

VAST Challenge 2016: Reviewer Guide for Mini-Challenges 2 and 3

This document provides information to support peer review of submissions to VAST Challenge 2016, Mini-Challenges 2 and 3. This document includes a general section and sections for each mini-challenge. It covers background about the submission structure, the challenge problem, tasks and questions presented to participants, potential answers, and evidence found in the Challenge data supporting these answers. For a full description of the challenge problems and to access the data provided to the participants, please visit <http://vacommunity.org/VAST+Challenge+2016>.

Submissions

Participants are required to submit their entries on a standard answer form, along with a video explaining how visual analytics were used to help solve the challenges. Please consider both parts of the submission in your review. If you have difficulty reading the answer form or playing the video, please contact vast-challenge@ieee.org for assistance.

Background Information on Mini-Challenges 2 and 3

Please note: All organizations, locations, and events are fictitious.

Background

It has been two years since the “Incident at Kronos” activities took place between the Protectors of Kronos (POK), the GASTech Corporation, the government of Kronos and others (please see <http://www.vacommunity.org/VAST+Challenge+2014> for more details on the 2014 incidents). Since then, the GASTech Corporation has moved into a new state of the art three-story building in Abila. The office is built to high energy efficiency standards. Sensors are installed to help building operations personnel understand and adjust HVAC, determine electricity use and detect airborne chemicals. In light of the 2014 incidents, staff members are required to wear proximity cards, which provide access to the building and various rooms and areas throughout the installation.

Important to note that building operation sensors and prox card readers do not cover the same physical areas within the building. They each have their own coverage and range. These are illustrated in the supplemental floor plans of the GASTech building.

One interesting feature of the GASTech building is Rosie the Robot, a mail-delivering automaton that travels the hallways of each floor during each business day. Rosie moves between floors via a special elevator.

Reviewers are encouraged to read <http://vacommunity.org/2016+VAST+Challenge%3A+MC2> or <http://vacommunity.org/2016+VAST+Challenge%3A+MC3> for additional descriptions of the setting.

Data Provided

The following data was given to the contestants to support this challenge:

- A building layout for the GASTech offices, including the maps of the prox zones and the HVAC zones
- A current list of employees, roles, and office assignments
- A description of the data formats and fields provided
- Proximity sensor data for each of the prox zone regions
- Proximity sensor data from Rosie the mobile robot
- HVAC sensor readings and status information from each of the building's HVAC zones
- Hazium readings from four sensors.

Metadata

Floor Plans to the GASTech Building: There are floor plans for each of the three stories of the GASTech Building. Floor 1 includes the entrance, a loading dock at the rear, a Deli at the northwest corner, and various offices and meeting rooms. Floor 2 is where most of the employees have their offices. These range from larger offices (e.g., Room 2100) to cubicles (e.g., Room 2540). There are conference rooms and break rooms here also. Floor 3 is not completely utilized; there is a large space at the east side for future expansion. This floor contains executive offices; CEO Sanjorge's office is 3000 and his hallway is closed off. There are conference rooms and cubicles on this floor also. There are elevators that connect each floor and stairs which are not used at present.

Proximity Reader Zones: These maps show zones that are recorded when an employee's prox card passes into them. The following table describes the prox zones.

Floor 1 Prox Zones	Floor 2 Prox Zones	Floor 3 Prox Zones
1- The Main Entrance and Hallways	1- The Elevator Lobby and Conference Room	1- The Elevator Lobby and Conference Room
2- The Deli	2- The West hallway	2- The Central Offices
3- The Loading Dock	3- The Security Office	3- The West Hallway
4- The Elevator and Stairwells	4- The Elevators and Stairwells	4- The Elevator and Stairwells
5- The Large Meeting Room	5- Room 2500 (possible future server room)	5- The Future Expansion Areas
6- The Conference Room	6- The Southeast hallways	6- Sanjorge's Offices
7- The Security Office 1010	7- The Northeast hallways	(un-numbered) Server Room – Room 3440
8- The Security Office 1020		

Proximity data is only recorded when a prox badge crosses into a new prox zone, e.g., walking from the 3rd floor elevator would record prox zone changes from Zone 1 to Zone 3 to Zone 6.

