortness of breath, severe respiratory tract irritation, and pulmonary edema.
<b>Inhalation:</b>	<b>Chronic</b>	No chronic inhalation effects of this product are known.
<b>Skin Contact:</b>	<b>Acute</b>	Skin contact may cause irritation, redness, blisters, and dermatitis.
<b>Skin Contact:</b>	<b>Chronic</b>	Repeated or prolonged skin contact may cause skin sensitization.
<b>Eye Contact:</b>	<b>Acute</b>	Eye contact causes severe irritation with redness and pain.
<b>Ingestion:</b>	<b>Acute</b>	Ingestion may cause pain and inflammation of the mouth, pharynx, esophagus, and stomach; erosion of mucous membranes; vomiting; hemorrhage; circulatory collapse; cold and clammy skin; cyanosis and shallow respiration; confusion; delirium; coma; edema of pharynx; glottis and larynx with stridor and obstruction; and perforation of esophagus and stomach.
<b>Ingestion:</b>	<b>Chronic</b>	No chronic ingestions effects of this product are known.
<b>Carcinogenicity/Mutagenicity</b>		Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
<b>Reproductive Effects</b>		No reproductive effects for this product are known.
<b>Neurotoxicity</b>		None are known.
<b>Other Effects</b>		None are known.
<b>Target Organs</b>		Skin, eyes, respiratory tract, and digestive system.

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**SECTION 12: ECOLOGICAL INFORMATION**


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**Ecotoxicity** This product is toxic to aquatic organisms. Do not allow to enter streams, lakes, etc.

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**SECTION 13: DISPOSAL CONSIDERATIONS**


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Material that cannot be used or reprocessed for use, and empty containers should be disposed of in accordance with all applicable Federal, State, Local, and Provincial regulations. Product containers should be thoroughly emptied before disposal.

**NOTE:** State and local regulations may be more strict than federal regulations.

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**SECTION 14: TRANSPORT INFORMATION**


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**D.O.T. Shipping Information** See product label and Bill of Lading.

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**SECTION 15: REGULATORY INFORMATION**


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<b>CERCLA SECTION 103 (40CFR302.4)</b>	Yes CAS# 7681-52-9 RQ: 100 lbs.
<b>SARA SECTION 302 (40CFR355.30)</b>	No.
<b>TSCA SECTION 304 (40CFR355.40)</b>	No.
<b>SARA SECTION 313 (40CFR372.65)</b>	No.



**OSHA PROCESS SAFETY (29CFR1910.119)** No.

**CALIFORNIA PROPOSITION 65**

No.

**RCRA (40CFR261 Subpart C)**

If this product becomes a waste, it does not meet the Definition of a characteristic waste, and no other EPA hazardous waste codes are applicable.

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## SECTION 16: OTHER INFORMATION

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**Disclaimer** PSI Water Technologies, Inc. provides the information contained herein in good faith but makes no representations as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. It is the buyer's and/or users' responsibility to make sure that its activities comply with federal, state, provincial, and local laws. PSI WATER TECHNOLOGIES, INC. MAKES NO REPRESENTATIONS OR WARRANTIES EITHER EXPRESS OR IMPLIED INCLUDING WITHOUT LIMITATION ANY WARRANTIES OR MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, PSI WATER TECHNOLOGIES, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

**Issue Date** September 9, 2020

## SAFETY DATA SHEET

Version 6.4  
Revision Date 12/06/2022  
Print Date 08/05/2023

**SECTION 1: Identification of the substance/mixture and of the company/undertaking****1.1 Product identifiers**

Product name : Sodium bisulfite solution

Product Number : 13438

Brand : SIGALD

**1.2 Relevant identified uses of the substance or mixture and uses advised against**

Identified uses : Laboratory chemicals, Synthesis of substances

**1.3 Details of the supplier of the safety data sheet**

Company : Sigma-Aldrich Inc.  
3050 SPRUCE ST  
ST. LOUIS MO 63103  
UNITED STATES

Telephone : +1 314 771-5765

Fax : +1 800 325-5052

**1.4 Emergency telephone**

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

**SECTION 2: Hazards identification****2.1 Classification of the substance or mixture****GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**

Eye irritation (Category 2A), H319  
Short-term (acute) aquatic hazard (Category 3), H402

For the full text of the H-Statements mentioned in this Section, see Section 16.

**2.2 GHS Label elements, including precautionary statements**

Pictogram



Signal Word

Warning

Hazard statement(s)

H319  
H402

Causes serious eye irritation.  
Harmful to aquatic life.

Precautionary statement(s)	
P264	Wash skin thoroughly after handling.
P273	Avoid release to the environment.
P280	Wear eye protection/ face protection.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P501	Dispose of contents/ container to an approved waste disposal plant.

### 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Contact with acids liberates toxic gas.

## SECTION 3: Composition/information on ingredients

### 3.2 Mixtures

Molecular weight : 104.06 g/mol

Component	Classification	Concentration
<b>sodium hydrogensulphite</b>		
CAS-No.	7631-90-5	≥ 30 - < 50 %
EC-No.	231-548-0	
Index-No.	016-064-00-8	
	Acute Tox. 4; Eye Irrit. 2A; Aquatic Acute 3; H302, H319, H402	

For the full text of the H-Statements mentioned in this Section, see Section 16.

## SECTION 4: First aid measures

### 4.1 Description of first-aid measures

#### General advice

Show this material safety data sheet to the doctor in attendance.

#### If inhaled

After inhalation: fresh air.

#### In case of skin contact

In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

#### In case of eye contact

After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

#### If swallowed

After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

### 4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

### 4.3 Indication of any immediate medical attention and special treatment needed

No data available

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**SECTION 5: Firefighting measures****5.1 Extinguishing media****Suitable extinguishing media**

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

**Unsuitable extinguishing media**

For this substance/mixture no limitations of extinguishing agents are given.

**5.2 Special hazards arising from the substance or mixture**

Sodium oxides

Sulfur oxides

Sulfur oxides

Sodium oxides

Not combustible.

Ambient fire may liberate hazardous vapours.

**5.3 Advice for firefighters**

In the event of fire, wear self-contained breathing apparatus.

**5.4 Further information**

Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

---

**SECTION 6: Accidental release measures****6.1 Personal precautions, protective equipment and emergency procedures**

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.

For personal protection see section 8.

**6.2 Environmental precautions**

Do not let product enter drains.

**6.3 Methods and materials for containment and cleaning up**

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

**6.4 Reference to other sections**

For disposal see section 13.

