EVENT INVESTIGATION REPORT

EIR-2017-024: Investigation of 285-A AOP-015 Event

Event Investigation Team Lead — Date: 07/20/2017

PER Responsible Manager — Date: July 20, 2017

PER No. WRPS-PER-2017-1272

AOP-015 for Odors Reported Inside and Around 285-A

AOP-015 Summary

Date/Time of Event	• June 13, 2017 • 0735 hours
Location	• Inside and Around 285-A • Corner of 4th St. and Buffalo Ave in 200E.
Personnel Affected	Eight (8) reported odors: Transported to HPMC: • Five (5) Construction personnel transported to HPMC Symptoms Experienced: • Three (3) Construction personnel experienced symptoms
Odor / Taste	• Rotten egg • Sulfur • Ammonia • Metallic after taste
Symptoms	• Burning in throat/ inability to clear throat/sore throat • Sinus/eye irritation • Nausea
Industrial Hygiene (IH) Direct Read Instrumentation (DRI) Monitoring / Sampling	Monitoring and Sampling data results: • Ammonia • Total VOCs • Mercury • Hydrogen Sulfide All less than background
Potential Source	• MSA sanitary tank pumping activities, releasing hydrogen sulfide
Wind Speed / Direction	From NW to SE direction at 15 mph with gusts up to 34 mph
Waste Disturbing or Tank Work in Adjacent Area	No waste disturbing activities were occurring at the time.
Other Work in Adjacent Area	• MSA was pumping 3 sanitary tanks northwest of 285-A within 1 hour and 4 minutes of odors being reported, 2 sanitary tanks completed pumping activities 2 minutes after odors were reported.

Investigation Summary

On June 13, 2017 workers from WRPS and WRPS construction subcontractors arrived to 4th St and Buffalo Ave for the mornings' pre-jobs at approximately 0630 am for installation of the mechanical/piping components associated with WO#275269, all workers were present including WRPS Health Physics Technician (HPTs) and Industrial Hygiene Technicians (IHTs). After the pre-job briefing the IHTs needed to return to their office to retrieve their monitoring instruments. Around 0725 the Field Work Supervisor (FWS) left 4th and Buffalo to head over to MSA Utilities. Around 0735 seven of eight workers both inside and outside of 285-A encounter a "rotten egg, sulfur" smell. One of the workers called the FWS who was approximately one minute away, they notified him that all 8 workers have egressed the building and the workers are staged on the Northwest corner of the concrete slab on the northside of the 285-A building.

Four workers were located inside of the building, and four were located outside the building. Once the FWS arrived on the scene, workers had grouped together on the concrete slab where they couldn't detect the odor anymore. The FWS immediately noticed the "rotten egg/sulfur" odor, at this time the IHTs had arrived back at the job site for normal work activities. The FWS informed the IHTs of the odor, and the IHTs began their monitoring for ammonia, volatile organic compounds (VOCs), carbon monoxide, flammable gas, and oxygen with direct reading instruments. There were no elevated readings detected. It is current practice that if odors are reported but the area has not yet declared an AOP-015, then the IHTs continue monitoring of the area. An AOP-015 is an Abnormal Operating Procedure for a Response to Reported Odors or Unexpected Changes to Vapor Conditions that is entered "if odors have caused symptoms of exposure or a stronger than normal odor is detected by multiple personnel outside of areas where potential or actual vapor concerns are expected such as waste transfers, 242-A operations, or cover block removal." The FWS began making notifications to WRPS construction manager, Building Trades Safety Rep., and the Central Shift Office (CSO). At 0814 a Shift Office Event Notification (SOEN) message was issued entering the procedure TF-AOP-015 at 4th St. and Buffalo Ave. The Shift Office directed the work crew to move up wind to a staging area, this area was on the south side of 4th St. and West of Buffalo Ave. Three workers were transported to HPMC due to reported symptoms. "Response" IHTs were dispatched to the CSO to be briefed on the investigative response plan. Another SOEN was issued at 0828 for high winds greater than 20 miles per hour. At this time after receiving the SOEN for AOP-008, the FWS called the CSO for further direction to take cover from the winds, and the crew was directed to MO-164.

IHTs responded to the AOP-015 at 0843 and performed continuous monitoring for VOCs, ammonia (NH_3) and mercury (Hg) and hydrogen sulfide (H_2S) both inside and outside the building. IHTs also used a direct reading instrument (DRI) to survey to H_2S. A bag sample was taken inside of the building. All monitoring and the bag sample showed no elevated readings (survey 17-04361). Data reviewed by the Vapor Monitoring Detection System located in A farm and AP farm had no out of the ordinary vapor concentrations on 06/13 from 0700-0800. An Event Investigation was initiated at 0900 hours on June 13th and the Office of River Protection (ORP) Facility Representative were notified. A fact finding meeting was held Wednesday morning on June 14th.

At the time of the event, there were no waste disturbing or tank-intrusive activities occurring in the nearby tank farms. Wind directions were from the north-northwest traveling at 15 mph with gusts up to 30 mph. The event investigation looked at possible sources of chemical releases that may have attributed to these odors. Affected personnel as well as others in the area pointed to the 244-AR Vault, and 204-AR as the source and wind direction at the time supports this theory,

however the description of the odors differs from the "body odor" odor typically attributed to previous odor events from 244-AR and 204-AR.

Event Timeline

June 13, 2017	
0631	MSA Sanitary Tank completed pumping activities (400 gallons) at MO-174 (approximately 311 yards Northwest of 285-A)
0630-0645	Held pre-job (Retrieval IHTs assigned to the job were present, after pre-job IHTs left to retrieve instruments from 2750)
~0725	FWS leaves 285-A
~0735	Workers described smell as "rotten/sulfur" inside and around the building exited through the north door rollup door, encounter odors. 7 total workers reported odors. Worker contacted FWS who was "a minute away" to report odors
~0736	FWS arrives back at 285A, workers are staged in outside of the building on concrete slab on NW corner. Workers no longer smelled any odors, FWS noticed a rotten/sulfur odor and begin making notifications.
0737	MSA Sanitary Tank completed pumping activities (350 gallons) at MO-173 (approximately 281 yards Northwest of 285-A)
0737	MSA Sanitary Tank completed pumping activities (2500 gallons) at 2607-E12 (East of 285-A)
0737	MSA Sanitary Tank completed pumping activities (350 gallons) at MO-098 (approximately 193 yards Northwest of 285-A)
0740	IHTs (Retrieval) reported to job site for work support (got notified about odors prior to AOP-015 entry. Retrieval IHTs perform surveys in and around 285-A, no elevated readings were recorded
0753	Notified Construction Manager, Building Trades Safety Rep, and CSO
~0755	Construction manager arrives at location
0808	Response IHTs arrive at the CSO for AOP-015 response
0814	SOEN message "Entering AOP-015 for 4th and Buffalo. Access is restricted, all personnel stay clear of 4th and Buffalo. CSM
0815	Notified ORP On-Call
0828	SOEN message "Entering AOP-008 for winds greater than 20 mph. Goggles required for all outdoor work. No excavation of radioactive material. CSM"
0828	3 Construction employees reported odor and symptoms concern at 285A and were taken to HPMC for evaluation by Safety Rep. CSM
0832	Response IHTs perform sweeps
0834	DOE Fac Rep arrives at CSO
0836	First employee evaluated at HPMC
0838	DRI Instrument fitted with H_2S sensor arrives
0838	DOE Fac Rep leaves CSO to take pictures of event scene
0855	RJ Lee van drives by event scene on 4th St.
0855	2nd and 3rd employees are evaluated at HPMC.
0859	DOE Fac Rep arrives at CSO
0900	SOEN message "Initiated Event Investigation for 285-A AOP-015 Event."
0902	DOE Fac Rep leaves.
0903	Report from AN team IH no source detected at 285-A.
0907	Call from AN team IH after evaluating chemical odors with DRI instrumentation and no source was identified.
1014	Safety arrives at CSO with six odor response cards.
1138	SOEN message "Exiting AOP-008, winds are less than 20 mph. CSM"

1239	IH Programs Manager contacts AN team IH with negative HAPSITE results.
1250	AN IH reports negative results to CSM
1320	SOEN message "Sample analysis for TF-AOP-015 event has been completed and the results are at or below background levels. Exiting AOP-015. CSM"
1328	3 Construction employees who reported odor concerns at 285-A have been evaluated at HPMC and returned to work. CSM
1330	2 Construction employees involved with odor response at 285-A were taken to HPMC for precautionary evaluation. CSM
1614	2 Construction employees involved with odor response at 285-A were evaluated and released to return to work. CSM
	One construction employee went to Kadlec for evaluation.
June, 15, 2017	
0756	Construction employee reported breathing difficulties and has been taken to HPMC for evaluation. CSM.
1244	Construction employee that reported breathing difficulties has been evaluated at HPMC and released to return to work. CSM.
CSM refers to Central Shift Manager entries into logbook	

Immediate Actions Taken

Notifications were made, Shift Office entered AOP-015 at 4th and Buffalo. The work crews moved to an upwind location, however after high winds AOP message was issued, the work crews relocated to MO-164 for a safe location. Surveys were performed by Response IHTs, HAPSITE Analysis was completed and results showed no elevated levels. The CSO exited AOP-015.

Discussion of Potential Cause

On Monday morning, two (2) Retrieval Mangers were driving on 4th Street headed to C Farm and encountered a "rotten egg like/sulfur" odor. The Managers noticed a pump truck nearby and assumed it was pumping the porta potties or 'blue rooms.' The odor experienced and the pumping activities gave plausible reason to assume the source of the odor. In these odor cases it is not necessary to notify the shift office or enter AOP-015 when the source of the odor is known and there are no symptoms present.

The Investigation made contact with MSA to see if the 'blue rooms' were serviced before or during the AOP event on Tuesday. The investigation discovered that a subcontractor services the 'blue rooms' on specific days, but MSA regularly pumps/services sanitary tanks during the week, which are septic tanks underground that trailers or facilities use. It was found that MSA was pumping sanitary tanks and not the "blue-rooms" during Monday's and Tuesdays odor encounter.

The investigation concludes that the cause and the source of the odor is most likely Hydrogen Sulfide (H_2S), a bi-product of the anaerobic breakdown process of organic material, which was agitated during the MSA pumping activities. The investigation identified a confirmed source of H_2S. Descriptions from the workers on type of smell, and reported symptoms align with the suspect source. However, it should be noted that workers involved with the odor event reported that they did not smell a sewage or "blue room" type odor. The investigation acquired the pumping logs of the sanitary pump truck for both Monday and Tuesday. The truck noticed by the Retrieval Managers was pumping 2607-E12 a sanitary tank located at 4th and Canton Ave. On Tuesday, pumping activities included completing a sanitary tank pump at 0631 am around MO-174. Two other sanitary tanks were serviced by two trucks at 0737, these were located at

MO-098 and MO-173. See Attachment 1: Suspect odor source. These tanks are located approximately 190 to 280 yards northwest of 285-A.

Additionally while located at 285-A on 06/15/2017 (on 4th St and Buffalo Ave), construction crew workers noticed a non-overwhelming rotten/sewage odor smell, a Construction Manager (CM) and IHT visually confirmed a sanitary tank beginning pumping activities near the intersection of 4th St and Canton Place, sanitary tank 2607-E12, approximately 235 yards east of 285-A. The wind was around eight mph from the southeast direction. The CM and IHT equipped with a H_2S sensor investigated, spoke with the driver/operator of the MSA tanker truck, who recalled being in the area pumping smaller sanitary tanks around MO-164 Tuesday morning. The CM and IHT placed the instrument 8-12 inches from the exhaust pipe on the pump of the tanker truck and alarmed at 13.6 parts per million (ppm) at the suspected source. No H_2S was detected approximately 16-24 inches away from the source. The instrument can detect H_2S at .1 ppm.

H_2S has an 8 hour time weighted average (TWA) of 10 ppm, and a Short term exposure limit (STEL) of 15 ppm. The NIOSH Pocket Guide to Chemical Hazards states H_2S is a colorless gas with a strong odor of rotten eggs. According to OSHA, H_2S has an odor threshold as low as 0.010 ppm. It is both an irritant and chemical asphyxiant. WRPS does not classify H_2S as a tank waste Chemicals of Potential Concern (COPC) therefore H_2S is not a chemical associated with tank farm vapors. H_2S is not a chemical identified on the AreaRaes, Tank Vapor Assessment Team (TVAT) equipment, or on the RJ Lee van.

Preliminary Extent of Condition Review

The area surrounding 4th St. and Buffalo Ave has been the location of several previous odor events. During a search in the problem evaluation request (PER) database four PERs written in the location of 4th and Buffalo Ave for odors were identified. Although the symptoms are similar, the odor described in this event is different.

A pervious PER and event investigation report (EIR) had a concluded MSA pumping activities as the source of odor EIR-2016-034 located at 4th St and 4th St loop.