Energy Zones: Different from the Proximity Zones, Building Energy Zones influence and are influenced by the building heating, cooling, and electrical systems. They are also designated differently in that

some zones will have an A or B designator associated with their data, e.g., Zone 8A and Zone 8B comprise the hallway zones on floor 1. The following table describes the zones on each floor.

Floor 1 Energy Zones	Floor 2 Energy Zones	Floor 3 Energy Zones
1- The Deli	2- The north west corner office (2100)	1- CEO Sanjorge's offices
2- The Large Meeting Room	2- The northern offices	2- The northern offices
3 - The Main Entrance Area	3- The northeast corner office (2200)	3- The northern interior offices (cubicles)
4- The Two Security Offices at the southeast corner	4- The eastern offices	4- The Central Core Area
5 - The large Conference Room	5- The southeast corner office (2300)	5- The Training/Conference room
6- The Central Core Area	6- The southern offices	6- The southern offices
7- The southwest Offices and Loading Dock	7- The southwest corner office (2400)	7- The southwest corner office (3300)
8(A)- The northern corridor	8- The western offices	8- The western offices
8(B)- The southern corridor	9- The northwest interior offices	9- The server room and adjacent office to the east
	10- The northern interior offices (cubicles)	10- The northwest interior offices
	11- The northeast interior offices (cubicles)	11(A)- the northern corridor
	12(A) - The northern corridor	11(B)- the central corridor
	12(B) - The central corridor	11(C)- the southern corridor
	12(C) - The southern corridor	12- The Future Expansion area
	13- The Central Core Area	
	14 - *No Designated Area Exists*	
	15 - The eastern interior offices (cubicles)	
	16 - The southeastern interior offices	

Notations such as "F2Z3" refer to the floor and zone within the building. F2Z3 refers to Floor 2 Zone 3 on the map.

Employee List: This spreadsheet provides the name, department, and office number for the current GASTech staff.

Data Formats

The data formats .pdf file provides information about the sensor data provided. It begins with a description of the Prox data, including the "fixed sensors" and the "mobile sensor". The mobile sensor is Rosie the Robot, who has a prox card read embedded in her to help the managers "keep track" of their employees, in addition to her mail-delivery duties. Note that a prox card has its own ID that references

their owner's name, but has additional encoding to help keep track in case a card is lost (or perhaps stolen).

The document presents information on both the .csv format and the JSON format.

There are several building data fields, that represent information about all aspects of the building and that a building control operator would want to know about. Major categories of this data include external weather, setpoints, heating, cooling, fans, dampers, electric use, and air flow. The least familiar of these data would be the "Hazium" sensors – detectors of the potentially dangerous (fictitious) Hazium gas throughout the building. If the notion of an invented gas is confusing, just think about it like you would consider CO2 gas levels. Hazium readings are taken from only four sensors.

A quick read through of the data formats document will help familiarize the reviewer with the data elements being referenced in submissions.

Mini-Challenge 2: GASTech Building Operations

Data

There are seven static data sets provided to contestants:

- Bldg.-MC2: the large dataset containing all the building operations data (the JSON files are separated into separate floor files and one relevant to the entire building).
- F1z8a-, f2z2-, f2z4-, f3z1-MC2: datasets containing Hazium readings from the four sensors
- proxMobileOut-MC2: dataset containing the Rosie prox card reading data
- proxOut-MC2: dataset containing the prox card data from the building prox zones.

Please see the data formats sheet for baseline information about these datasets.

Challenge Questions and Submission Responses

Participants were asked to examine the employees' movement and behavior according to the prox card data. They were then asked to examine the building data to identify the daily characteristics of the building data and what they signify. This was followed with a task to identify anomalies in the datasets and what they imply. Finally, the contestants are to examine any relationships they see between the building data and the prox data.

Ground Truth

- Please review the Backstory section at the end of this document for the motivations and activities that occurred during the scenario. The backstory is not released to the contestants, but was used to guide the data generation.
- Loretta's planned activities can be seen in section called Loretta's Activities below.
- Hazium Concentrations can also be found in a separate section below.

Challenge Questions

MC2.1 – What are the typical patterns visible in the prox card data? What does a typical day look like for GASTech employees?