---

**SECTION 7: Handling and storage****7.1 Precautions for safe handling**

For precautions see section 2.2.

**7.2 Conditions for safe storage, including any incompatibilities****Storage conditions**

Tightly closed.

Do not store near acids.

### Storage class

Storage class (TRGS 510): 12: Non Combustible Liquids

### 7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## SECTION 8: Exposure controls/personal protection

### 8.1 Control parameters

#### Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
sodium hydrogensulphite	7631-90-5	TWA	5 mg/m <sup>3</sup>	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Not classifiable as a human carcinogen		
		TWA	5 mg/m <sup>3</sup>	USA. NIOSH Recommended Exposure Limits
		PEL	5 mg/m <sup>3</sup>	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

### 8.2 Exposure controls

#### Appropriate engineering controls

Change contaminated clothing. Wash hands after working with substance.

#### Personal protective equipment

##### Eye/face protection

Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

##### Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

##### Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

##### Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

#### **Body Protection**

protective clothing

#### **Respiratory protection**

required when vapours/aerosols are generated.

Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

#### **Control of environmental exposure**

Do not let product enter drains.

---

## **SECTION 9: Physical and chemical properties**

### **9.1 Information on basic physical and chemical properties**

a) Appearance	Form: liquid
b) Odor	No data available
c) Odor Threshold	No data available
d) pH	No data available
e) Melting point/freezing point	No data available
f) Initial boiling point and boiling range	No data available
g) Flash point	( )Not applicable
h) Evaporation rate	No data available
i) Flammability (solid, gas)	No data available
j) Upper/lower flammability or explosive limits	No data available
k) Vapor pressure	No data available
l) Vapor density	No data available
m) Density	No data available
Relative density	No data available
n) Water solubility	soluble
o) Partition coefficient: n-octanol/water	No data available
p) Autoignition temperature	Not applicable

- q) Decomposition temperature No data available
- r) Viscosity No data available
- s) Explosive properties Not classified as explosive.
- t) Oxidizing properties none

## 9.2 Other safety information

No data available

---

## SECTION 10: Stability and reactivity

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

The product is chemically stable under standard ambient conditions (room temperature) .

### 10.3 Possibility of hazardous reactions

Generates dangerous gases or fumes in contact with:  
Acids

### 10.4 Conditions to avoid

no information available

### 10.5 Incompatible materials

Strong acids and oxidizing agents

### 10.6 Hazardous decomposition products

In the event of fire: see section 5

---

## SECTION 11: Toxicological information

### 11.1 Information on toxicological effects

#### Mixture

#### Acute toxicity

Oral: No data available

Acute toxicity estimate Oral - 3,850 mg/kg

(Calculation method)

Acute toxicity estimate Inhalation - 4 h - 13.13 mg/l - dust/mist(Calculation method)

Symptoms: Possible symptoms:, mucosal irritations

Acute toxicity estimate Dermal - > 5,000 mg/kg

(Calculation method)

#### Skin corrosion/irritation

No data available

#### Serious eye damage/eye irritation

Remarks: Mixture causes serious eye irritation.

#### Respiratory or skin sensitization

No data available

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**Germ cell mutagenicity**

No data available

**Carcinogenicity**

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

**Reproductive toxicity**

No data available

**Specific target organ toxicity - single exposure**

No data available

**Specific target organ toxicity - repeated exposure**

No data available

**Aspiration hazard**

No data available

**11.2 Additional Information**

May cause irritation to eyes and respiratory passages to workers briefly exposed to high concentrations

Other dangerous properties can not be excluded.

Handle in accordance with good industrial hygiene and safety practice.

**Components****sodium hydrogensulphite****Acute toxicity**

LD50 Oral - Rat - male and female - 1,540 mg/kg  
(OECD Test Guideline 401)

LC50 Inhalation - Rat - male and female - 4 h - > 5.5 mg/l - dust/mist  
(OECD Test Guideline 403)

Remarks: (ECHA)

The value is given in analogy to the following substances: sodium sulphite

LD50 Dermal - Rat - male and female - > 2,000 mg/kg  
(OECD Test Guideline 402)

Remarks: (ECHA)

The value is given in analogy to the following substances: sodium sulphite

No data available

**Skin corrosion/irritation**

Skin - Rabbit

Result: No skin irritation

(OECD Test Guideline 404)

Remarks: (in analogy to similar products)

**Serious eye damage/eye irritation**

Remarks: Causes serious eye irritation.

(in analogy to similar products)

**Respiratory or skin sensitization**

Local lymph node assay (LLNA) - Mouse

Result: negative

(OECD Test Guideline 429)

Remarks: (ECHA)

The value is given in analogy to the following substances: sodium sulphite

**Germ cell mutagenicity**

Species: Rat - male

Result: negative

Remarks: (ECHA)

**Carcinogenicity**

Carcinogenicity classification not possible from current data.

**Reproductive toxicity**

Weight of evidence does not support classification for reproductive toxicity

**Specific target organ toxicity - single exposure**

No data available

**Specific target organ toxicity - repeated exposure****Aspiration hazard**

No data available

---

**SECTION 12: Ecological information****12.1 Toxicity****Mixture**

No data available

**12.2 Persistence and degradability**

No data available

**12.3 Bioaccumulative potential**

No data available

**12.4 Mobility in soil**

No data available

**12.5 Results of PBT and vPvB assessment**

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

**12.6 Endocrine disrupting properties**

No data available

**12.7 Other adverse effects**

No data available

**Components****sodium hydrogensulphite**

Toxicity to fish

static test LC50 - *Leuciscus idus* (Golden orfe) - > 215 - < 464 mg/l - 96 h

Remarks: (ECHA)

The value is given in analogy to the following substances: potassium sulfite

Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Daphnia magna (Water flea) - 89 mg/l - 48 h Remarks: (ECHA) The value is given in analogy to the following substances: sodium metabisulphite
Toxicity to algae	static test ErC50 - Desmodesmus subspicatus (green algae) - 43.8 mg/l - 72 h (OECD Test Guideline 201) Remarks: (ECHA) The value is given in analogy to the following substances: sodium metabisulphite
Toxicity to bacteria	static test EC50 - activated sludge - > 1,000 mg/l - 3 h (OECD Test Guideline 209) Remarks: (ECHA) The value is given in analogy to the following substances: sodium sulphite
Toxicity to fish(Chronic toxicity)	flow-through test NOEC - Danio rerio (zebra fish) - >= 316 mg/l - 34 d (OECD Test Guideline 210)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	semi-static test NOEC - Daphnia magna (Water flea) - > 10 mg/l - 21 d (OECD Test Guideline 211)

---

## SECTION 13: Disposal considerations

### 13.1 Waste treatment methods

#### Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

---

## SECTION 14: Transport information

#### DOT (US)

Not dangerous goods

#### IMDG

Not dangerous goods

#### IATA

Not dangerous goods

#### Further information

Not classified as dangerous in the meaning of transport regulations.