Recommendations/Proposed Corrective Actions

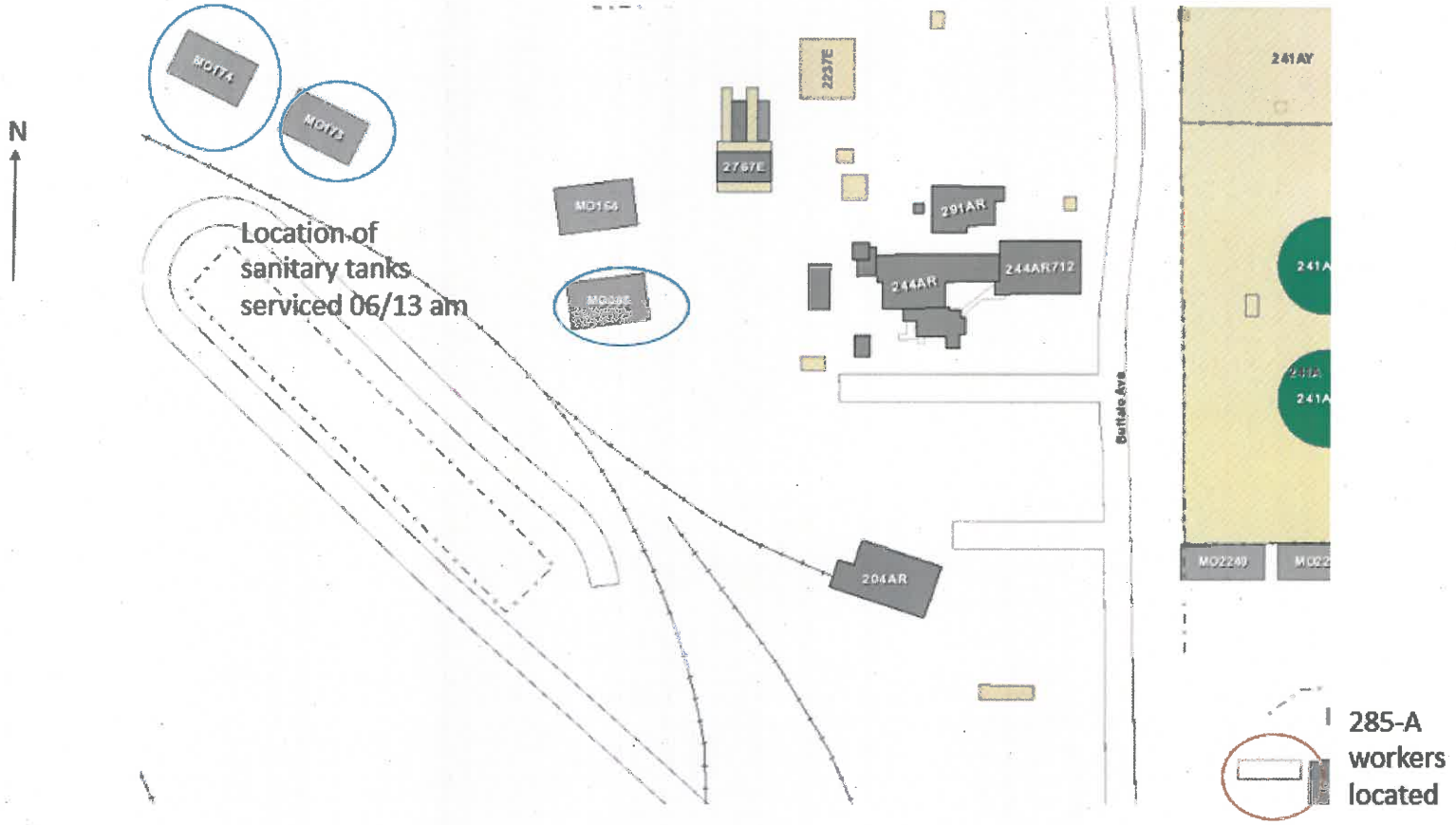
WRPS has recommended to MSA to conduct enhanced monitoring in relation to the exhaust on the MSA Sewer and Water trucks. It is further recommended to conduct sewage pumping on backshift and weekends. As of June 27th, MSA has notified WRPS that to help minimize noxious odors during summer work routines, septic systems are now being pumped between 4am and 6am, Monday through Thursday.

The investigation also recommended, that two AreaRaes be equipped with H_2S sensors for monitoring and stationed at the corner of 4th St and Buffalo Ave and at 244-AR. This recommendation has already been implemented.

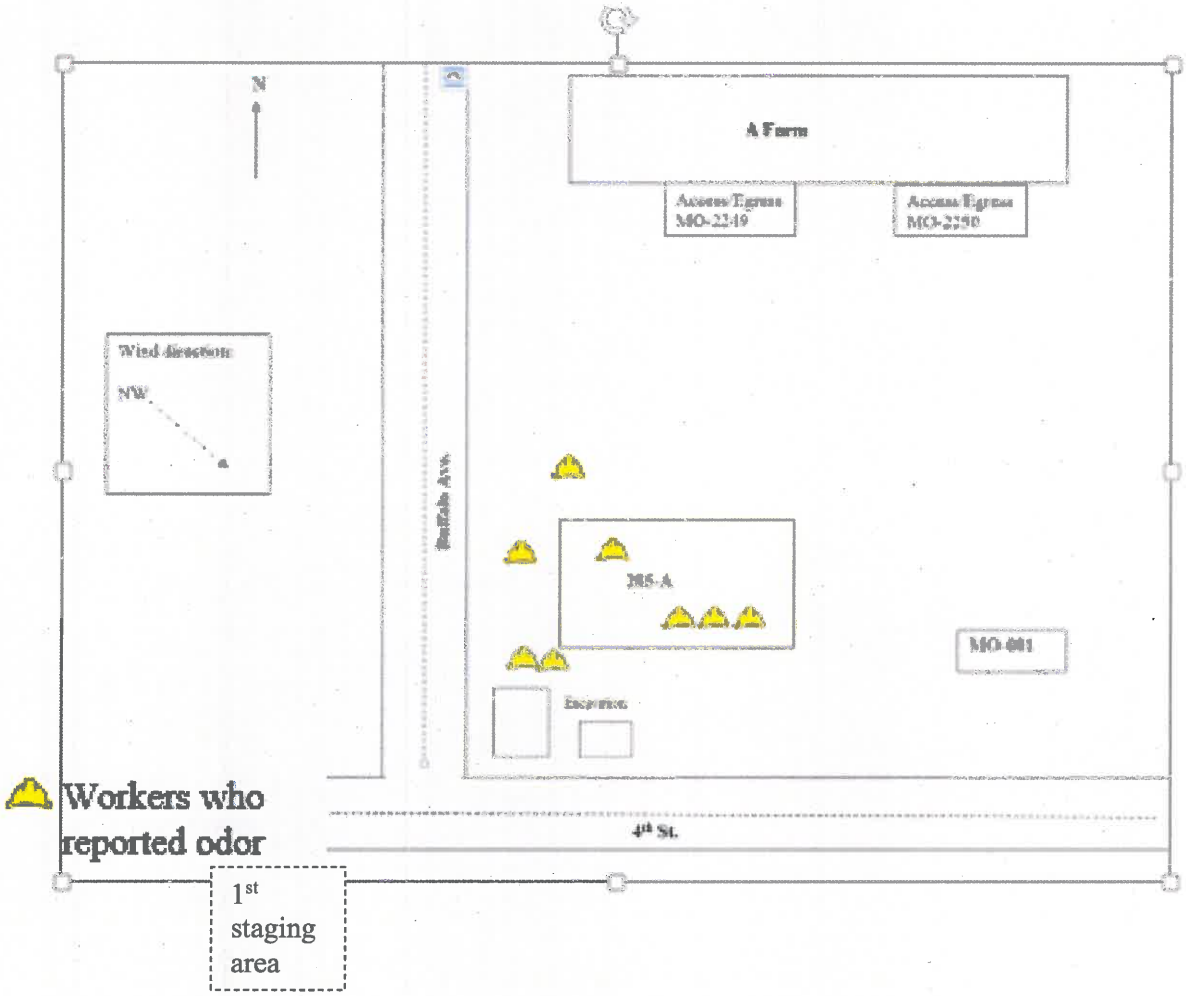
Attachments:

Attachment 1: Suspect odor source
Attachment 2: Location of workers who reported Odors
Attachment 3: MSA Sanitary Tanker Truck
Attachment 4: Odor Response Plan
Attachment 5: OSHA Fact Sheet
Attachment 6: Odor Response Cards

Attachment 1: Suspect odor source



Attachment 2: Location of workers who reported Odors



Attachment 3: MSA Sanitary Tanker Truck

Pump and exhaust line; where IH surveys were taken, where H_2S was identified.

Attachment 4: Odor Response Plan

ATTACHMENT 1 – ODOR RESPONSE PLAN

DESCRIPTION OF EVENT (date/time & description of odors detected, location, symptoms, etc):
06/13/2017 @ 0755 Eight individuals working at 241-285-A shop near 4th and Buffalo detected a rotten egg/sulfur odor inside and outside building. 3 individuals experienced sore throats (1 electrician, 1 pipefitter, 1 DGR laborer) and sent to onsite medical provider. IHT's were NOT present supporting the work but arrived shortly after detected odor and did not detect ammonia or VOCs with handheld DRI instrumentation.

Weather Station # 6:
Wind direction: West to East
Wind Speed: 15mph with gusts up to 34mph
Temp: 61°F
Pressure: 29.19 in/Hg and rising
Humidity: 37%

RESPONSE STEPS:
Access restriction to 285-A and surrounding area
IHTs to perform survey: Initial survey for Ammonia, VOCs, and Mercury with DRI instruments. Grab air sample collected inside the building. Additional survey with DRI instrument outfitted with H_2S sensor. DRI# 17-04361
Exited TF-AOP-015 based on all results < Background

IH Sampling Plan # IHP-09001 RWP # N/A
JHA: N/A Other DRI Survey # 17-04361

REQUIRED APPROVAL SIGNATURES

Industrial Hygiene: [redacted] Date: 06/13/2017
Central Shift Manager [redacted] Date: 06/13/2017

ADDITIONAL SIGNATURES (as determined by Shift Manager or Safety & Health Rep: N/A if not applicable)

RadCon Hazards Assessor: N/A Date: N/A
Industrial Safety: N/A Date: N/A
Environmental: N/A Date: N/A
Engineer: N/A Date: N/A

Odor Response Plan Notes (monitoring data, results of actions taken, etc. Use more sheets as necessary)

Attachment 4: Odor Response Plan (Cont.)

Response to Reported Odors or Unexpected Changes to Vapor Conditions

DRI monitoring of event scene found no detectable readings for ammonia, mercury, H_2S or VOCs. Grab Air Sample collected for HAPSITE analysis.

Timeline of Event:
0806: EV team IH received call from IHT supervisor to report to CSO for potential AOP-15 response.
0808: EV team IH and AN team IH arrive at CSO.
0809: IHT Lead and IHT supervisors arrive at CSO
0811: CSM briefs EV IH and AN IH regarding event. 5 Individuals detected rotten egg/sulfur odor inside and outside of building 285-A on the N.E. corner of 4th and Buffalo. 2 with symptoms of sore throat.
0812: IHT Lead sent to obtain H_2S sensored DRI instrument
0814: Directed IHTs to perform initial response with handheld DRI instruments to detect Ammonia and total VOCs

0820: IHT left to prepare instrument and materials
0832: Response IHT's begin are sweep.
0833: Report to CSO from field manager changes information to eight individuals detected odors with three experiencing sore throat symptoms.
0834: DOE Fac Rep arrives at CSO.
0838: DOE Fac Rep leaves to take pictures of event scene.
0843: DRI fitted with H_2S sensor arrives.
0848: Shift Team IH and AY/AZ team IH arrive at CSO.
0851: AY/AZ team IH made notifications to central IH lab to prepare HAPSITE
0855: RJ Lee van drives by event scene on 4th.
0859: DOE Fac Rep arrives at CSO.
0901: Safety arrives at CSO.
0902: Safety leaves to collect Odor Response Cards at onsite Medical. Fac Rep leaves.
0903: Report from AN team IH no source detected at 285-A. Building contains multiple containers of various chemicals.
0907: Call from AN team IH after evaluating chemical containers with DRI instrumentation and no source was identified.
0908: CSM informed that RJ Lee van being deployed to the area.
0910: AN team IH arrives at CSO from field response and briefs CSM regarding evaluation of chemical inventory inside 241-285-A and general area sweep.
0929: IHT Lead notifies AN team IH with survey # 17-04361. Nitrous oxide complete and tedlar bag is en route to central IH laboratory for HAPSITE analysis.
0931: CSM updated on event timeline by FWS: FWS notified of odor. FWS enters bldg. to notify work crew. SWIMS initiated. IHTs arrived and FWS sent IHTs into bldg. to perform sweep.
0944: Safety arrives at CSO with Patient Reports of Odors from the onsite medical provider.
1014: Safety arrives at CSO with six Odor Response Cards.
1058: AN IH contacts AOP-015 SME with update on response.
1239: IH Programs Manager contacts AN Team IH with negative HAPSITE results.
1250: AN IH reports negative results to CSM.

Attachment 4: Odor Response Plan (Cont.)

Response to Reported Odors or Unexpected Changes to Vapor Conditions

Odor Response Cards.

ODOR RESPONSE CARD

1. Contact CSM, Complete below bulleted information and map.
   - Date and time odor was noticed: 6-13-17 7:35
   - Your name and the work you were performing: [redacted]
   - Location of odors (mark area on map and wind direction): In side of 285 A and at side
   - Name(s) of others in or near the affected area: [redacted]
   - Was an IHT present? NOPE
   - Describe the odor: ☐ Sweet ☐ Sour ☐ Musty ☐ Earthy ☐ Metallic ☐ Smoky ☒ Rotten ☐ Onion ☐ Cleaning Solution ☐ Ammonia ☐ Other: Sulfur Small Strong
   - Possible Source: 204 AR Hanford
   - Your symptoms (if any): ☐ Headache ☐ Dizziness/Lightheaded ☒ Nausea ☐ Cough ☐ Fatigue/Drowsiness/Weakness ☐ Sore/Burning Throat ☐ Difficulty Breathing ☐ Watery/Irritated Eyes/Trouble with Vision ☐ Tingling/Numbness/Paralysis ☐ Rash/Itching ☐ Other:
2. Send this card to the Central Shift Office.