A typical day in a typical employee's life is quite simple: arrive, go to the office, get coffee, return to the office, take a bathroom break, return to the office, go to a meeting, return to the office, go to lunch, return to the office, go to another meeting, return to the office, wander to stretch the legs, return to the office, get more coffee, return to the office, leave for the day. Staff members in different types of roles exhibit different patterns. For example, some groups within GASTech have meetings scheduled for particular days and times that may be identified. Staff members in different types of roles exhibit different patterns.

- Coffee may be obtained at the second floor break room (2710) or at the Deli.
- There are day-shift, swing-shift, and graveyard shift workers. Day-shift workers are at GASTech from 8AM-5PM. Swing-shift workers are present from 4PM-Midnight. Graveyard workers work from Midnight to 8AM.
- Delivery people may exit and enter the building from the Loading Dock on the first floor. These people include: Nant (id 73), Scozzese (75), Staley (76), and Paredes (77).
- Administrative professionals meet in 3700 from 10AM-12N on 1-Jun, and from 9A-10A on 7-Jun.
- Executives meet in Room 3700 from 130p-5pm on 13-Jun.
- Facilities group uses Room 2365 from 1030A-1130A and from 200P -300P.
- Engineering meets in Room 2700 from 130P-300P on every Tuesday and Thursday.
- Human Resources meets in Room 2700 from 230PM-330PM every Wednesday.
- Facilities uses Room 1030 from 230PM-330PM every Tuesday and Thursday.
- A person named Orsco has a meeting in 1030 from 1130AM-100PM on 3-Jun.

It is possible that employees that appear to stay in a single location may move around while their prox badge remains in their office. Employees are still getting used to wearing their badges and are not always consistent about it.

MC2.2 – Describe up to ten of the most interesting patterns you observe in the building data. Describe what is notable about the pattern and explain what you can about the significance of the pattern.

Some building patterns include:

1. Total Electric Demand Power peaks during office hours and is lower on weekends.
2. Temperature Setpoints are mostly regular across all Floors and Zones.
3. Supply Inlet Rates are consistent across all zones (except for F3Z9, the third floor server room).
4. Equipment and Lighting Power is consistent across all zones (except for F3Z9).
5. F3Z1 (Sanjorge's offices) has wild fluctuations in temperature during the day with readings over 32(C) in the afternoons, and around 20(C) during the mornings.

MC2.3 – Describe up to ten notable anomalies or unusual events you see in the data. Describe when and where the event or anomaly occurs and describe why it is notable. If you have more than ten anomalies to report, prioritize those anomalies that are most likely to represent a danger or serious issue for building operation.

Prox card data anomalies include the following:

- Occasionally, a worker will lose or drop their badge. This will result in the badge remaining in one location for long periods of time, not appearing in the data after having appeared the previous day, or being taken to security, and then being re-acquired by the staff member.

Persons to whom this happens include: Kirchner, V Morlun, Quiroz, Bagni, Salvay, Arlotti, Bello, Arpa, Awelon, Florez, Vasco-Pais, and Edward.

- P. Young appears to lose his prox card (pyoung001) on 2-Jun, and picks up a replacement (pyoung002) that he uses for the rest of the data provided. However, there are also detected prox movements for pyoung001 on 2-, 3-, 8-, and 10-Jun around and entering the 3rd Floor Server Room.

An example of this from 2-Jun is below.

Person-Id	Prox-Id	Prox-Zone	Second of Timestamp
85	pyoung001	floor 2 prox zone 4	6/2/2016 10:20:49 AM
85	pyoung001	floor 3 prox zone 4	6/2/2016 10:21:31 AM
85	pyoung001	floor 3 prox zone 1	6/2/2016 10:21:33 AM
85	pyoung001	floor 3 prox zone 3	6/2/2016 10:21:50 AM
85	pyoung001	floor 3 prox Server Room	6/2/2016 10:22:00 AM
85	pyoung001	floor 3 prox zone 3	6/2/2016 10:25:01 AM
85	pyoung001	floor 3 prox zone 1	6/2/2016 10:25:12 AM
85	pyoung001	floor 3 prox zone 4	6/2/2016 10:25:29 AM
85	pyoung001	floor 2 prox zone 4	6/2/2016 10:26:11 AM
85	pyoung001	floor 2 prox zone 1	6/2/2016 10:26:13 AM
85	pyoung001	floor 2 prox zone 2	6/2/2016 10:26:33 AM