---

**SECTION 15: Regulatory information****SARA 302 Components**

This material does not contain any components with a section 302 EHS TPQ.

**SARA 313 Components**

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

**SARA 311/312 Hazards**

Acute Health Hazard

**Massachusetts Right To Know Components**

No components are subject to the Massachusetts Right to Know Act.

---

**SECTION 16: Other information****Further information**

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See [www.sigma-aldrich.com](http://www.sigma-aldrich.com) and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 6.4

Revision Date: 12/06/2022

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## **APPENDIX F- Gresham Fire & Emergency Services Standard Operating Guidelines 2.6.4, *HM-3 Operations***



GRESHAM FIRE & EMERGENCY SERVICES				
STANDARD OPERATING GUIDELINES				
EFFECTIVE DATE: November 23, 2004	SOG NUMBER: 2.6.4	SECTION: Operations	REPLACES: New	PAGE: 1 OF 2
APPROVED:  CHIEF: 		TITLE:  <b>HM-3 OPERATIONS</b>		

## 1.0 PURPOSE

The purpose of this guideline is to provide guidance and understanding concerning the function and operations of Hazardous Materials Team 3.

## 2.0 BACKGROUND

In 1990, the Gresham Fire Department entered into talks with the State of Oregon to provide Hazardous Materials Response within the State of Oregon. The Gresham Fire Department was awarded Region 3 in the State of Oregon as its primary response area. The Oregon State Fire Marshal's Office (OSFM) is responsible for the coordination of the Oregon Regional Hazardous Materials Team Program. Currently there are 15 teams protecting the State of Oregon. The geographical boundary descriptions can be found in OSFM SOG T-002. The Oregon Regional Teams are directed by the Teams Advisory Group (TAG), HM-3's Captain is a voting member. The TAG has an ad hoc committee called the Teams Training Advisory Committee (TTAC). HM-3's training officer is a voting member of this committee. Both of these committees meet quarterly throughout the year. HM-3 operates under approved SOG's from the OSFM. These can be found at Station 73.

## 3.0 DEFINITION

### 3.1 HM-3 Personnel

HM-3 Team Members come from the following agencies: Gresham Fire & Emergency Services, Multnomah County Sheriff's Office, Gresham Police Department and Multnomah County Office of Emergency Management.

### 3.2 Training Requirements

To be a member of HM-3, a person must be certified as an NFPA 472 Hazardous Materials Technician through the OSFM approved course, which is currently the International Association of Firefighters (IAFF) course.

## 4.0 HM-3 OPERATIONS

### 4.1 Deployment

#### 4.1.1 State Qualified Responses

- A. HM-3 uses the OSFM Incident Response Decision Matrix (found in OSFM SOG T-002) to decide if a call is a state reimbursable response.
- B. HM-3 will call the OSFM Duty Officer to let them know that HM-3 is responding to a call.
- C. HM-3 personnel will call 701 and work out a response plan to use on-duty personnel.
- D. The Team Leader for the call is responsible for getting a State Run number for the response.
- E. The Team Leader is responsible for collecting all portions of the OSFM run report and turning it into the Haz Mat Captain within two shifts of the call.

#### 4.1.2 GFES Haz Mat Responses

- A. Most will fall under the GFES HM Engine Company SOG.
- B. The on-duty HM Officer or Senior HM Team Member at Station 73 is responsible for documenting resources used on these calls. Materials used on these calls come out of GFES' HM budget.
- C. GFES' contract with OFSM allows GFES to use OSFM equipment. GFES is responsible for maintenance and replacement for equipment used on calls that GFES may choose to respond to that do not qualify as state responses.
- D. If more personnel are needed than are at Station 73, the company officer will call 701 and work out a response plan to get the personnel needed.

#### 4.1.3 Dispatch Procedures

- A. Calls initiated from Dispatch
  - 1. After receiving a page from dispatch, team members are to wait for a page from the on-duty team members at Station 73 before responding.
  - 2. On-duty team members at Station 73 are to determine the response needs, initiate contact with the IC at the scene, start resource functions, send a team page stating the nature of the call and personnel needed and how those members will be chosen.
  - 3. On-duty team members at Station 73 will contact 701 and work out a response plan for the use of team members who are at other stations, if they are needed.
  - 4. In some cases, the on-duty members may choose to do some of the above functions enroute to a call.
  - 5. If E73 is committed to a call, 701 will determine whether or not E73 will be released to take the Haz Mat call. If they are not released, 701 will direct dispatch to contact Sgt. Gates of MCSO or 704 who will initiate HM-3 response.
- B. Calls initiated from other sources
  - 1. On-duty team members at Station 73 will gather all relevant information to determine if the call qualifies as a state response. In either case, they are to contact 701 with this information and decide on the appropriate course of action.
  - 2. On-duty team members at Station 73 will contact dispatch and have a call initiated and give all pertinent information.
  - 3. The team will be paged by team members at Station 73 with appropriate information.