ODOR RESPONSE CARD

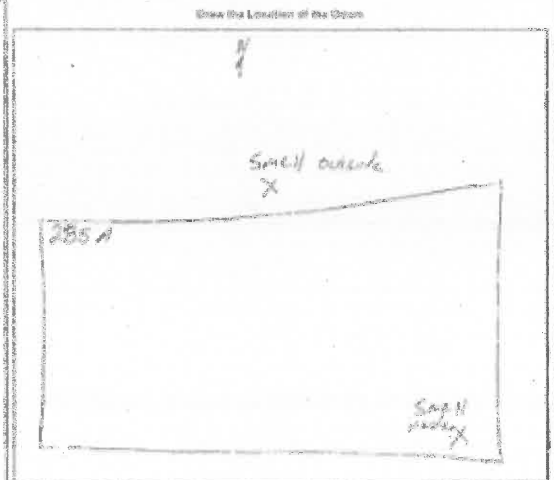
Odors Detected with NO immediate symptoms

1. Notify Immediate Supervisor.
2. Central Control Shift Manager: [redacted] Provide the bulleted information below.
3. Complete map, return to Central Shift Office as soon as practicable.

Odors Detected With Symptoms

4. Notify Immediate Supervisor.
5. Contact CSM: [redacted] complete below bulleted information and map.
   - Your name and the work you were performing
   - Your symptoms (if any)
   - Date and time odor was noticed
   - Location of odors (mark area on map and wind direction)
   - Describe the odor
   - Name of others in or near the affected area
   - Was an IHT present?
   - Possible source
6. Provide information on the back of card.
7. Send this card immediately to the Central Shift Office.

Draw the Location of the Odors



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Attachment 4: Odor Response Plan (Cont.)

Response to Reported Odors or Unexpected Changes to Vapor Conditions

ODOR RESPONSE CARD

1. Contact CSM, Complete below bulleted information and map.
   - Date and time odor was noticed: 6-13-2017 7:25AM
   - Your name and the work your were performing: [redacted]
   - Location of odors (mark area on map and wind direction): Inside 285A
   - Name(s) of others in or near the affected area: [redacted]
   - Was an IHT present?: No
   - Describe the odor: ☐ Sweet ☐ Sour ☐ Musty ☐ Earthy ☐ Metallic ☐ Smoky ☒ Rotten ☐ Onion ☐ Cleaning Solution ☐ Ammonia ☐ Other:
   - Possible Source: 204AL
   - Your symptoms (if any): ☐ Headache ☐ Dizziness/Light-Headed ☒ Nausea ☐ Cough ☐ Fatigue/Drowsiness/Weakness ☐ Sore/Burning Throat ☐ Difficulty Breathing ☐ Watery/Irritated Eyes/Trouble with Vision ☐ Tingling/Numbness/Paralysis ☐ Rash/Itching ☐ Other:
2. Send this card to the Central Shift Office.

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ODOR RESPONSE CARD

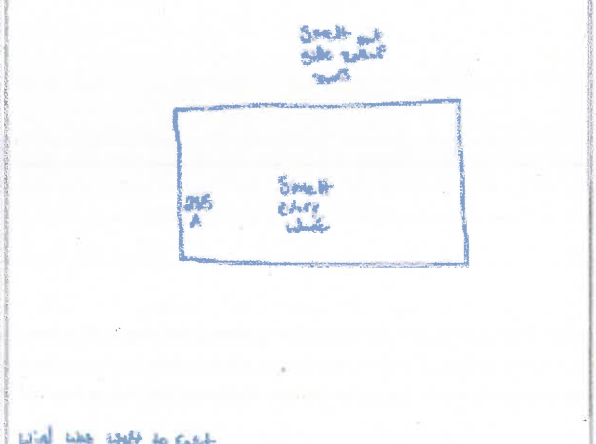
Odors Detected with NO Immediate symptoms

1. Notify Immediate Supervisor
2. Contact Central Shift Manager [redacted] Provide the bulleted information below.
3. Complete map, return to Central Shift Office as soon as practicable

Odors Detected WITH Symptoms

4. Notify Immediate Supervisor
5. Contact CSM [redacted] complete below bulleted information and map
   - Your name and the work you were performing
   - Your symptoms (if any)
   - Date and time odor was noticed
   - Location of odors (mark area on map and the wind direction)
   - Describe the odor
   - Name of other in or near the affected area
   - Was an IHT present?
   - Possible source
6. Provide information on the back of card
7. Send this card immediately to the Central Shift Office

Draw the Location of the Odors



Wind Direction

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Attachment 4: Odor Response Plan (Cont.)

Response to Reported Odors or Unexpected Changes to Vapor Conditions

ODOR RESPONSE CARD

1. **Contact CSM, Complete below bulleted information and map.**
   - Date and time odor was noticed: 7:35 6-13-2017
   - Your name and the work your were performing: [redacted]
   - Location of odors (mark area on map and wind direction): SW corner of building 285
   - Name(s) of others in or near the affected area: [redacted]
   - Was an IHT present? no
   - Describe the odor ☐ Sweet ☐ Sour ☐ Musty ☐ Earthy ☐ Metallic ☐ Smoky ☐ Rotten ☐ Onion ☐ Cleaning Solution ☐ Ammonia ☐ Other: _____
   - Possible Source: _____
   - Your symptoms (if any) ☐ Headache ☐ Dizziness/Light-Headed ☐ Nausea ☐ Cough ☐ Fatigue/Drowsiness/Weakness ☐ Sore/Burning Throat ☐ Difficulty Breathing ☐ Watery/Irritated Eyes/Trouble with Vision ☐ Tingling/Numbness/Paralysis ☐ Rash/Itching ☐ Other: _____
2. **Send this card to the Central Shift Office.**

ODOR RESPONSE CARD

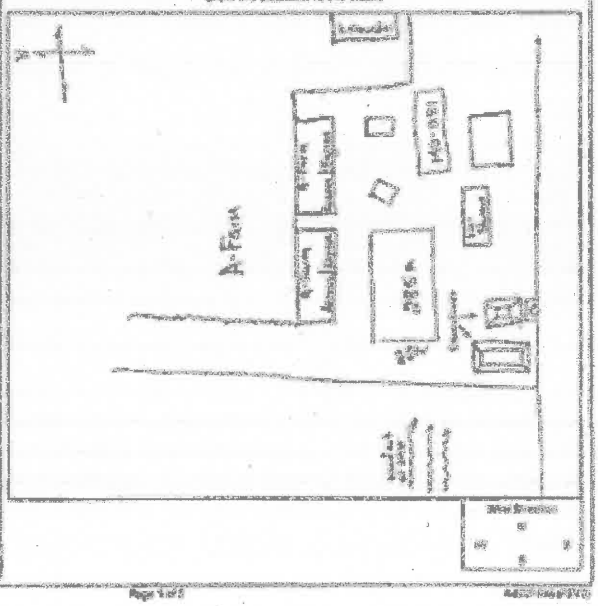
Odors Detected with A/2 Immediate symptoms

1. Notify Immediate Supervisor.
2. Contact Central Shift Manager [redacted] Provide the bulleted information below.
3. Complete map, return to Central Shift Office as soon as practicable.

Odors Detected (WITH) Symptoms

4. Notify Immediate Supervisor.
5. Contact CSM [redacted] complete below bulleted information and map.
   - Your name and the work you were performing
   - Your symptoms (if any)
   - Date and time odor was noticed
   - Location of odors (mark area on map and the wind direction)
   - Describe the odor
   - Name of other in or near the affected area
   - Was an IHT present?
   - Possible source
6. Provide information on the back of card.
7. Send this card immediately to the Central Shift Office.

Draw the Location of the Odors



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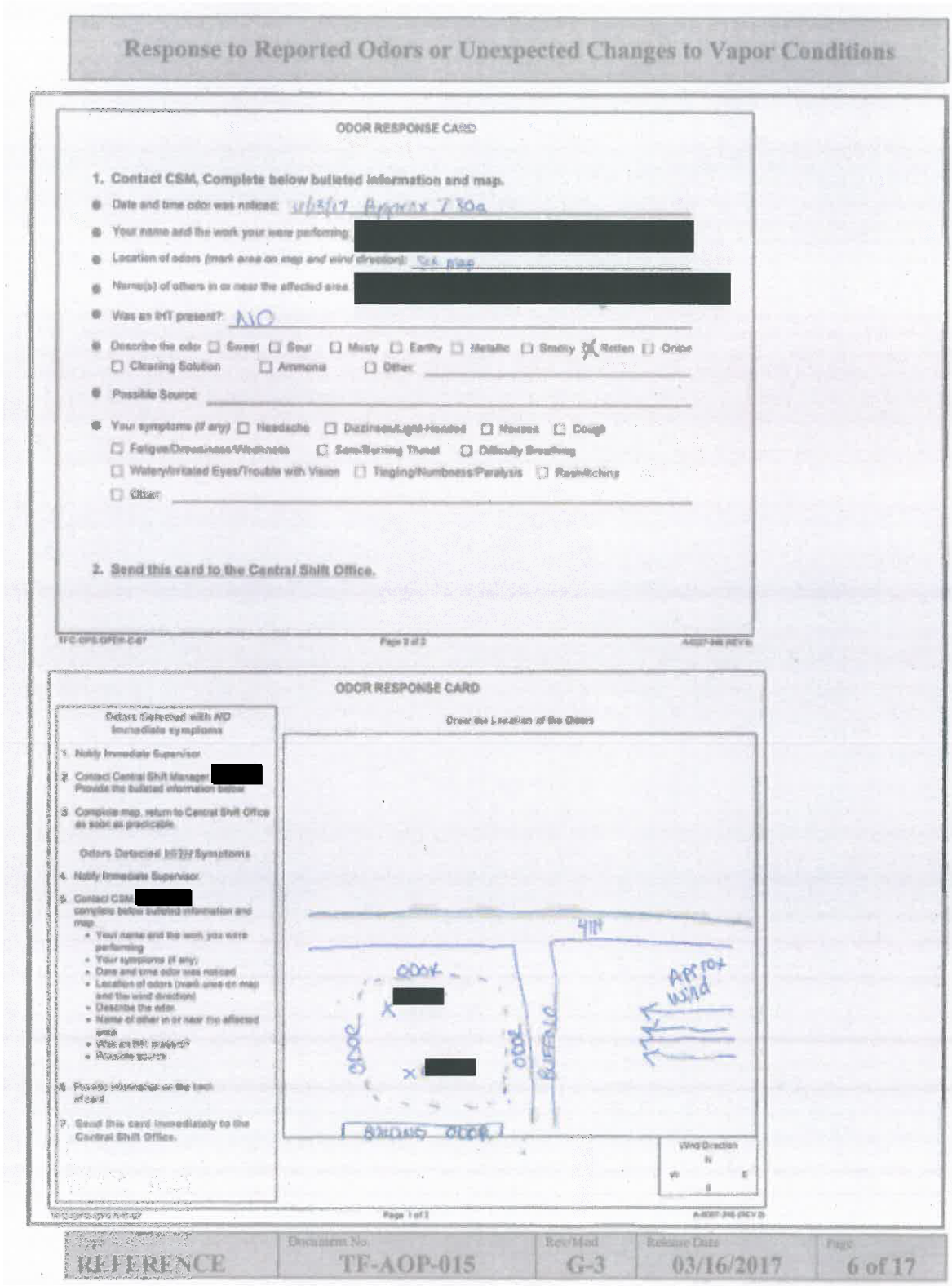
Attachment 4: Odor Response Plan (Cont.)



Response to Reported Odors or Unexpected Changes to Vapor Conditions

ODOR RESPONSE CARD

1. Contact CSM, Complete below bulleted information and map.
   - Date and time odor was noticed: 1/13/17 Approx 7:30a
   - Your name and the work your were performing: [redacted]
   - Location of odors (mark area on map and wind direction): See Map
   - Name(s) of others in or near the affected area: [redacted]
   - Was an INT present? NO
   - Describe the odor ☐ Sweet ☐ Sour ☐ Musty ☐ Earthy ☐ Metallic ☐ Smelly ☒ Rotten ☐ Onion ☐ Cleaning Solution ☐ Ammonia ☐ Other:
   - Possible Source:
   - Your symptoms (if any) ☐ Headache ☐ Dizziness/Light-Headed ☐ Nausea ☐ Cough ☐ Fatigue/Drowsiness/Weakness ☐ Sore/Burning Throat ☐ Difficulty Breathing ☐ Watery/Irritated Eyes/Trouble with Vision ☐ Tingling/Numbness/Paralysis ☐ Rash/Itching ☐ Other:
2. Send this card to the Central Shift Office.

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ODOR RESPONSE CARD

Odors Detected with NO Immediate symptoms

1. Notify Immediate Supervisor
2. Contact Central Shift Manager [redacted] Provide the bulleted information below
3. Complete map, return to Central Shift Office as soon as practicable

Odors Detected WITH Symptoms

4. Notify Immediate Supervisor
5. Contact CSM [redacted] complete below bulleted information and map
   - Your name and the work you were performing
   - Your symptoms (if any)
   - Date and time odor was noticed
   - Location of odors (mark area on map and the wind direction)
   - Describe the odor
   - Name of other in or near the affected area
   - Was an INT present?
   - Possible source
6. Provide information on the back of card
7. Send this card immediately to the Central Shift Office.

Draw the Location of the Odors

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Document No.	Rev/Mod	Release Date	Page
REFERENCE TF-AOP-015	G-3	03/16/2017	6 of 17

Attachment 4: Odor Response Plan (Cont.)