- Rosie also detects Loretta and Patrick's 001 prox cards in the same location in or around Loretta's office during Rosie's rounds on Jun 3,6,7,8,9,10, and 13.
- Building data anomalies include the following:
 1. June 7, 2016 3 PM max F 3 VAV SYS AIR LOOP INLET Temperature is 34, a high figure. This continues through Jun 8 12N. On June 8, 2016 1 PM max F 3 VAV SYS AIR LOOP INLET Temperature is 33.
 2. VAV COOLING COIL Power runs very high for F3 from Jun 3 to Jun 6. It spikes for F2 and F3 on Jun 7 and 8 at 10PM.
 3. HVAC power demand spikes on Jun 7 at 7AM and Jun 8 at 7AM. It is also high during the Jun 10-12 weekend.
 4. May 31, 2016 12 PM Median F 1 Z 2: Lights and Equipment Power spikes.
 5. Hazium concentrations peak in F3Z1 on June 3 at 7AM. It also peaks at June 11 at 8PM. Other peaks include F2Z4 on June 11 at 6PM and F2Z2 on June 11 at 6PM.
 6. Several F2 RETURN OUTLET CO2 Concentrations peak on June 7 and June 8 at around 4000 ppm.
 7. F3Z1 Thermostat Temperature varies widely for several day, both low and high
 8. F3Z9 (Server Room) thermostat temperature peaks on June 7 at 5PM and June 8 at 12PM (Around 36C).

MC2.4 — Describe up to five observed relationships between the proximity card data and building data elements. If you find a causal relationship (for example, a building event or condition leading to personnel behavior changes or personnel activity leading to building operations changes), describe your discovered cause and effect, the evidence you found to support it, and your level of confidence in your assessment of the relationship.

The primary relationship between the prox data (including the Rosie mobile prox data) and the building data concerns the Loretta plot. Please see the sections below concerning her planned activities, the use of the pyoung001 prox card, her movements around the computer server room and around the third floor, and the detection of her prox and the pyoung001 prox in her office at the same time. Interesting relationships can be identified with respect to the temperature in Sanjorge's offices, the third floor server room temperature, and other environmental conditions around the building.

Other relationships may be discovered. However, there should be no indications of a mass exodus of staff or relocation of staff mentioned due to building environmental conditions, for example.

Mini-Challenge 3: GASTech Building Operations Streaming Data

Background

For Mini-Challenge 3, the same type of building and proximity card data is provided as in Mini-Challenge 2. However, 60 hours of this data is streamed to the contestants for analysis, instead of being provided a static data set. All of the metadata (data fields, data formats, background) remains the same. There is increased concern with the Hazium concentrations in this data, so the contestants are allowed to “place” an additional sensor (i.e., receive additional data) after approximately 2 days’ worth of data to better detect Hazium during the remainder of the data set run. Please see the mini-challenge instructions for the logistical information about this data provision.

Challenge Goal

The key to this streaming data mini-challenge is the following passage from the instructions:

The goal of the challenge is to develop new approaches to allow people to understand current data, as well as to catch up on events that took place while the system was not being monitored. The challenge organizers do not expect or want teams to monitor the data stream constantly throughout the 2.5 days (60 hours)! Check the data streams periodically as needed to ensure your software is working as expected and you are able to identify patterns of interest. Capture screen shots to include in your submission when you identify items of significance.

So, while Mini-Challenge 2 asks contestants to handle a challenging data situation with respect to its complexity, this challenge focuses on handling a complex, continuous data stream.

Challenge Questions and Submission Responses

MC3.1 – Describe the unusual or unexpected patterns and anomalies you observed during the first two days of streaming data (June 14-15). Please describe up to ten notable patterns or anomalies.