## **APPENDIX G-Responses to Wastewater and Water Treatment Plants (By Jurisdiction)**



GRESHAM WWTP Facility Responses - 2015 NE Sandy Blvd						
Inci_number	Alm_date	Alm_time	Station	Township	Address	Describe
235594	3/22/2023	5:53:05	74	GRS	20015 NE SANDY BLVD	False Alarm or false call, other
2214509	7/31/2022	20:45:36	74	GRS	20015 NE SANDY BLVD	False Alarm or false call, other
2213459	7/17/2022	19:22:50	74	GRS	20015 NE SANDY BLVD	Good intent call, other
21221645	11/21/2021	14:33:05	74	GRS	20015 NE SANDY BLVD	EMS call, excluding vehicle accident with injury
20217560	10/26/2020	5:12:32	74	GRS	20015 NE SANDY BLVD	False alarm or false call, Other
20212236	8/4/2020	9:33:42	74	GRS	20015 NE SANDY BLVD	EMS call, excluding vehicle accident with injury
2026610	4/26/2020	13:19:29	74	GRS	20015 NE SANDY BLVD	Outside rubbish fire, Other
2022493	2/12/2020	1:16:16	74	GRS	20015 NE SANDY BLVD	Good intent call, Other
19219291	11/12/2019	13:52:31	74	GRS	20015 NE SANDY BLVD	Rescue, EMS incident, other
19218126	10/24/2019	13:38:59	74	GRS	20015 NE SANDY BLVD	False alarm or false call, Other
19216571	9/28/2019	17:44:57	74	GRS	20015 NE SANDY BLVD	Authorized controlled burning
19211883	7/15/2019	7:05:02	74	GRS	20015 NE SANDY BLVD	Non-EMS: Cancelled
19211633	7/11/2019	13:22:01	74	GRS	20015 NE SANDY BLVD	Alarm system activation, no fire unintentional
1927463	5/3/2019	21:57:30	74	GRS	20015 NE SANDY BLVD	Authorized controlled burning
1925568	4/2/2019	0:48:59	74	GRS	20015 NE SANDY BLVD	Good intent call, Other
1924731	3/19/2019	1:41:45	74	GRS	20015 NE SANDY BLVD	False alarm or false call, Other
1923823	3/5/2019	5:29:10	74	GRS	20015 NE SANDY BLVD	Smoke scare, odor of smoke
1923572	2/28/2019	19:21:43	74	GRS	20015 NE SANDY BLVD	False alarm or false call, Other
1923526	2/28/2019	1:22:33	74	GRS	20015 NE SANDY BLVD	Good intent call, Other
18216914	10/31/2018	19:14:43	72	GRS	20015 NE SANDY BLVD	Steam, Other gas mistaken for smoke, Other
17213880	9/4/2017	21:04:19	74	GRS	20015 NE SANDY BLVD	No Incident found on arrival at dispatch address
17213815	9/3/2017	23:29:16	74	GRS	20015 NE SANDY BLVD	Good intent call, Other
17213799	9/3/2017	20:20:29	72	GRS	20015 NE SANDY BLVD	Good intent call, Other
1722418	2/6/2017	17:57:54	72	GRS	20015 NE SANDY BLVD	False alarm or false call, Other
172110	1/2/2017	16:51:49	74	GRS	20015 NE SANDY BLVD	False alarm or false call, Other
16219107	12/24/2016	22:40:23	74	GRS	20015 NE SANDY BLVD	False alarm or false call, Other
16218176	12/9/2016	22:08:39	71	GRS	20015 NE SANDY BLVD	Authorized controlled burning
16217867	12/5/2016	19:52:38	74	GRS	20015 NE SANDY BLVD	False alarm or false call, Other
1628323	6/9/2016	20:42:24	72	GRS	20015 NE SANDY BLVD	False alarm or false call, Other
1623534	3/7/2016	14:20:15	74	GRS	20015 NE SANDY BLVD	Fire, Other
1623048	2/27/2016	19:25:28	74	GRS	20015 NE SANDY BLVD	Good intent call, Other
162505	1/8/2016	13:42:31	74	GRS	20015 NE SANDY BLVD	False alarm or false call, Other
15218013	12/18/2015	21:17:28	74	GRS	20015 NE SANDY BLVD	Good intent call, Other
15216451	11/19/2015	16:53:03	74	GRS	20015 NE SANDY BLVD	Dispatched & cancelled en route
15214214	10/6/2015	3:04:59	74	GRS	20015 NE SANDY BLVD	False alarm or false call, Other
15214147	10/4/2015	19:23:37	74	GRS	20015 NE SANDY BLVD	Dispatched & cancelled en route
15211754	8/21/2015	8:56:56	74	GRS	20015 NE SANDY BLVD	Rescue, EMS incident, other
1526558	5/17/2015	20:43:25	71	GRS	20015 NE SANDY BLVD	False alarm or false call, Other
152612	1/14/2015	6:19:36	74	GRS	20015 NE SANDY BLVD	False alarm or false call, Other
14216545	12/22/2014	1:15:07	74	GRS	20015 NE SANDY BLVD	False alarm or false call, Other
14215453	11/27/2014	18:56:37	74	GRS	20015 NE SANDY BLVD	Prescribed fire
1421337	1/31/2014	15:55:11	74	GRS	20015 NE SANDY BLVD	Dispatched & cancelled en route
1421328	1/31/2014	12:20:54	74	GRS	20015 NE SANDY BLVD	Dispatched & cancelled en route
13216327	12/30/2013	7:48:21	74	GRS	20015 NE SANDY BLVD	Good intent call, Other
13215869	12/19/2013	18:53:54	71	GRS	20015 NE SANDY BLVD	Authorized controlled burning
1328642	7/10/2013	19:50:43	74	GRS	20015 NE SANDY BLVD	Alarm system sounded due to malfunction