Response to Reported Odors or Unexpected Changes to Vapor Conditions

ODOR RESPONSE CARD

1. **Contact CSM, Complete below indicated information and map.**
   - Date and time odor was noticed: 6/13/17 0730
   - Your name and the work you were performing: [redacted]
   - Location of odors (mark area on map and wind direction): corner of 4th & Buffalo
   - Name(s) of others in or near the affected area: [redacted]
   - Was an SHT present? NO
   - Describe the odor: ☐ Sweet ☐ Sour ☐ Musty ☐ Earthy ☐ Metallic ☐ Smoky ☒ Rotten ☐ Other ☐ Cleaning Solution ☐ Ammonia ☐ Other: _____
   - Possible Source: _____
   - Your symptoms (if any): ☐ Headache ☐ Dizziness/Light-Headed ☐ Nausea ☐ Cough ☐ Fatigue/Weakness/Numbness ☐ Sore/Burning Throat ☐ Difficulty Breathing ☐ Watery/Irritated Eyes/Trouble with Vision ☐ Tingling/Numbness/Paralysis ☐ Rash/Itching ☐ Other: _____
2. **Send this card to the Central Shift Office.**

Page 2 of 2

ODOR RESPONSE CARD

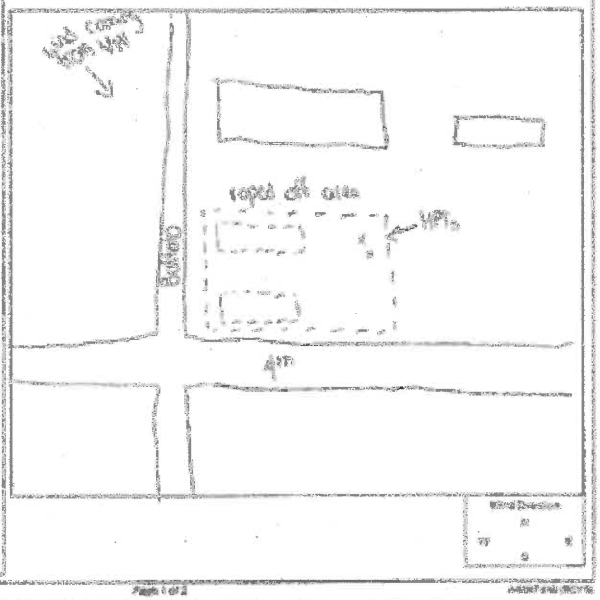
Odors Detected with NO Immediate Symptoms

1. Notify Immediate Supervisor.
2. Contact Central Shift Manager: [redacted] Provide the indicated information below.
3. Complete map, return to Central Shift Office as soon as practicable.

Odors Detected WITH Symptoms

4. Notify Immediate Supervisor.
5. Contact CSM: [redacted] complete below indicated information and map:
   - Your name and the work you were performing
   - Your symptoms (if any)
   - Date and time odor was noticed
   - Location of odors (mark area on map and the wind direction)
   - Describe the odor
   - Name of others in or near the affected area
   - Was an SHT present?
   - Possible source
6. Provide information on the back of card
7. Send this card immediately to the Central Shift Office.

Show the Location of the Odors



Page 1 of 2

Type	Document No.	Rev/Mod	Release Date	Page
REFERENCE	TF-AOP-015	G-3	03/16/2017	7 of 17

Attachment 4: Odor Response Plan (Cont.)

Response to Reported Odors or Unexpected Changes to Vapor Conditions

ODOR RESPONSE CARD

1. **Contact CSM. Complete below bulleted information and map.**

- Date and time odor was noticed: 06-13-2017 0730 am
- Your name and the work your were performing: [redacted]
- Location of odors (mark area on map and wind direction): 285-A Building
- Name(s) of others in or near the affected area: [redacted]
- Was an IHT present? NO, BUT SHOWED UP A SHORT TIME LATER
- Describe the odor: ☐ Sweet ☐ Sour ☐ Musty ☐ Earthy ☐ Metallic ☐ Smoky ☒ Rotten ☐ Colon ☐ Cleaning Solution ☐ Ammonia ☒ Other: SULFER
- Possible Source: UNK
- Your symptoms (if any): ☐ Headache ☐ Dizziness/Light-Headed ☐ Nausea ☐ Cough ☐ Fatigue/Drowsiness/Anxiness ☐ Sore/Burning Throat ☐ Difficulty Breathing ☐ Watery/Irritated Eyes/Trouble with Vision ☐ Tingling/Numbness/Paralysis ☐ Rash/Itching ☐ Other:

2. Send this card to the Central Shift Office.

Page 2 of 2

ODOR RESPONSE CARD

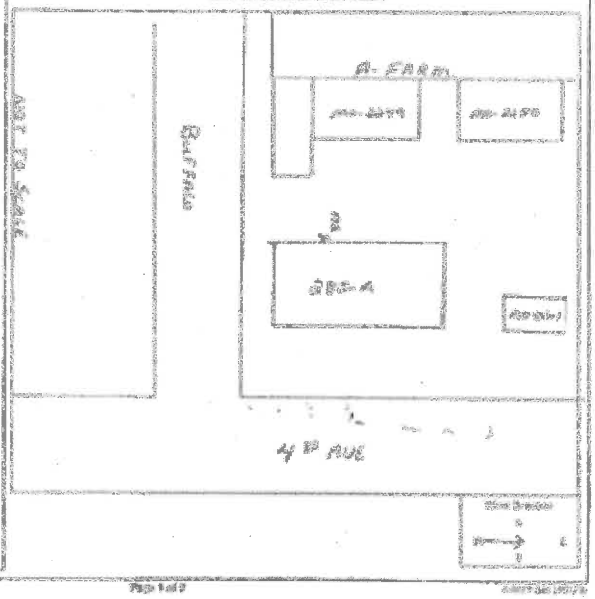
Odors Detected with NO Immediate symptoms

1. Notify Immediate Supervisor
2. Contact Central Shift Manager: [redacted] Provide the bulleted information below
3. Complete map, return to Central Shift Office as soon as practicable.

Odors Detected WITH Symptoms

4. Notify Immediate Supervisor
5. Contact CSM: [redacted] complete below bulleted information and map
   - Your name and the work you were performing
   - Your symptoms (if any)
   - Date and time odor was noticed
   - Location of odors (mark area on map and the wind direction)
   - Describe the odor
   - Name of others in or near the affected area
   - Was an IHT present?
   - Possible source
6. Provide information on the back of card
7. Send this card immediately to the Central Shift Office

Draw the Location of the Odors



Page 1 of 2

Type	Document No.	Rev/Mod	Release Date	Page
REFERENCE	TF-AOP-015	G-3	03/16/2017	8 of 17

Attachment 4: Odor Response Plan (Cont.)

Response to Reported Odors or Unexpected Changes to Vapor Conditions

Pictures of Potential Odor Sources.

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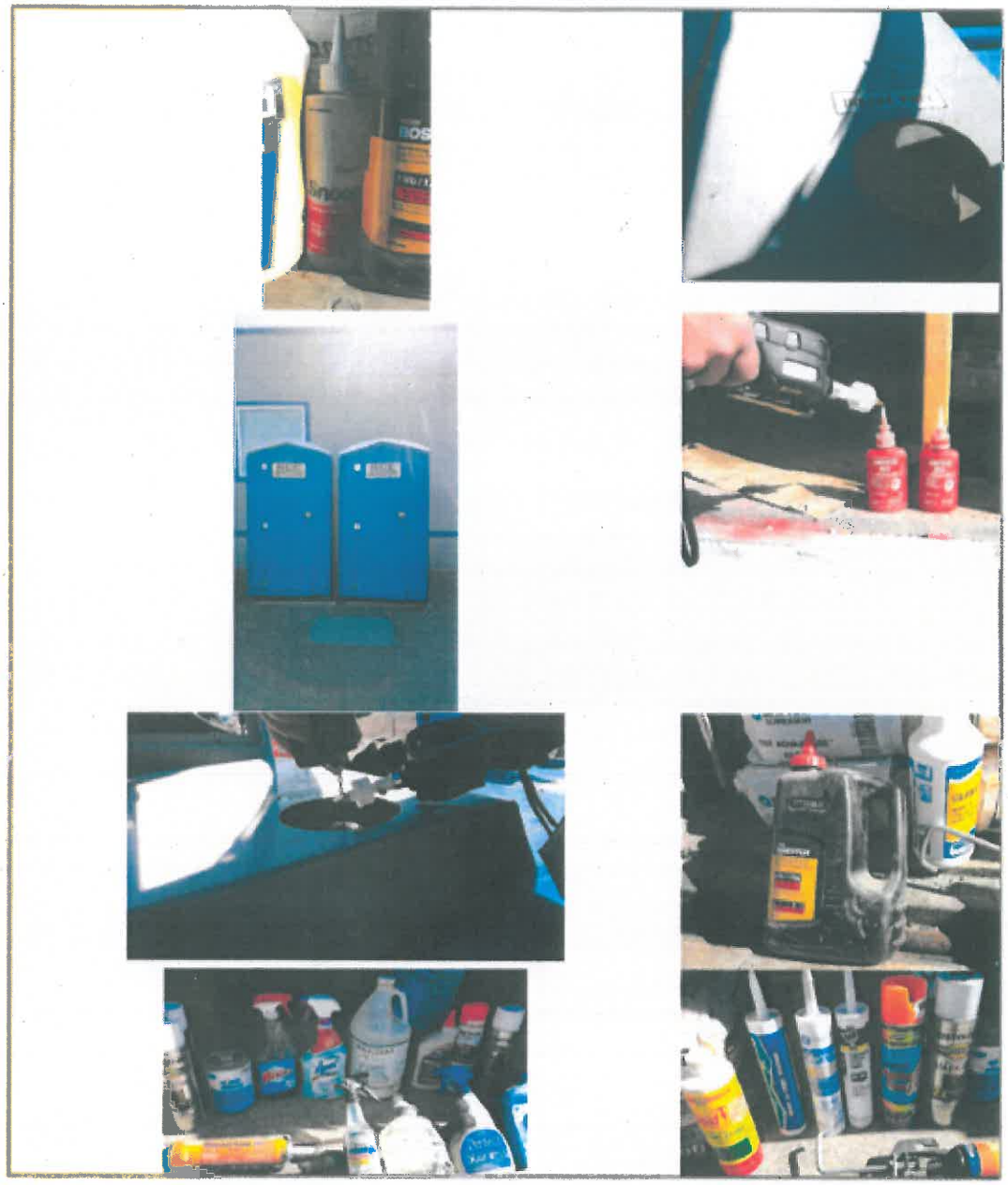
REFERENCE	TF-AOP-015	G-3	03/16/2017	12 of 17

Attachment 4: Odor Response Plan (Cont.)

Response to Reported Odors or Unexpected Changes to Vapor Conditions



Attachment 4: Odor Response Plan (Cont.)

Response to Reported Odors or Unexpected Changes to Vapor Conditions

Attachment 4: Odor Response Plan (Cont.)

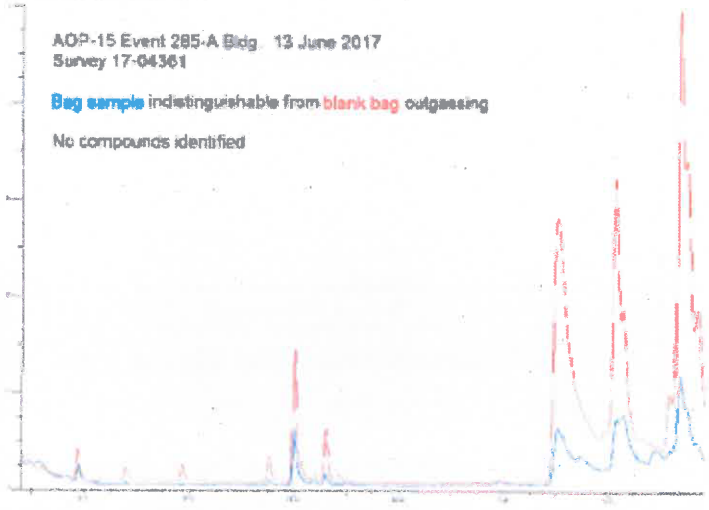
Response to Reported Odors or Unexpected Changes to Vapor Conditions

Type	Document No.	Rev/Mod	Release Date	Page
REFERENCE	TF-AOP-015	G-3	03/16/2017	15 of 17

Attachment 4: Odor Response Plan (Cont.)

Response to Reported Odors or Unexpected Changes to Vapor Conditions

Results of grab sample:



The HAPSITE results of the bag received from the 285-A building were essentially a blank bag sample.
The traces of blank bag outgassing and sample bag overlay each other perfectly.
No compounds were identified.

Industrial Hygiene Programs

RESPONSE PLAN COMPLETED: [redacted] 06/13/2017
Safety & Health Rep Date

Attachment 5: OSHA Fact Sheet

OSHA FactSheet

Hydrogen Sulfide (H_2S)

Hydrogen sulfide is a colorless, flammable, extremely hazardous gas with a "rotten egg" smell. Some common names for the gas include sewer gas, stink damp, swamp gas and manure gas. It occurs naturally in crude petroleum, natural gas, and hot springs. In addition, hydrogen sulfide is produced by bacterial breakdown of organic materials and human and animal wastes (e.g., sewage). Industrial activities that can produce the gas include petroleum/natural gas drilling and refining, wastewater treatment, coke ovens, tanneries, and kraft paper mills. Hydrogen sulfide can also exist as a liquid compressed gas.

Hazardous properties of H_2S gas

Hydrogen sulfide is heavier than air and may travel along the ground. It collects in low-lying and enclosed, poorly-ventilated areas such as basements, manholes, sewer lines, underground telephone vaults and manure pits.

For work within confined spaces, use appropriate procedures for identifying hazards, monitoring and entering confined spaces.

The primary route of exposure is inhalation and the gas is rapidly absorbed by the lungs. Absorption through the skin is minimal. People can smell the "rotten egg" odor of hydrogen sulfide at low concentrations in air. However, with continuous low-level exposure, or at high concentrations, a person loses his/her ability to smell the gas even though it is still present (olfactory fatigue). This can happen very rapidly and at high concentrations, the ability to smell the gas can be lost instantaneously. Therefore, **DO NOT** rely on your sense of smell to indicate the continuing presence of hydrogen sulfide or to warn of hazardous concentrations.

In addition, hydrogen sulfide is a highly flammable gas and gas/air mixtures can be explosive. It may travel to sources of ignition and flash back. If ignited, the gas burns to produce toxic vapors and gases, such as sulfur dioxide.

Contact with liquid hydrogen sulfide causes frostbite. If clothing becomes wet with the liquid, avoid ignition sources, remove the clothing and isolate it in a safe area to allow the liquid to evaporate.