Some patterns or anomalies that could be included are:

- Continued prox card issues with Loretta Bennett and Patrick Young (use of pyoung001 prox by Loretta)
- Continued daily activities including meeting room use, coffee breaks, typical daily patterns including shift work.
- Median F 3 VAV SYS AIR LOOP INLET Temperature at June 14, 2016 1 AM was 28.3. Also, Median F 3 VAV SYS AIR LOOP INLET Temperature at June 14, 2016 11 PM was 29.1. These temperature readings indicate issues with the Third Floor server room environment.
- Sanjorge’s offices continue to suffer severe temperature fluctuations throughout this time.
- Intermittent high power use levels (both overall and HVAC) could be noted during this time. These tend to map to expected values for a working day.
- Several IT staff go to the server room between 11 and 1pm on 6/15. They are shutting down machines due to the extreme temperatures in the Server Room.

- High CO2 levels can be spotted during these times, for example F2Z14 and F1Z5 zones are well above 1000 ppm at certain morning and evening periods.

MC3.2 – Which additional sensor did you choose to add to your data stream? What was the rationale for your selection? Did it provide additional insight?

The possible additional sensors are located at F1Z5, F2Z11, F2Z15, and F3Z5. All show some potentially threatening characteristics. It is important to consider the rationale provided for selecting the data.

MC3.3 – Describe anomalies or unusual events you saw in the last four hours of the data stream.

- Describe specific anomalies or unusual events
- Which of these anomalies may be of greatest concern? What is your rationale?

F1Z5 hovers around the 5-6 ppm range. F2Z11 reads from 30-40 ppm. F2Z15 reads from 32-41 pp. F3Z5 reads from 28 to 32 pp. F1Z5 would seem to be of the least concern in this set.

MC3.4 – Mini-Challenge 3 asks you to develop ways of understanding developments in streaming data that take place even while you are away from the data.

- Describe how your team approached the challenge of catching up on events that took place while you were not monitoring the stream. What features of your software helped you to review past events and catch up on things you missed?
- How could these features be used to help you reconsider recent data in light of new events?

These responses are dependent on the individual team's approach.

Backstory

Cast

- Loretta Bennett, Centralized Building Controls Specialist
- Boyd Mullen, Centralized Building Controls Specialist
- Patrick Young, Facilities Operations Manager (also, the supervisor of Loretta and Boyd)
- Sten Sanjorge – President, CEO, head of GASTech

Background and Motivations

After the great debacle of 2014, GASTech updated their security procedures, physical facilities and hired a LOT of security personnel. One of the upgrades that Management demanded was a centralized building control system. This job was handed to an ambitious mid-level manager with a sketchy moral compass named Patrick Young. He asked his controls staff – both hired at the same time in 2015 and with equal qualifications – to provide a proposal with specifications and a cost estimate for the upgrade.

Boyd Mullen, an easy-going, likeable man in his late 20s from a wealthy Kronos family, designed a system that was initially less expensive, and was conveniently connected to the GASTech network. This system used average software that had opportunities for interface from staff.

Loretta Bennett, a technically talented and somewhat prickly woman in her mid-30s designed a similar system. The system would be more expensive to implement due to the security controls she incorporated in her design.

Loretta and Boyd couldn't agree on a single proposal to present, so they agreed to present both to Patrick. Loretta was confident that the company would go with her superior design. At the meeting, Patrick listened to both proposals. He asked Boyd a lot of questions about cost savings, and how Boyd's system would meet the needs of the business. The questions he asked Loretta were targeted at pointing out how the system was unnecessarily expensive and needlessly complex. Patrick left the meeting with both proposals, telling Boyd and Loretta he would let them know his decision within a week.

Neither Boyd nor Loretta heard anything for three weeks. One morning Loretta answered a call from the GASTech contracts officer about a purchase order being submitted by Patrick Young. The officer was asking for more detail on a piece of equipment for the new centralized building control system. This is how Loretta found out that Patrick had chosen Boyd's design. Further, Loretta found out that when Patrick had presented the design to upper Management (including CEO Sten Sanjorge), he had taken credit for the design.

Loretta fumed for a while. She felt angry and resentful that her superior design had been rejected, and that Patrick hadn't given credit to either of the team. She was also pretty sure Patrick was a misogynist.