## Portland WWTP Facility Responses - 5001 N Columbia Blvd

Run Number	Date	Address	Type Code	Situation Found
RP130030004	5/20/2013 0:00	5001 N COLUMBIA BLVD	TRAUMA/1ST RESP	MEDICAL STANDBY / NO CARE PROVIDED
RP130057825	9/18/2013 0:00	5001 N COLUMBIA BLVD	CHEST PAIN/1ST RESP	EMS CALL (TRANSPORT BY AMBULANCE CO.)
RP130059817	9/26/2013 0:00	5001 N COLUMBIA BLVD[COLUMBIA B	TRAUMA/1ST RESP	EMS CALL (CANCELED AT SCENE)
RP140004590	1/21/2014 0:00	5001 N COLUMBIA BLVD	BREATHING/1ST RESP	MEDICAL STANDBY / NO CARE PROVIDED
RP140008048	2/6/2014 0:00	5001 N COLUMBIA BLVD	TRAFFIC ACC/1ST RESP	EMS CALL (TRANSPORT BY AMBULANCE CO.)
RP160095719	12/20/2016 0:00	5001 N COLUMBIA BLVD	CHEST PAIN/1ST RESP	EMS CALL (NO TRANSPORT)
RP170020207	3/11/2017 0:00	5001 N COLUMBIA BLVD	UNCONSCIOUS/1ST RESP	MEDICAL STANDBY / NO CARE PROVIDED
RP170026891	4/6/2017 0:00	5001 N COLUMBIA BLVD	TRAUMA/1ST RESP	EMS CALL (TRANSPORT BY AMBULANCE CO.)
RP170055709	7/17/2017 0:00	5001 N COLUMBIA BLVD	TRAUMA/1ST RESP	MEDICAL STANDBY / NO CARE PROVIDED
RP180022527	3/21/2018 0:00	5001 N COLUMBIA BLVD	CHEST PAIN/1ST RESP	EMS CALL (CANCELED AT SCENE)
RP180024389	3/28/2018 0:00	5001 N COLUMBIA BLVD	CHEST PAIN/1ST RESP	EMS CALL (TRANSPORT BY AMBULANCE CO.)
RP180034262	5/1/2018 0:00	5001 N COLUMBIA BLVD	BURNS/1ST RESP	EMS CALL (CANCELED ENROUTE)
RP180034878	5/4/2018 0:00	5001 N COLUMBIA BLVD	OVERDOSE/1ST RESP	EMS CALL (CANCELED AT SCENE)
RP180062753	8/2/2018 0:00	5001 N COLUMBIA BLVD	TRAFFIC ACC/1ST RESP	MOTOR VEHICLE ACCIDENT WITH NO INJURIES
RP180064833	8/8/2018 0:00	5001 N COLUMBIA BLVD	HEAT-COLD/1ST RESP	EMS CALL (CANCELED AT SCENE)
RP190027521	4/1/2019 0:00	5001 N COLUMBIA BLVD	BREATHING/1ST RESP	MEDICAL ASSIST, ASSIST EMS CREW
RP190037757	5/6/2019 0:00	5001 N COLUMBIA BLVD	CHEST PAIN/1ST RESP	EMS CALL (TRANSPORT BY AMBULANCE CO.)
RP190067443	8/7/2019 0:00	5001 N COLUMBIA BLVD	UNCONSCIOUS/1ST RESP	EMS CALL (TRANSPORT BY AMBULANCE CO.)
RP210011799	2/8/2021 0:00	5001 N COLUMBIA BLVD	TRAFFIC ACC/PIN IN	MOTOR VEHICLE ACCIDENT WITH INJURIES
RP210016805	2/20/2021 0:00	5001 N COLUMBIA BLVD	UNCONSCIOUS/1ST RESP	EMS CALL (CANCELED ENROUTE)
RP210017035	2/21/2021 0:00	5001 N COLUMBIA BLVD #	TRAUMA/1ST RESP	MEDICAL STANDBY / NO CARE PROVIDED
RP210059006	6/29/2021 0:00	5001 N COLUMBIA BLVD	SEIZURE - CONTINUOUS/MULTIPL	EMS CALL (CANCELED ENROUTE)
RP210059474	6/30/2021 0:00	5001 N COLUMBIA BLVD	POLICE REQUEST FOR C1 MEDICA	EMS CALL (CANCELED ENROUTE)
RP220057941	6/17/2022 0:00	5001 N COLUMBIA BLVD	EYE INJURY - MODERATE	EMS CALL (TRANSPORT BY AMBULANCE CO.)
RP230000122	1/1/2023 0:00	5001 N COLUMBIA BLVD	TRAFFIC ACCIDENT	VEHICLE ACCIDENT, GENERAL CLEANUP
RP130076879	12/10/2013 0:00	5001 N COLUMBIA BLVD	MISCELLANEOUS FIRE	GOOD INTENT CALL, OTHER
RP130077931	12/14/2013 0:00	5001 N COLUMBIA BLVD	MISCELLANEOUS FIRE	DISPATCHED & CANCELED EN ROUTE
RP140010384	2/14/2014 0:00	5001 N COLUMBIA BLVD	COMMERCIAL FIRE	STEAM, OTHER GAS MISTAKEN FOR SMOKE, OTHER
RP160029435	4/25/2016 0:00	5001 N COLUMBIA BLVD	GRASS/BARKDUST/TREE FIRE	GOOD INTENT CALL, OTHER
RP160039958	6/4/2016 0:00	5001 N COLUMBIA BLVD	MISCELLANEOUS FIRE	DISPATCHED & CANCELED EN ROUTE
RP160052357	7/18/2016 0:00	5001 N COLUMBIA BLVD	MISCELLANEOUS FIRE	FALSE ALARM OR FALSE CALL, OTHER
RP160062347	8/22/2016 0:00	5001 N COLUMBIA BLVD[WASTEWAT	MISCELLANEOUS FIRE	FALSE ALARM OR FALSE CALL, OTHER
RP160084581	11/11/2016 0:00	5001 N COLUMBIA BLVD	GRASS/BARKDUST/TREE FIRE	GOOD INTENT CALL, OTHER
RP170060952	8/2/2017 0:00	5001 N COLUMBIA BLVD	MISCELLANEOUS FIRE	DISPATCHED & CANCELED EN ROUTE
RP170065972	8/19/2017 0:00	5001 N COLUMBIA BLVD	MISCELLANEOUS FIRE	FALSE ALARM OR FALSE CALL, OTHER
RP170071028	9/4/2017 0:00	5001 N COLUMBIA BLVD	COMMERCIAL FIRE	GOOD INTENT CALL, OTHER
RP180066924	8/14/2018 0:00	5001 N COLUMBIA BLVD	MISCELLANEOUS FIRE	FALSE ALARM OR FALSE CALL, OTHER
RP180068829	8/20/2018 0:00	5001 N COLUMBIA BLVD	GRASS/BARKDUST/TREE FIRE	FALSE ALARM OR FALSE CALL, OTHER
RP180069505	8/23/2018 0:00	5001 N COLUMBIA BLVD	MISCELLANEOUS FIRE	FALSE ALARM OR FALSE CALL, OTHER
RP180069743	8/23/2018 0:00	5001 N COLUMBIA BLVD	MISCELLANEOUS FIRE	FALSE ALARM OR FALSE CALL, OTHER
RP190075728	9/1/2019 0:00	5001 N COLUMBIA BLVD	MISCELLANEOUS FIRE	FALSE ALARM OR FALSE CALL, OTHER
RP190083736	9/27/2019 0:00	5001 N COLUMBIA BLVD	MISCELLANEOUS FIRE	DISPATCHED & CANCELED EN ROUTE
RP190087993	10/11/2019 0:00	5001 N COLUMBIA BLVD	COMMERCIAL FIRE	FALSE ALARM OR FALSE CALL, OTHER
RP210037472	4/27/2021 0:00	5001 N COLUMBIA BLVD	MISCELLANEOUS FIRE	DISPATCHED & CANCELED EN ROUTE
RP210068168	7/24/2021 0:00	5001 N COLUMBIA BLVD	MISCELLANEOUS FIRE	GOOD INTENT CALL, OTHER
RP220067416	7/13/2022 0:00	5001 N COLUMBIA BLVD	MISCELLANEOUS FIRE	DISPATCHED & CANCELED EN ROUTE
RP220114446	11/6/2022 0:00	5001 N COLUMBIA BLVD	MISCELLANEOUS FIRE	DISPATCHED & CANCELED EN ROUTE
RP220137194	12/31/2022 0:00	5001 N COLUMBIA BLVD	COMMERCIAL FIRE	GOOD INTENT CALL, OTHER
RP230014421	2/8/2023 0:00	5001 N COLUMBIA BLVD	MISCELLANEOUS FIRE	NO INCIDENT FOUND ON ARRIVAL AT DISPATCH ADDRESS
RP130002489	1/11/2013 0:00	5001 N COLUMBIA BLVD	MISCELLANEOUS FIRE	CONTROLLED BURNING
RP130074751	12/2/2013 0:00	5001 N COLUMBIA BLVD	GRASS/BARKDUST/TREE FIRE	VEGETATION FIRE, OTHER
RP140002861	1/13/2014 0:00	5001 N COLUMBIA BLVD	MISCELLANEOUS FIRE	SMOKE SCARE, ODOR OF SMOKE
RP160029204	4/24/2016 0:00	5001 N COLUMBIA BLVD	MISCELLANEOUS FIRE	OUTSIDE RUBBISH, TRASH OR WASTE FIRE
RP160035306	5/17/2016 0:00	5001 N COLUMBIA BLVD	ILLEGAL BURN	UNAUTHORIZED BURNING
RP180062990	8/2/2018 0:00	5001 N COLUMBIA BLVD	MISCELLANEOUS FIRE	FALSE ALARM OR FALSE CALL, OTHER
RP180097423	11/26/2018 0:00	5001 N COLUMBIA BLVD	SMOKE INVEST.-STRUCTURE	ARCING, SHORTED ELECTRICAL EQUIPMENT
RP200053767	7/6/2020 0:00	5001 N COLUMBIA BLVD	SMOKE IN AREA- OUTSIDE	SMOKE SCARE, ODOR OF SMOKE
RP220082492	8/22/2022 0:00	5001 N COLUMBIA BLVD	MISCELLANEOUS FIRE	UNAUTHORIZED BURNING
RP220093015	9/19/2022 0:00	5001 N COLUMBIA BLVD	MISCELLANEOUS FIRE	UNAUTHORIZED BURNING
RP230025953	3/10/2023 0:00	5001 N COLUMBIA BLVD	POWER LINE/POLE DOWN/ARCIN	NON-INJURY VEHICLE ACCIDENT