Health effects of H_2S exposure

Hydrogen sulfide is both an irritant and a chemical asphyxiant with effects on both oxygen utilization and the central nervous system. Its health effects can vary depending on the level and duration of exposure. Repeated exposure can result in health effects occurring at levels that were previously tolerated without any effect.

Low concentrations irritate the eyes, nose, throat and respiratory system (e.g., burning/tearing of eyes, cough, shortness of breath). Asthmatics may experience breathing difficulties. The effects can be delayed for several hours, or sometimes several days, when working in low-level concentrations. Repeated or prolonged exposures may cause eye inflammation, headache, fatigue, irritability, insomnia, digestive disturbances and weight loss.

Moderate concentrations can cause more severe eye and respiratory irritation (including coughing, difficulty breathing, accumulation of fluid in the lungs), headache, dizziness, nausea, vomiting, staggering and excitability.

Attachment 5: OSHA Fact Sheet (Cont.)

High concentrations can cause shock, convulsions, inability to breathe, extremely rapid unconsciousness, coma and death. Effects can occur within a few breaths, and possibly a single breath.

Protection against H_2S exposure

Before entering areas where hydrogen sulfide may be present:

1. Air must be tested for the presence and concentration of hydrogen sulfide by a qualified person using air monitoring equipment, such as hydrogen sulfide detector tubes or a multi-gas meter that detects the gas.

   Testing should also determine if fire/explosion precautions are necessary.

2. If the gas is present, the space/area must be ventilated continually to remove the gas.
3. If the gas cannot be removed, the person entering the space/area must use appropriate respiratory protection and any other necessary personal protective equipment, rescue and communication equipment.

   OSHA's Confined Spaces standard contains specific requirements for identifying, monitoring and entering confined spaces.

Entering dangerous H_2S atmospheres

A level of H_2S gas at or above 100 ppm is Immediately Dangerous to Life and Health (IDLH). Entry into IDLH atmospheres can only be made using: 1) a full facepiece pressure demand self-contained breathing apparatus (SCBA) with a minimum service life of thirty minutes, or 2) a combination full facepiece pressure demand supplied-air respirator with an auxiliary self-contained air supply.

If H_2S levels are below 100 ppm, an air-purifying respirator may be used, assuming the filter cartridge/canister is appropriate for hydrogen sulfide. A full facepiece respirator will prevent eye irritation.

If air concentrations are elevated, eye irritation may become a serious issue. If a half-mask respirator is used, tight fitting goggles must also be used.

Workers in areas containing hydrogen sulfide must be monitored for signs of overexposure.

NEVER attempt a rescue in an area that may contain hydrogen sulfide without using appropriate respiratory protection and without being trained to perform such a rescue.

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

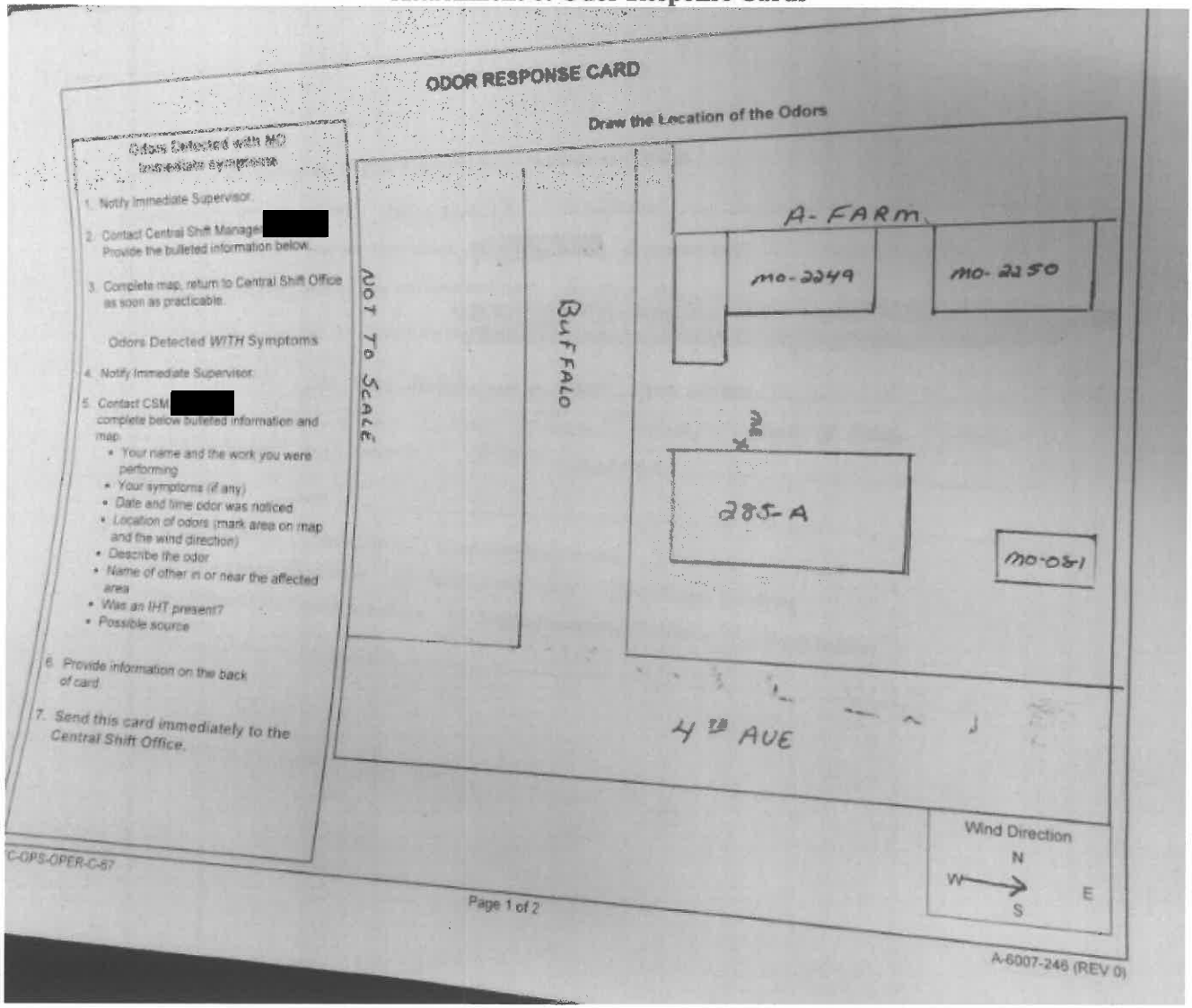
For more complete information:

OSHA Occupational Safety and Health Administration

U.S. Department of Labor
www.osha.gov
(800) 321-OSHA

DSG 10/2005

Attachment 6: Odor Response Cards



ODOR RESPONSE CARD

Odors Detected with NO Immediate Symptoms

1. Notify Immediate Supervisor.
2. Contact Central Shift Manager [redacted]. Provide the bulleted information below.
3. Complete map, return to Central Shift Office as soon as practicable.

Odors Detected *WITH* Symptoms

4. Notify Immediate Supervisor.
5. Contact CSM [redacted] complete below bulleted information and map.
   - Your name and the work you were performing
   - Your symptoms (if any)
   - Date and time odor was noticed
   - Location of odors (mark area on map and the wind direction)
   - Describe the odor
   - Name of other in or near the affected area
   - Was an IHT present?
   - Possible source
6. Provide information on the back of card.
7. Send this card immediately to the Central Shift Office.

Draw the Location of the Odors

NOT TO SCALE

BUFFALO

A-FARM

MO-2249

MO-2250

285-A

MO-081

4TH AVE

Wind Direction
N
W
E
S

C-OPS-OPER-C-57

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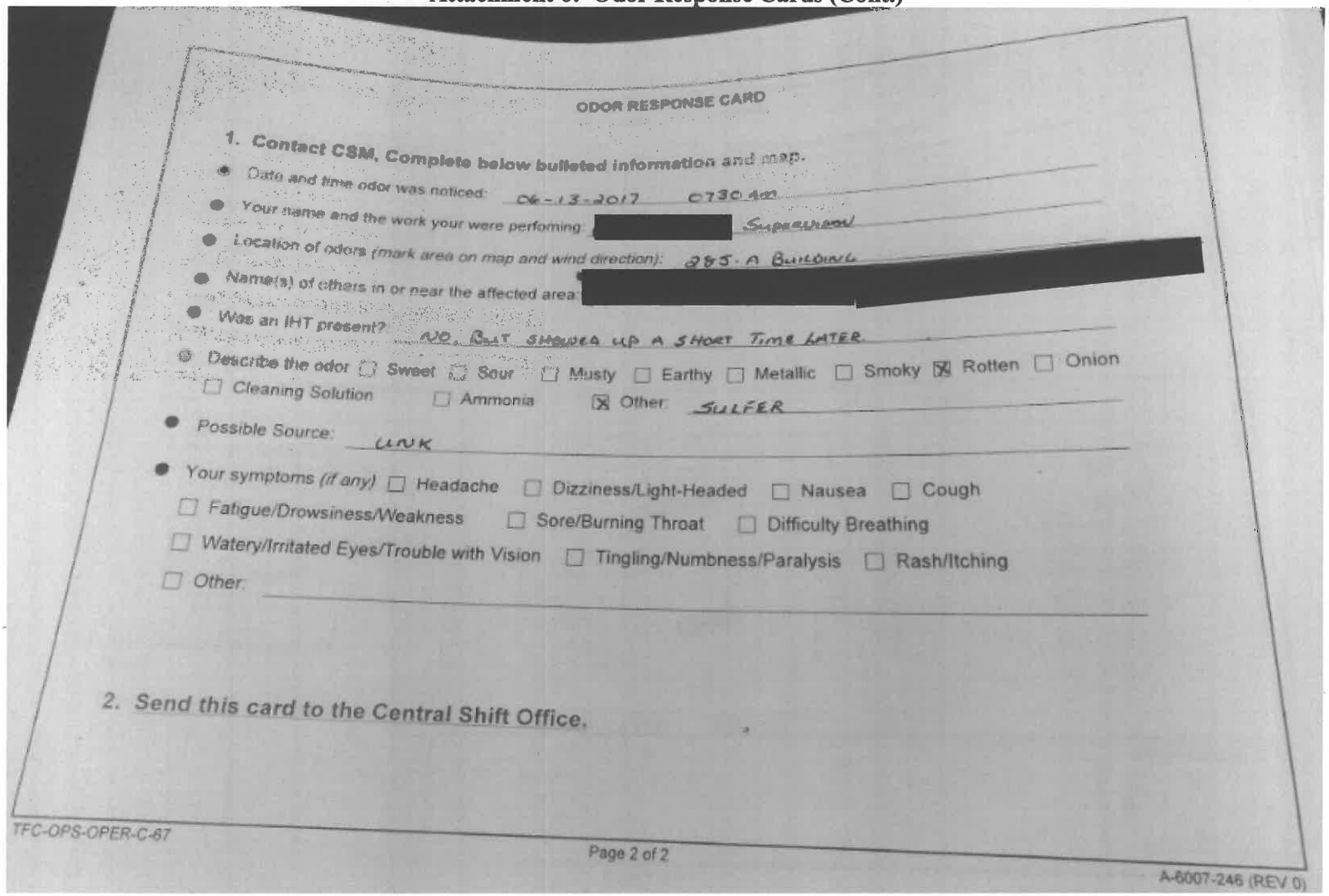
Attachment 6: Odor Response Cards (Cont.)