What Loretta Decided

Loretta decided to prove the superiority of her design by demonstrating the flaws in Boyd's design. This plan had the added benefit of placing the blame of an inferior system squarely on Patrick, since he took credit for the design. Since she wasn't unhappy with Boyd, this was an elegant solution. If things went well, the business would spend a LOT of money on heating, cooling, parts and repairs, and the system would wear out or break very quickly. Then it could be fitted to her design. She would be a savior.

Loretta planned to create situations in which changes were made to the system – traceable to other people – that caused complaints and increased wear and tear. She planned to take advantage of the changes to the badging system to carry out her plan.

GASTech has also upgraded the proximity sensors and staff badges. This enables them to know that everyone from the building has been accounted for in the case of an emergency. Each badge is used in an active fashion to go into the building from the exterior. It is used in a proximity form to access computers. There are also passive sensors throughout the building that read the badge from a distance. This tracks an employee's location as they move throughout the building. Badge access is required for entrance into some specific areas, like the server room. Executives don't like wearing the badges and are frequently issued replacement badges. The replacement badges allow all the same things but frequently are not returned (and de-assigned) in a timely fashion.

GASTech is also experimenting with automated mail delivery using a robot that can traverse a fixed path through the building. The robot has been nicknamed "Rosie" by the staff. It's not generally known to the staff, but part of the way Rosie knows if she should pause to deliver mail is because she is equipped with a mobile passive Prox Reader. As Rosie passes staff badges, she logs their presence in a proximity zone. Rosie's navigation is far from perfect and she can be tripped up by things and people in her way.

The newly instrumented building is up and running along. As part of a concern for health and wellness, as part of the building monitoring, GASTech has deployed a limited number of sensors to monitor for the chemical Hazium™, a new contaminant that has properties similar to CO₂/CO.

GASTech has one more sensor available to install – and a limited number of spots in the building where the wiring is available. In Mini-Challenge 3, the contestants are asked – where in the building would you add a new wired sensor to help figure out what's going on?

Loretta's Plan

Loretta forms an idea to use the prox cards against Patrick. One day while she is upstairs in Patrick's office, she snags a forgotten temporary prox card sitting around Patrick's office. She wraps and drops the prox card into Rosie for a later pickup, so it can move and not be detected by the building sensors, and that she won't be associated with it moving, just in case some signal leaks. Later, she watches for Rosie to head for the server farm (or somewhere where the building controls can be controlled—not her computer though) and leaves her prox card in her office. She grabs Patrick's card from Rosie, accesses a building control machine and starts to work. Now that she is in her prox zone, she doesn't have to worry about keeping Patrick's card safe from detection, and leaves it uncovered (but stashed in her

desk). Unfortunately, when Rosie comes by after that, she registers both prox cards. This becomes a problem when Patrick is clearly elsewhere as well.

Loretta's Planned Activities

Date	Time	Activity
31-May	0920	Floor 2 Zone 16 AC temperature turned down by 10 degrees for two hours (67F)
	0925	Floor 1 Zone 2 AC temperature turned off for two hours
1-Jun	0500	Floor 2 Zone 14 both heat and AC are run until 0700
	1300	Setpoint to 80F for Floor 1 Zone 2, Floor 2 Zone 6 & 14, Floor 3 Zones 5&6 until 1700
2-Jun	0500	Floor 3, Zone 1 temp set to 50F until 1300
	0630	Damper in Floor 2, Zone 8 gets stuck closed until 1500.
	1200	AC turned on full on Floor 3 Zone 9 until 1020 next day
	1300	Floor 3, Zone 1 temp set to 90F until 0500 next day
3-Jun	0500	Floor 3, Zone 1 temp set to 50F until 1300
	1300	Floor 3, Zone 1 temp set to 90F until 0500 next day
	1800	All Floor 3 zones heat and AC on full until 6-Jun 0500
4-Jun	0500	Floor 3, Zone 1 temp set to 50F until 1300
	1300	Floor 3, Zone 1 temp set to 90F until 0500 next day
5-Jun	0500	Floor 3, Zone 1 temp set to 50F until 1300
	1300	Floor 3, Zone 1 temp set to 90F until 0500 next day
6-Jun	0100	Floor 1 Zones 4&7 AC set to 60F until 2300
	0500	Floor 3, Zone 1 temp set to 50F until 1300
	0900	Floor 2 Zones 2,4,6,8 temp set to 80F until 2100
	1300	Floor 3, Zone 1 temp set to 90F until 0500 next day
7-Jun	0001	All zones, all floors. Set point temp set to 80F during day and 60F for night, until midnight next day
	0500	Floor 3, Zone 1 temp set to 50F until 1300
	1100	Compressor for Floor 3, Zone 4 goes offline until 1300 8-Jun
	1300	Floor 3, Zone 1 temp set to 90F until 0500 next day
8-Jun	0500	Floor 3, Zone 1 temp set to 50F until 1300
	1200	Damper in Floor 2, Zone 8 gets stuck closed until 1800
	1300	Floor 3, Zone 1 temp set to 90F until 0500 next day
9-Jun	0500	Floor 3, Zone 1 temp set to 50F until 1300
	0900	Floor 1 Zone 1 AC turns off until 1700
	1000	Floor 3 Zone 8 set point goes to 90F until 2245
	1000	Floor 3 Zone 1,2,3,4,5,6,7,9,10,11 set point goes to 60F until 2245
10-Jun	0500	Floor 3, Zone 1 temp set to 50F until 1300
	1000	Floor 1 Zone 2 temperature goes to 85F until 1400
	1300	Floor 3, Zone 1 temp set to 90F until 0500 next day
	1800	All zones, all floors, heat and AC to full until 13-Jun 0500