# Incident History

Prepared on 8/1/2023  
 Criteria: Listed water treatment facilities; occurred between 01/01/2013 and 07/31/2023; all incident types

TV&R Incident Number	Incident Date	Dispatched As	Situation Found	Address
<b>Wilsonville Wastewater Treatment Plant</b>				
5211	2/7/2013	MEDICAL EMERGENCY	622 - No incident found on arrival at dispatch address	10350 SW ARROWHEAD CREEK LN
26678	7/11/2013	FIRE ALARM COMMERCIAL	611 - Dispatched & canceled en route	10350 SW ARROWHEAD CREEK LN
13506	4/4/2014	FIRE ALARM COMMERCIAL	745 - Alarm system activation, no fire - unintentional	10350 SW ARROWHEAD CREEK LN
23994	6/14/2014	BURN COMPLAINT	911 - Citizen complaint	10350 SW ARROWHEAD CREEK LN
36239	8/31/2014	FIRE ALARM COMMERCIAL	745 - Alarm system activation, no fire - unintentional	10350 SW ARROWHEAD CREEK LN
44322	10/23/2014	FIRE ALARM COMMERCIAL	735 - Alarm system sounded due to malfunction	10350 SW ARROWHEAD CREEK LN
52337	12/15/2014	MEDICAL EMERGENCY	321 - EMS call, excluding vehicle accident with injury	10350 SW ARROWHEAD CREEK LN
3643	1/24/2016	MARINE RESCUE	363 - Swift water rescue	10350 SW ARROWHEAD CREEK LN
26342	6/9/2016	TECHNICAL RESCUE	357 - Extrication of victim(s) from machinery	10350 SW ARROWHEAD CREEK LN
55174	11/10/2016	FIRE ALARM COMMERCIAL	743 - Smoke detector activation, no fire - unintentional	10350 SW ARROWHEAD CREEK LN
64946	8/8/2018	FIRE ALARM COMMERCIAL	745 - Alarm system activation, no fire - unintentional	10350 SW ARROWHEAD CREEK LN
70464	8/23/2018	BURNS	321 - EMS call, excluding vehicle accident with injury	10350 SW ARROWHEAD CREEK LN
74693	9/4/2018	FIRE ALARM COMMERCIAL	745 - Alarm system activation, no fire - unintentional	10350 SW ARROWHEAD CREEK LN
40401	4/26/2019	FIRE ALARM COMMERCIAL	611 - Dispatched & canceled en route	10350 SW ARROWHEAD CREEK LN
54693	6/3/2019	FIRE ALARM COMMERCIAL	611 - Dispatched & canceled en route	10350 SW ARROWHEAD CREEK LN
39620	5/1/2020	FIRE ALARM COMMERCIAL	611 - Dispatched & canceled en route	10350 SW ARROWHEAD CREEK LN
115629	12/1/2020	MEDICAL EMERGENCY	321 - EMS call, excluding vehicle accident with injury	10350 SW ARROWHEAD CREEK LN
123194	11/12/2021	FIRE ALARM COMMERCIAL	611 - Dispatched & canceled en route	10350 SW ARROWHEAD CREEK LN
69423	6/26/2023	FIRE ALARM COMMERCIAL	745 - Alarm system activation, no fire - unintentional	10350 SW ARROWHEAD CREEK LN
<b>Lake Oswego/Tigard Water Treatment Plant</b>				
29227	7/18/2014	MEDICAL EMERGENCY	321 - EMS call, excluding vehicle accident with injury	4260 KENTHORPE WAY
22535	5/27/2015	FIRE ALARM COMMERCIAL	740 - Unintentional transmission of alarm, other	4260 KENTHORPE WAY
24955	4/18/2018	MISC FIRE (bark, dump, elec, ext, pole, unkf, tree/small grass)	445 - Arcing, shorted electrical equipment	4260 KENTHORPE WAY
138118	12/22/2021	MEDICAL EMERGENCY	321 - EMS call, excluding vehicle accident with injury	4260 KENTHORPE WAY
86551	8/10/2022	MEDICAL EMERGENCY	321 - EMS call, excluding vehicle accident with injury	4260 KENTHORPE WAY
<b>Newberg Water Treatment Plant</b>				
94749	10/1/2020	MISC FIRE (bark, dump, elec, ext, pole, unkf, tree/small grass)	142 - Brush or brush-and-grass mixture fire	2200 NE WYNOOSKI ST
<b>Clean Water Services - Durham Water Resource Recovery Facility</b>				
44255	6/13/2018	FIRE ALARM COMMERCIAL	611 - Dispatched & canceled en route	16060 SW 85TH AVE
58542	6/13/2019	FIRE ALARM COMMERCIAL	611 - Dispatched & canceled en route	16060 SW 85TH AVE
58546	6/13/2019	FIRE ALARM COMMERCIAL	735 - Alarm system sounded due to malfunction	16060 SW 85TH AVE
74713	7/27/2019	FIRE ALARM COMMERCIAL	611 - Dispatched & canceled en route	16060 SW 85TH AVE
78425	8/22/2020	MEDICAL EMERGENCY	321 - EMS call, excluding vehicle accident with injury	16060 SW 85TH AVE