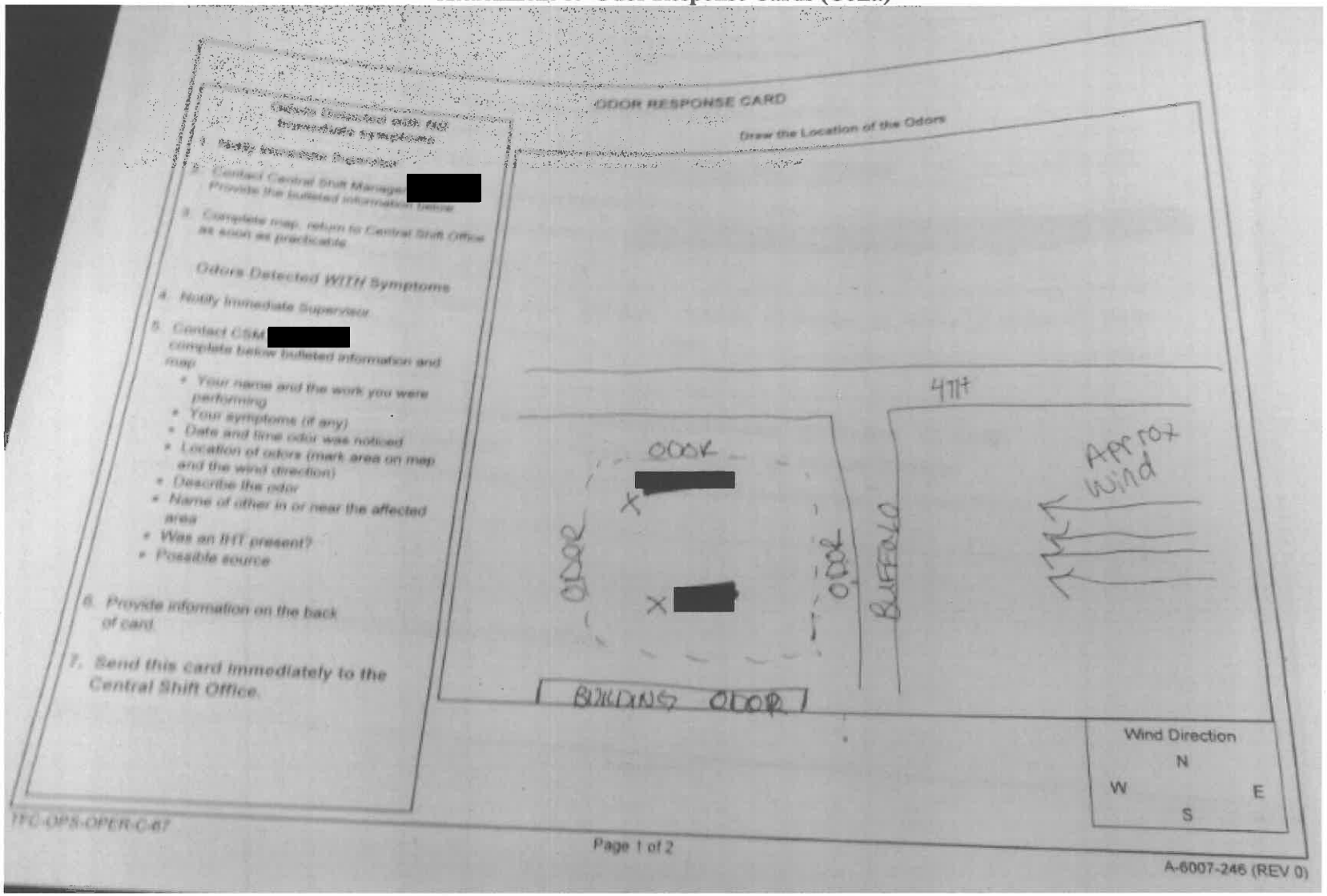
ODOR RESPONSE CARD

1. **Contact CSM. Complete below bulleted information and map.**
   - Date and time odor was noticed: 06-13-2017 0730 AM
   - Your name and the work your were performing: [redacted] Supervisor
   - Location of odors (mark area on map and wind direction): 285-A Building
   - Name(s) of others in or near the affected area: [redacted]
   - Was an IHT present? NO. But showed up a short time later
   - Describe the odor ☐ Sweet ☐ Sour ☐ Musty ☐ Earthy ☐ Metallic ☐ Smoky ☒ Rotten ☐ Onion ☐ Cleaning Solution ☐ Ammonia ☒ Other: SULFER
   - Possible Source: UNK
   - Your symptoms (if any) ☐ Headache ☐ Dizziness/Light-Headed ☐ Nausea ☐ Cough ☐ Fatigue/Drowsiness/Weakness ☐ Sore/Burning Throat ☐ Difficulty Breathing ☐ Watery/Irritated Eyes/Trouble with Vision ☐ Tingling/Numbness/Paralysis ☐ Rash/Itching ☐ Other:

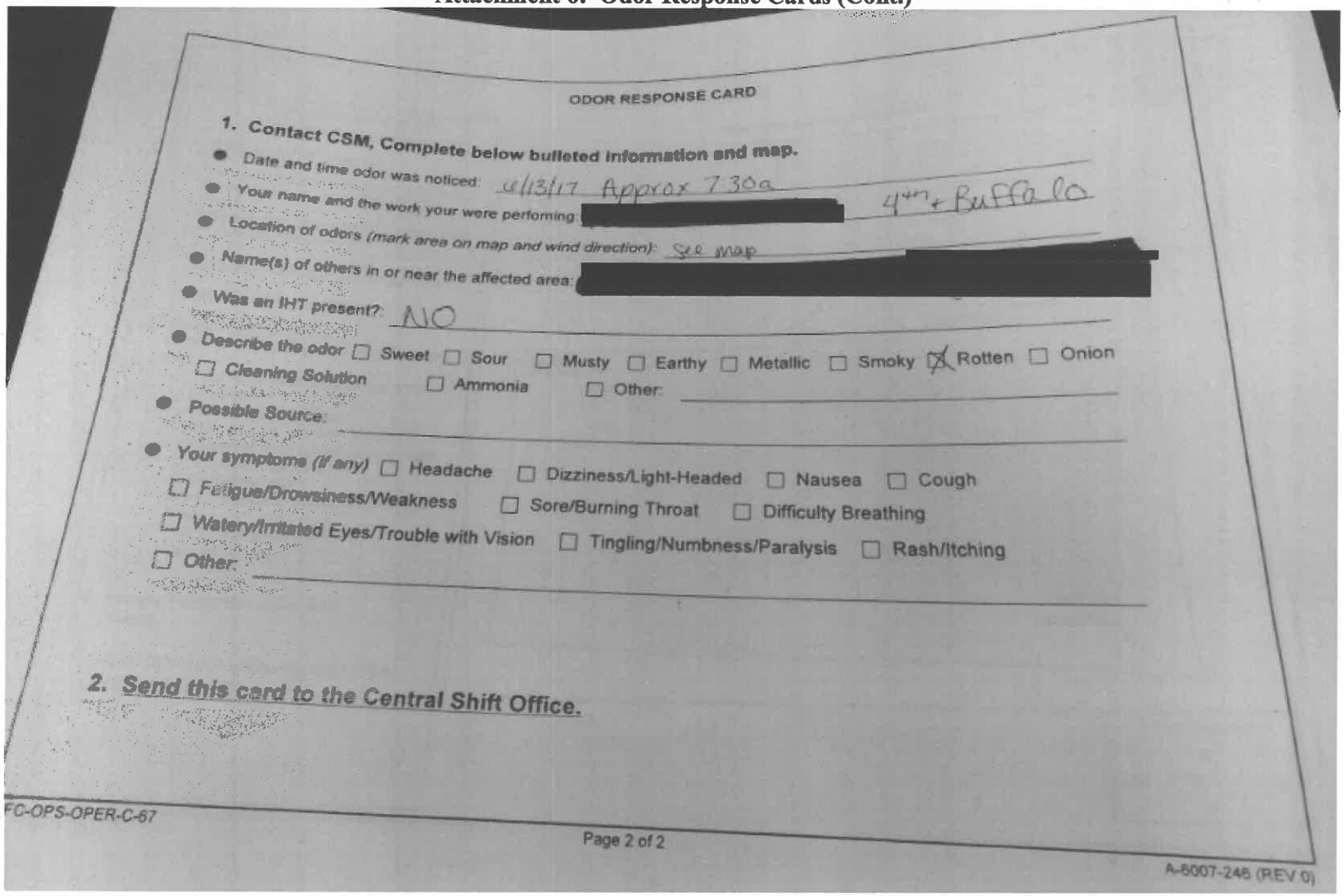
2. **Send this card to the Central Shift Office.**

TFC-OPS-OPER-C-67 Page 2 of 2 A-6007-246 (REV 0)

Attachment 6: Odor Response Cards (Cont.)



Attachment 6: Odor Response Cards (Cont.)



ODOR RESPONSE CARD

1. **Contact CSM, Complete below bulleted information and map.**

- Date and time odor was noticed: 6/13/17 Approx 7:30a
- Your name and the work your were performing: [redacted] 4th + Buffalo
- Location of odors *(mark area on map and wind direction)*: See map
- Name(s) of others in or near the affected area: [redacted]
- Was an IHT present? NO
- Describe the odor ☐ Sweet ☐ Sour ☐ Musty ☐ Earthy ☐ Metallic ☐ Smoky ☒ Rotten ☐ Onion
  ☐ Cleaning Solution ☐ Ammonia ☐ Other: _____
- Possible Source: _____
- Your symptoms *(if any)* ☐ Headache ☐ Dizziness/Light-Headed ☐ Nausea ☐ Cough
  ☐ Fatigue/Drowsiness/Weakness ☐ Sore/Burning Throat ☐ Difficulty Breathing
  ☐ Watery/Irritated Eyes/Trouble with Vision ☐ Tingling/Numbness/Paralysis ☐ Rash/Itching
  ☐ Other: _____

2. **Send this card to the Central Shift Office.**

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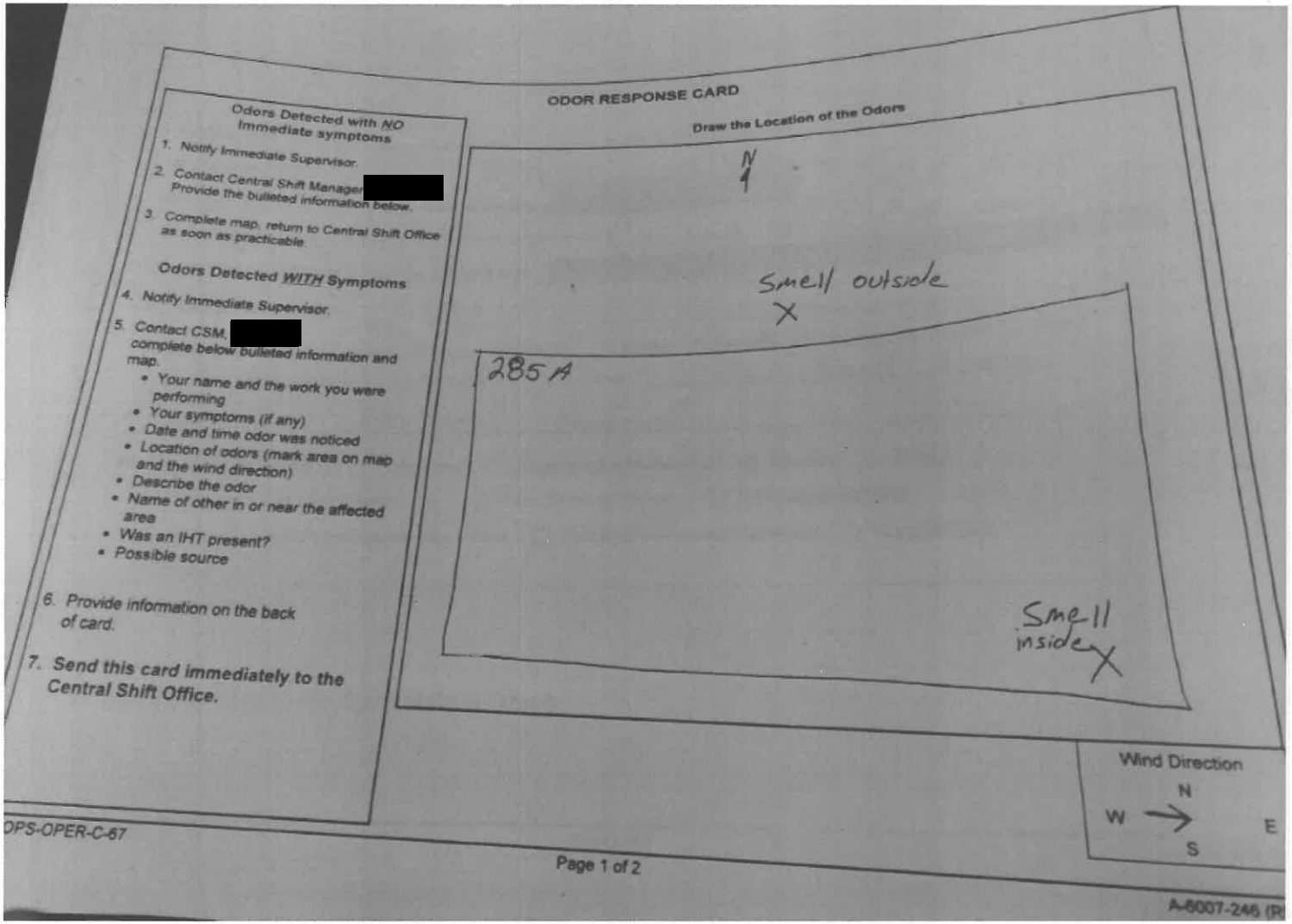
Page 2 of 2

A-6007-246 (REV 0)

Attachment 6: Odor Response Cards (Cont.)



ODOR RESPONSE CARD

Odors Detected with NO Immediate symptoms

1. Notify Immediate Supervisor.
2. Contact Central Shift Manager [redacted] Provide the bulleted information below.
3. Complete map, return to Central Shift Office as soon as practicable.

Odors Detected WITH Symptoms

4. Notify Immediate Supervisor.
5. Contact CSM [redacted] complete below bulleted information and map.
   - Your name and the work you were performing
   - Your symptoms (if any)
   - Date and time odor was noticed
   - Location of odors (mark area on map and the wind direction)
   - Describe the odor
   - Name of other in or near the affected area
   - Was an IHT present?
   - Possible source
6. Provide information on the back of card.
7. **Send this card immediately to the Central Shift Office.**