Date	Time	Activity
11-Jun	0100	Damper in Floor 3, Zone 11A, 11B, 11C stuck open until Tuesday at 1630
	0500	Floor 3, Zone 1 temp set to 50F until 1300
	1300	Floor 3, Zone 1 temp set to 90F until 0500 next day
12-Jun	0500	Floor 3, Zone 1 temp set to 50F until 1300
	1300	Floor 3, Zone 1 temp set to 90F until 0500 next day
13-Jun	0500	Floor 3, Zone 1 temp set to 50F until 1300
	1300	Floor 3, Zone 1 temp set to 90F until 0500 next day
14-Jun	0001	All zones, all floors. Set point temp set to 60F during day and 80F for night, until 15-Jun midnight
	0500	Floor 3, Zone 1 temp set to 50F until 1300
	1300	Floor 3, Zone 1 temp set to 90F until 0500 next day
15-Jun	0500	Floor 3, Zone 1 temp set to 90F until 1300
	1045	Floor 3 Zone 9 temp set to 90F until 1200 next day
	1300	Floor 3, Zone 1 temp set to 50F until 0500 next day
16-Jun	0500	Floor 3, Zone 1 temp set to 50F until 1300
	1200	-AC turned on full on Floor 3 Zone 9 until 1020 next day
	1300	Floor 3, Zone 1 temp set to 90F until 0500 next day

Hazium Concentrations

Hazium detection color legend		
	Low	
	Medium	
	Medium to High	

	31-May	1-Jun	2-Jun	3-Jun	4-Jun	5-Jun	6-Jun	7-Jun	8-Jun	9-Jun	10-Jun	11-Jun	12-Jun	13-Jun	14-Jun	15-Jun	16-Jun
Floor 1																	
1												1100-2030					0100-0400
2																	
3																	
4																	
5								1300-2230									
6																	0100-
7																	
8A				1100-1830					1900-1000								
8B																	0100-
Floor 2																	
1																	0100-
2																	
3							0200-0700							0900-1730			0100-
4				1430-1500								1100-2030					0100-0400
5														0900-1730			
6																	0100-
7																	
8																	
9																	
10				1500-2220								1100-2030					0100-
11																	
12A															1600-0300	0300-1500	
12B																	
12C												1100-2030					
13							1130-2000	0400-1400									0100-
14																	0100-
15			0400-0630	0915-2100			1130-2000					1100-2030			1600-0300	0300-1500	0100-0400
16																	
Floor 3																	
1																	
2								1900-1000				1100-2030		0130-1300			0100-0400
3																	
4			1600-2300					0400-1400									
5																	
6									1900-1000	0200-1830		1100-2030					
7																	
8																	
9																	0100-
10																	
11A		1300-1500		0100-0830								1100-2030					0100-0400
11B																	
11C			1600-2300									1100-2030					
12																	