# Incident History

Prepared on 8/1/2023  
 Criteria: Listed water treatment facilities; occurred between 01/01/2013 and 07/31/2023; all incident types

TV&R Incident Number	Incident Date	Dispatched As	Situation Found	Address
<b>Clean Water Services - Rock Creek Water Resource Recovery Facility</b>				
26133	7/8/2013	MEDICAL EMERGENCY	311 - Medical assist, assist EMS crew	3235 SE RIVER RD
88374	10/12/2018	MEDICAL EMERGENCY	611 - Dispatched & canceled en route	3235 SE RIVER RD
95499	11/1/2018	MISC FIRE (bark, dump, elec, ext, pole, unkf, tree/small grass)	611 - Dispatched & canceled en route	3235 SE RIVER RD
16996	2/19/2019	COMMERCIAL FIRE	611 - Dispatched & canceled en route	3235 SE RIVER RD
24261	3/11/2019	FIRE ALARM COMMERCIAL	611 - Dispatched & canceled en route	3235 SE RIVER RD
60874	6/19/2019	FIRE ALARM COMMERCIAL	745 - Alarm system activation, no fire - unintentional	3235 SE RIVER RD
64257	6/28/2019	FIRE ALARM COMMERCIAL	611 - Dispatched & canceled en route	3235 SE RIVER RD
19370	2/26/2020	FIRE ALARM COMMERCIAL	735 - Alarm system sounded due to malfunction	3235 SE RIVER RD
20184	2/28/2020	MEDICAL EMERGENCY	UUU - Undetermined - other agency only	3235 SE RIVER RD
49236	6/1/2020	FIRE ALARM COMMERCIAL	745 - Alarm system activation, no fire - unintentional	3235 SE RIVER RD
62719	7/10/2020	FIRE ALARM COMMERCIAL	611 - Dispatched & canceled en route	3235 SE RIVER RD
33160	4/2/2021	FIRE ALARM COMMERCIAL	UUU - Undetermined - other agency only	3235 SE RIVER RD
140177	12/27/2021	MISC FIRE (bark, dump, elec, ext, pole, unkf, tree/small grass)	UUU - Undetermined - other agency only	3235 SE RIVER RD
22037	2/28/2022	COMMERCIAL FIRE	650 - Steam, other gas mistaken for smoke, other	3235 SE RIVER RD
79162	7/24/2022	FIRE ALARM COMMERCIAL	735 - Alarm system sounded due to malfunction	3235 SE RIVER RD
79175	7/24/2022	FIRE ALARM COMMERCIAL	611 - Dispatched & canceled en route	3235 SE RIVER RD
79184	7/24/2022	FIRE ALARM COMMERCIAL	611 - Dispatched & canceled en route	3235 SE RIVER RD
79196	7/24/2022	FIRE ALARM COMMERCIAL	735 - Alarm system sounded due to malfunction	3235 SE RIVER RD
116787	10/22/2022	INJURY MVC	UUU - Undetermined - other agency only	3235 SE RIVER RD
131631	11/26/2022	MISC FIRE (bark, dump, elec, ext, pole, unkf, tree/small grass)	UUU - Undetermined - other agency only	3235 SE RIVER RD
135083	12/5/2022	MISC FIRE (bark, dump, elec, ext, pole, unkf, tree/small grass)	UUU - Undetermined - other agency only	3235 SE RIVER RD
29759	3/19/2023	MISC FIRE (bark, dump, elec, ext, pole, unkf, tree/small grass)	UUU - Undetermined - other agency only	3235 SE RIVER RD
36053	4/4/2023	MISC FIRE (bark, dump, elec, ext, pole, unkf, tree/small grass)	UUU - Undetermined - other agency only	3235 SE RIVER RD
45193	4/28/2023	BRUSH FIRE	611 - Dispatched & canceled en route	3235 SE RIVER RD
72061	7/2/2023	MISC FIRE (bark, dump, elec, ext, pole, unkf, tree/small grass)	UUU - Undetermined - other agency only	3235 SE RIVER RD
75429	7/10/2023	BRUSH FIRE	500 - Service Call, other	3235 SE RIVER RD
75612	7/10/2023	MISC FIRE (bark, dump, elec, ext, pole, unkf, tree/small grass)	UUU - Undetermined - other agency only	3235 SE RIVER RD
78164	7/16/2023	MISC FIRE (bark, dump, elec, ext, pole, unkf, tree/small grass)	UUU - Undetermined - other agency only	3235 SE RIVER RD
78678	7/17/2023	MISC FIRE (bark, dump, elec, ext, pole, unkf, tree/small grass)	UUU - Undetermined - other agency only	3235 SE RIVER RD
81852	7/25/2023	MISC FIRE (bark, dump, elec, ext, pole, unkf, tree/small grass)	UUU - Undetermined - other agency only	3235 SE RIVER RD

## APPENDIX H-Professional Qualification/Resume





## DAVID STACY, P.E.\*

P.O. Box 1847 Pittsboro, NC 27312  
dstacy@pbfpe.com · (919) 600-7780



David Stacy is a highly regarded professional in the fire protection engineering field, serving as the Principal and Founder of Performance Based Fire Protection Engineering, PLLC, based out of Raleigh, North Carolina. David's firm specializes in fire and egress modeling, performance-based designs, and building and fire code consulting. Beyond this specialization, his firm offers comprehensive full-service fire protection services through providing consulting support for US Government and military projects, conducting property condition assessments and surveys, performing hazardous materials analyses and inventory statements, research and litigation support, and providing third-party services such as reviews and commissioning/acceptance testing.