Draw the Location of the Odors

N

Smell outside X

285 A

Smell inside X

Wind Direction

N W E S

OPS-OPER-C-67

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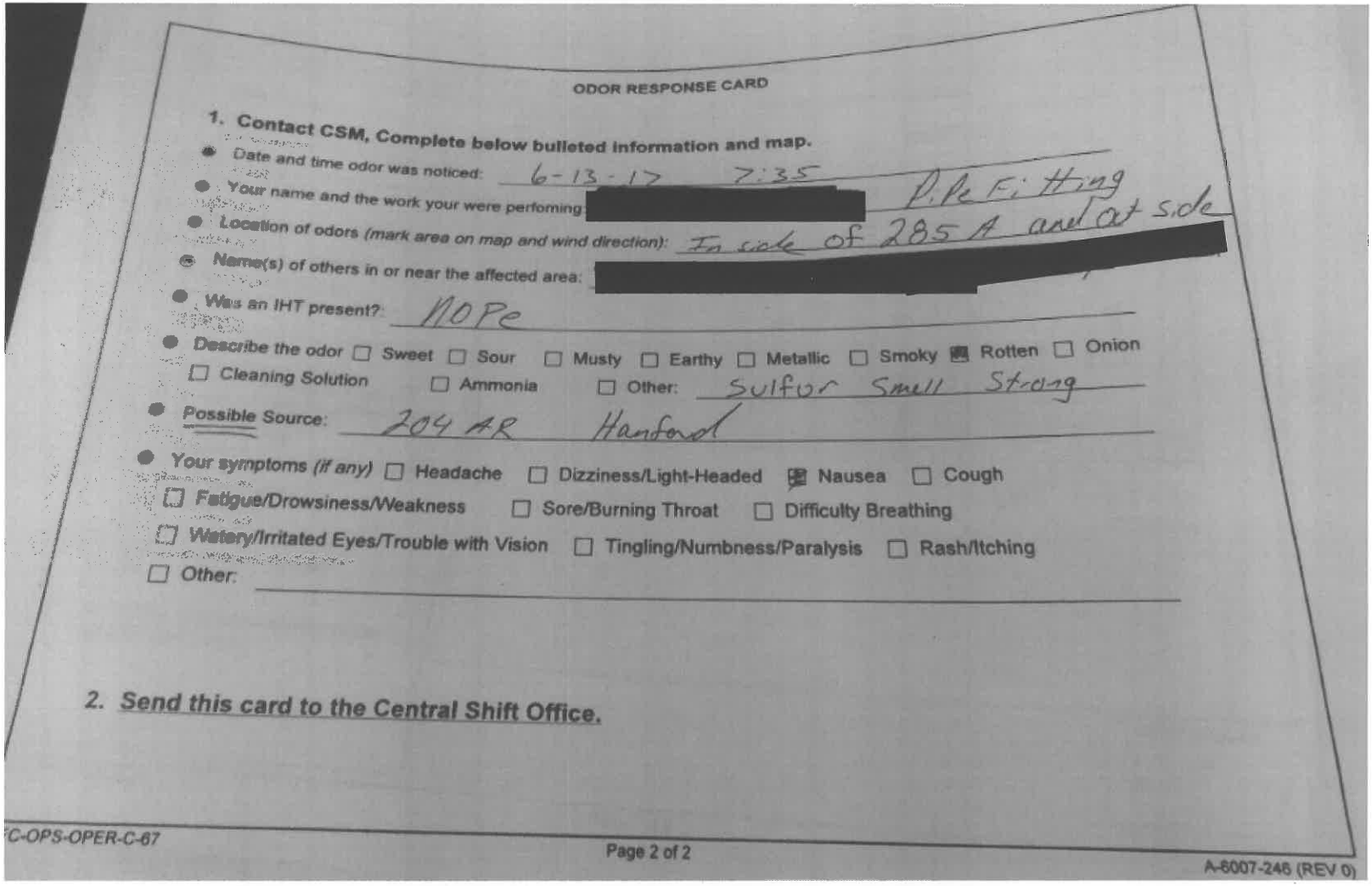
A-6007-246 (R

Attachment 6: Odor Response Cards (Cont.)



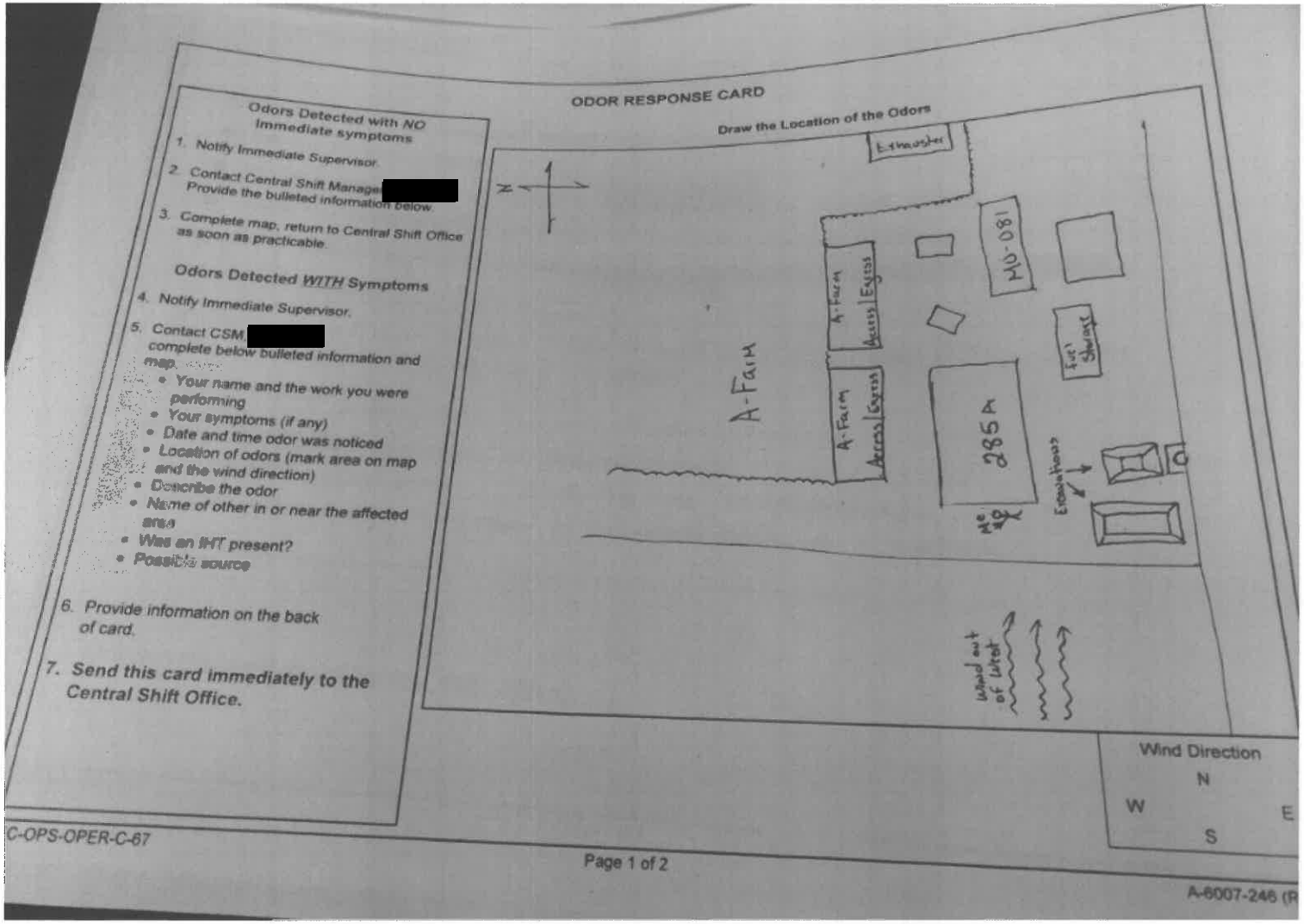
ODOR RESPONSE CARD

1. **Contact CSM, Complete below bulleted information and map.**
   - Date and time odor was noticed: 6-13-17 7:35
   - Your name and the work your were perfoming: [redacted] P.Pe Fitting
   - Location of odors *(mark area on map and wind direction)*: In side of 285 A and at side [redacted]
   - Name(s) of others in or near the affected area: [redacted]
   - Was an IHT present? NOPe
   - Describe the odor ☐ Sweet ☐ Sour ☐ Musty ☐ Earthy ☐ Metallic ☐ Smoky ☒ Rotten ☐ Onion ☐ Cleaning Solution ☐ Ammonia ☐ Other: Sulfur Smell Strong
   - Possible Source: 204 AR Hanford
   - Your symptoms *(if any)* ☐ Headache ☐ Dizziness/Light-Headed ☒ Nausea ☐ Cough ☐ Fatigue/Drowsiness/Weakness ☐ Sore/Burning Throat ☐ Difficulty Breathing ☐ Watery/Irritated Eyes/Trouble with Vision ☐ Tingling/Numbness/Paralysis ☐ Rash/Itching ☐ Other:

2. **Send this card to the Central Shift Office.**

C-OPS-OPER-C-67 Page 2 of 2 A-6007-246 (REV 0)

Attachment 6: Odor Response Cards (Cont.)



ODOR RESPONSE CARD

Odors Detected with NO Immediate symptoms

1. Notify Immediate Supervisor.
2. Contact Central Shift Manager [redacted] Provide the bulleted information below.
3. Complete map, return to Central Shift Office as soon as practicable.

Odors Detected *WITH* Symptoms

4. Notify Immediate Supervisor.
5. Contact CSM [redacted] complete below bulleted information and map.
   - Your name and the work you were performing
   - Your symptoms (if any)
   - Date and time odor was noticed
   - Location of odors (mark area on map and the wind direction)
   - Describe the odor
   - Name of other in or near the affected area
   - Was an IHT present?
   - Possible source
6. Provide information on the back of card.
7. Send this card immediately to the Central Shift Office.

Draw the Location of the Odors

C-OPS-OPER-C-67

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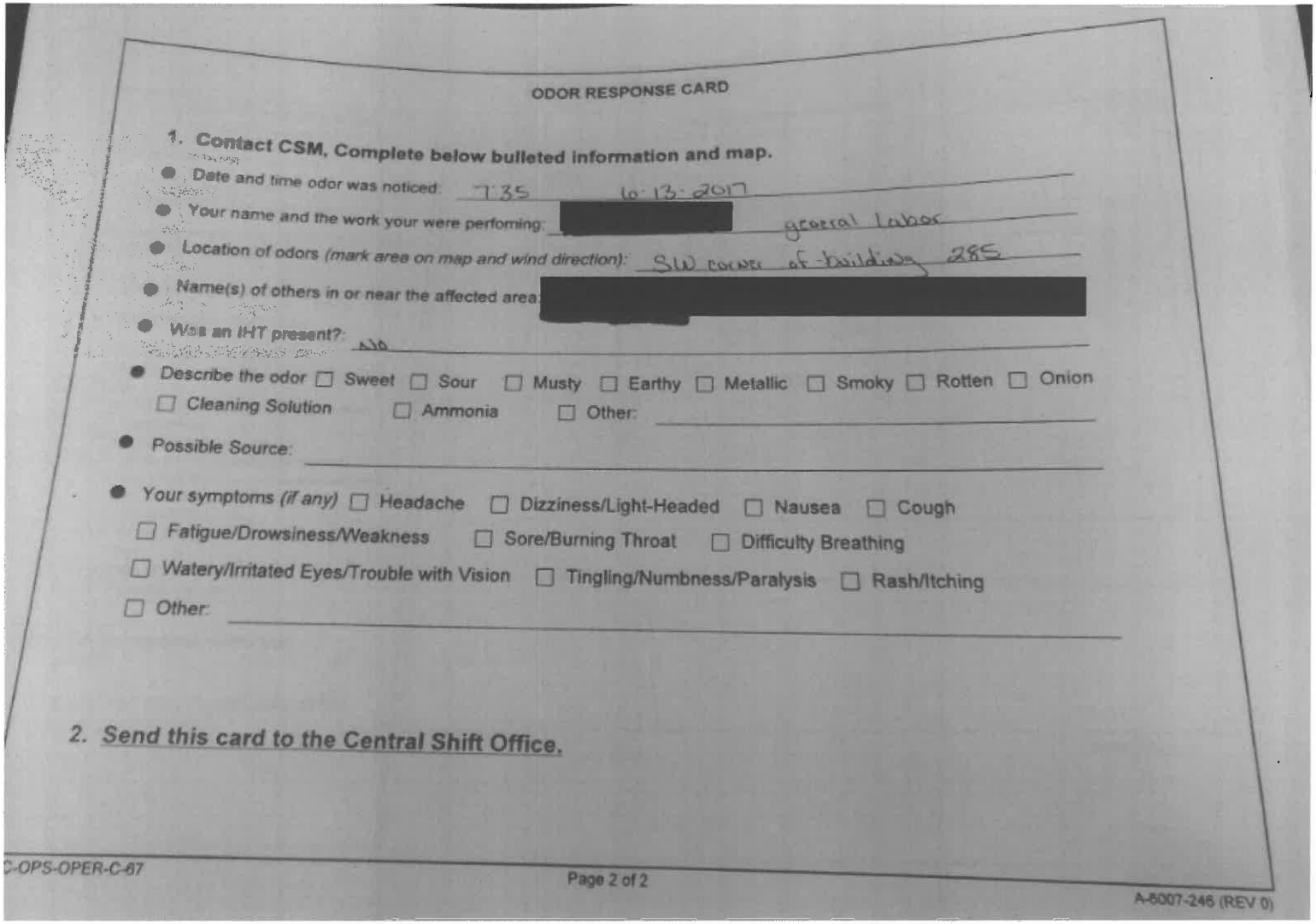
A-6007-246 (R

Attachment 6: Odor Response Cards (Cont.)