David's active involvement in the Society of Fire Protection Engineers (SFPE) and National Fire Protection Association (NFPA) has led him to present at various national conferences, further solidifying his position as a leading expert in the field. Holding engineering licensure based out of North Carolina as well as multiple additional states, his expertise is widely acknowledged and respected. David's career also encompasses extensive experience in the fire service, where he currently serves as a Captain within the operations division of a career municipal fire department. This hands-on experience has honed his understanding of fire safety, adding valuable practical knowledge and reinforcing his qualifications in the domain of fire protection engineering. Through his multifaceted background, David Stacy exemplifies a seasoned professional capable of delivering exceptional services in the fire protection industry, bridging the gap between theory and real-world application to ensure the safety and security of his clients.

## PROFESSIONAL EXPERIENCE

### **PRINCIPAL & FOUNDER,** PERFORMANCE BASED FIRE PROTECTION ENGINEERING, PLLC MAY 2018 – CURRENT

Responsible for the analysis, design, and delivery of unique fire protection solutions to meet client expectations. Majority of project work types includes building and fire code consulting, smoke control analysis, building airflow analyses, as well as fire protection system design and review. Leads a team of ten (10) staff, including seven (7) licensed fire protection engineers.

#### Representative Projects:

1. Litigation Support – Fatal High-rise apartment fire. Performing computational fire modeling to understand expected fire growth, sprinkler and smoke detector activation times, and Carbon Monoxide concentrations to understand the fire environment.
2. Code Consulting – Provide life safety plan reviews, engineering plan review, life safety and fire protection narratives, and alternative means and methods across a wide array of vertical markets, including multi-family residential, super high-rises, arenas and assembly spaces, corporate offices, and military/government facilities.
3. Smoke Control Modeling – Perform alternative means and methods through computational fire and egress modeling to determine appropriate design conditions for smoke control system as well as alternative means and methods. These approaches are used in spaces such as atriums, arenas, and large open space to justify tenability.
4. Fire Service Liaison – Assist the fire service with the application of fire protection engineering to fire ground operations. With a background in both industries, connecting the two fields has increased fire fighter safety and awareness, likewise raised awareness of the engineering field to how the fire service operates.

**FIRE CAPTAIN, CITY OF DURHAM, NC****MAY 2011 – CURRENT**

Currently serving the role as Fire Captain within the operations division. Certified Hazardous Materials Technician, Technical Rescue Technician (USAR), Advanced EMT, and various ICS certs.

Assigned as Captain at Quint 11, serving a combination of urban (Duke Forest) and suburban areas. Responsible for three (3) firefighters and two (2) drivers staffing a quint apparatus and a tanker.

Previously held the role of Shift Safety Officer, responsible for responding to all working fires, extrications, technical rescues, and hazardous materials incidents across 116 square miles with a population of nearly 300,000 residents. Additional duties included serving as one of the shift training officers, where my focus was connecting the field of fire protection engineering to the fire service.

Throughout my tenure I also started and chaired the Standard Operating Guidelines (SOG) committee and Fire Apparatus Committee. Within the SOG committee, we established the first documented written guidelines for the department and the apparatus committee leveraged the needs of the operating members to obtain and purchase apparatus that we could operate safely and efficiently from. This included replacing our engine, aerial apparatus, and heavy rescue specifications and multiple purchases across each of those service types.

**CONSULTANT, JENSEN HUGHES****FEB 2012 – FEB 2018**

Held the roles of Associate, Consultant, and Project Manager in the Raleigh, North Carolina office. Performed work in a wide range of fire protection disciplines within this global fire protection engineering firm that also provided specialty consulting across additional disciplines, including risk-based analysis and engineering judgments.

Most notable projects included:

- T-Mobile Arena Smoke Control Analysis (Las Vegas, Nevada)
- Monte Carlo Casino Theater Smoke Control Analysis (Las Vegas, Nevada)
- Orlando International Airport Concourse Expansion (Orlando, Florida)
- University code consulting for University of North Carolina, NC State, and Duke

**RESEARCH INTERN, NATIONAL INSTITUTE OF STANDARDS & TECHNOLOGY (NIST)****JAN 2009 – DEC 2010**

Student intern within the Building & Fire Research Laboratory (BFRL) working under industry leading experts Dan Madrzykowski and Dr. Stephen Kerber. Performed computational fire modeling on firefighter injury and line of duty death (LODD) investigations, performed laboratory live-fire experiments on firefighter operations and fire dynamics, researched positive pressure ventilation, hose stream mapping, and wind-driven fires.

## EDUCATION

**B.S. FIRE PROTECTION ENGINEERING**, UNIVERSITY OF MARYLAND – COLLEGE PARK  
DECEMBER 2010

Inducted into the Inaugural Early Career Distinguished Alumni (ECDA) Society in 2022 for efforts and contributions to the field of fire protection engineering.

## CERTIFICATIONS

**LICENSED FIRE PROTECTION ENGINEER (P.E.)**

Multi-state licensure including, but not limited to, NC, SC, MD, FL, CA, MI, AZ, TX, WA, & NV

\*Licensure pending in the State of Oregon

## PROFESSIONAL ORGANIZATIONS

**SOCIETY OF FIRE PROTECTION ENGINEERS (SFPE)**

Professional Grade Member

Actively Involved in the Following Committee:

- *Standards Making Committee on Performance-Based Design (ANSI Standard)*

**NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)**

Member

## PRESENTATIONS & PUBLICATIONS

Simulation of the Dynamics of a Wind-Driven Fire in a Ranch-Style House -Texas  
Co-author. National Institute of Standards & Technology Technical Note 1729 (2012)

The Design Fire: Selecting Fire characteristics for a CFD Model  
SFPE North America Conference – Philadelphia, PA (2015)

Analysis of Wind in an FDS Simulation (2016)  
SFPE North America Conference – Montreal (2016)

Life Safety and Fire Protection Systems at the Museum: A Case Study (2023)  
NFPA Conference & Expo – Las Vegas, NV (2023)