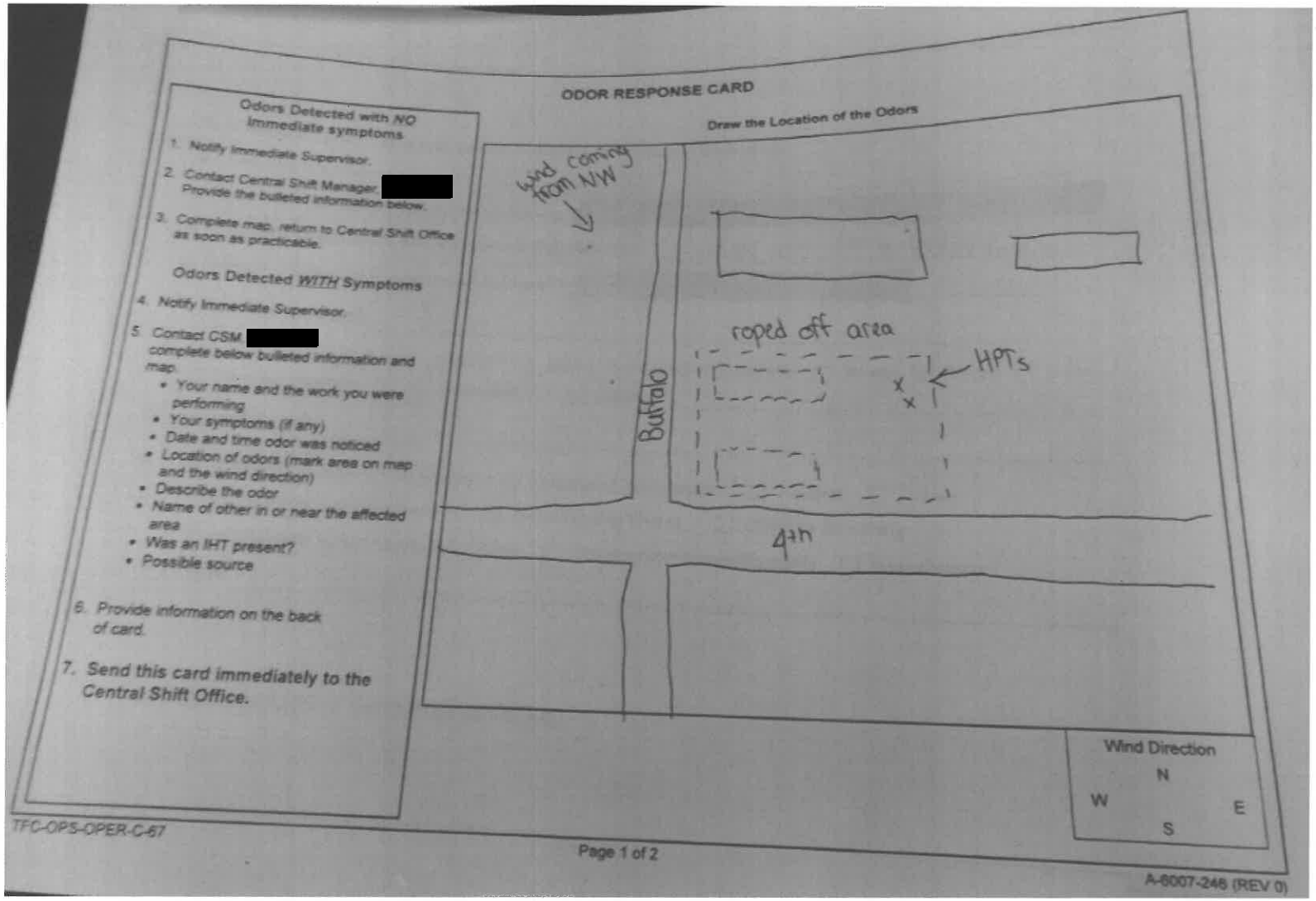
ODOR RESPONSE CARD

1. **Contact CSM, Complete below bulleted information and map.**
   - Date and time odor was noticed: 7:35 10-13-2017
   - Your name and the work your were perfoming: [redacted] general labor
   - Location of odors *(mark area on map and wind direction)*: SW corner of buildings 285
   - Name(s) of others in or near the affected area: [redacted]
   - Was an IHT present?: No
   - Describe the odor ☐ Sweet ☐ Sour ☐ Musty ☐ Earthy ☐ Metallic ☐ Smoky ☐ Rotten ☐ Onion ☐ Cleaning Solution ☐ Ammonia ☐ Other: _____
   - Possible Source: _____
   - Your symptoms *(if any)* ☐ Headache ☐ Dizziness/Light-Headed ☐ Nausea ☐ Cough ☐ Fatigue/Drowsiness/Weakness ☐ Sore/Burning Throat ☐ Difficulty Breathing ☐ Watery/Irritated Eyes/Trouble with Vision ☐ Tingling/Numbness/Paralysis ☐ Rash/Itching ☐ Other: _____

2. ***Send this card to the Central Shift Office.***

C-OPS-OPER-C-67 Page 2 of 2 A-6007-246 (REV 0)

Attachment 6: Odor Response Cards (Cont.)



ODOR RESPONSE CARD

Odors Detected with NO Immediate symptoms

1. Notify Immediate Supervisor.
2. Contact Central Shift Manager [redacted] Provide the bulleted information below.
3. Complete map, return to Central Shift Office as soon as practicable.

Odors Detected *WITH* Symptoms

4. Notify Immediate Supervisor.
5. Contact CSM [redacted] complete below bulleted information and map.
   - Your name and the work you were performing
   - Your symptoms (if any)
   - Date and time odor was noticed
   - Location of odors (mark area on map and the wind direction)
   - Describe the odor
   - Name of other in or near the affected area
   - Was an IHT present?
   - Possible source
6. Provide information on the back of card.
7. **Send this card immediately to the Central Shift Office.**

Draw the Location of the Odors

wind coming from N/W

roped off area

HPTs

Buffalo

4th

Wind Direction
N
W
E
S

TFC-OPS-OPER-C-67

Page 1 of 2

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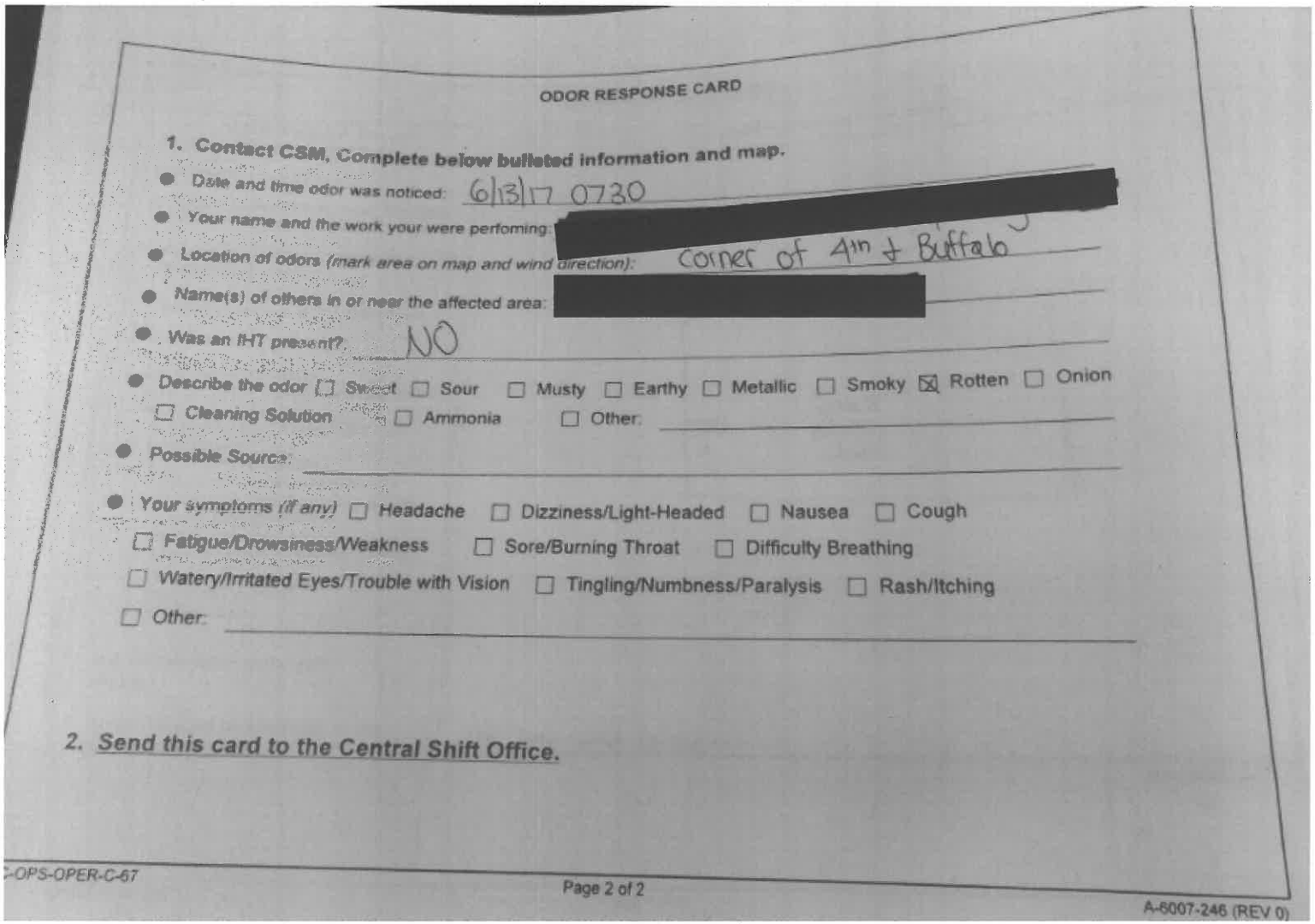
Attachment 6: Odor Response Cards (Cont.)



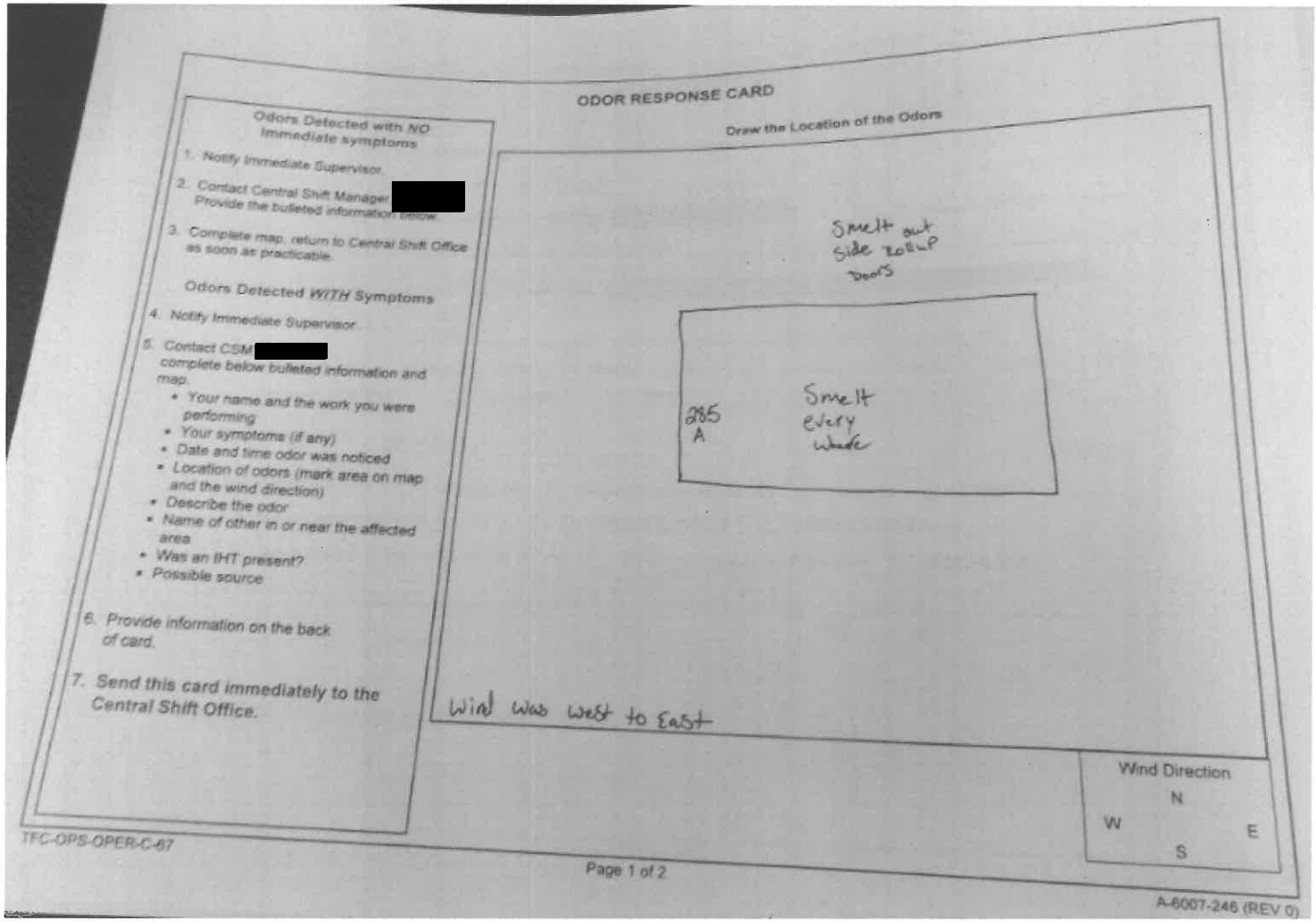
ODOR RESPONSE CARD

1. **Contact CSM, Complete below bulleted information and map.**
   - Date and time odor was noticed: 6/13/17 0730
   - Your name and the work your were perfoming: [redacted]
   - Location of odors *(mark area on map and wind direction)*: corner of 4th & Buffalo
   - Name(s) of others in or near the affected area: [redacted]
   - Was an IHT present? NO
   - Describe the odor ☐ Sweet ☐ Sour ☐ Musty ☐ Earthy ☐ Metallic ☐ Smoky ☒ Rotten ☐ Onion ☐ Cleaning Solution ☐ Ammonia ☐ Other:
   - Possible Source:
   - Your symptoms *(if any)* ☐ Headache ☐ Dizziness/Light-Headed ☐ Nausea ☐ Cough ☐ Fatigue/Drowsiness/Weakness ☐ Sore/Burning Throat ☐ Difficulty Breathing ☐ Watery/Irritated Eyes/Trouble with Vision ☐ Tingling/Numbness/Paralysis ☐ Rash/Itching ☐ Other:

2. ***Send this card to the Central Shift Office.***

C-OPS-OPER-C-67 Page 2 of 2 A-6007-246 (REV 0)

Attachment 6: Odor Response Cards (Cont.)



ODOR RESPONSE CARD

Odors Detected with NO Immediate symptoms

1. Notify Immediate Supervisor.
2. Contact Central Shift Manager [redacted] Provide the bulleted information below.
3. Complete map, return to Central Shift Office as soon as practicable.

Odors Detected *WITH* Symptoms

4. Notify Immediate Supervisor.
5. Contact CSM [redacted] complete below bulleted information and map.
   - Your name and the work you were performing
   - Your symptoms (if any)
   - Date and time odor was noticed
   - Location of odors (mark area on map and the wind direction)
   - Describe the odor
   - Name of other in or near the affected area
   - Was an IHT present?
   - Possible source
6. Provide information on the back of card.
7. Send this card immediately to the Central Shift Office.

Draw the Location of the Odors

Smelt out Side roll up Doors

285 A

Smelt every where

Wind was west to East

Wind Direction: N, W, E, S

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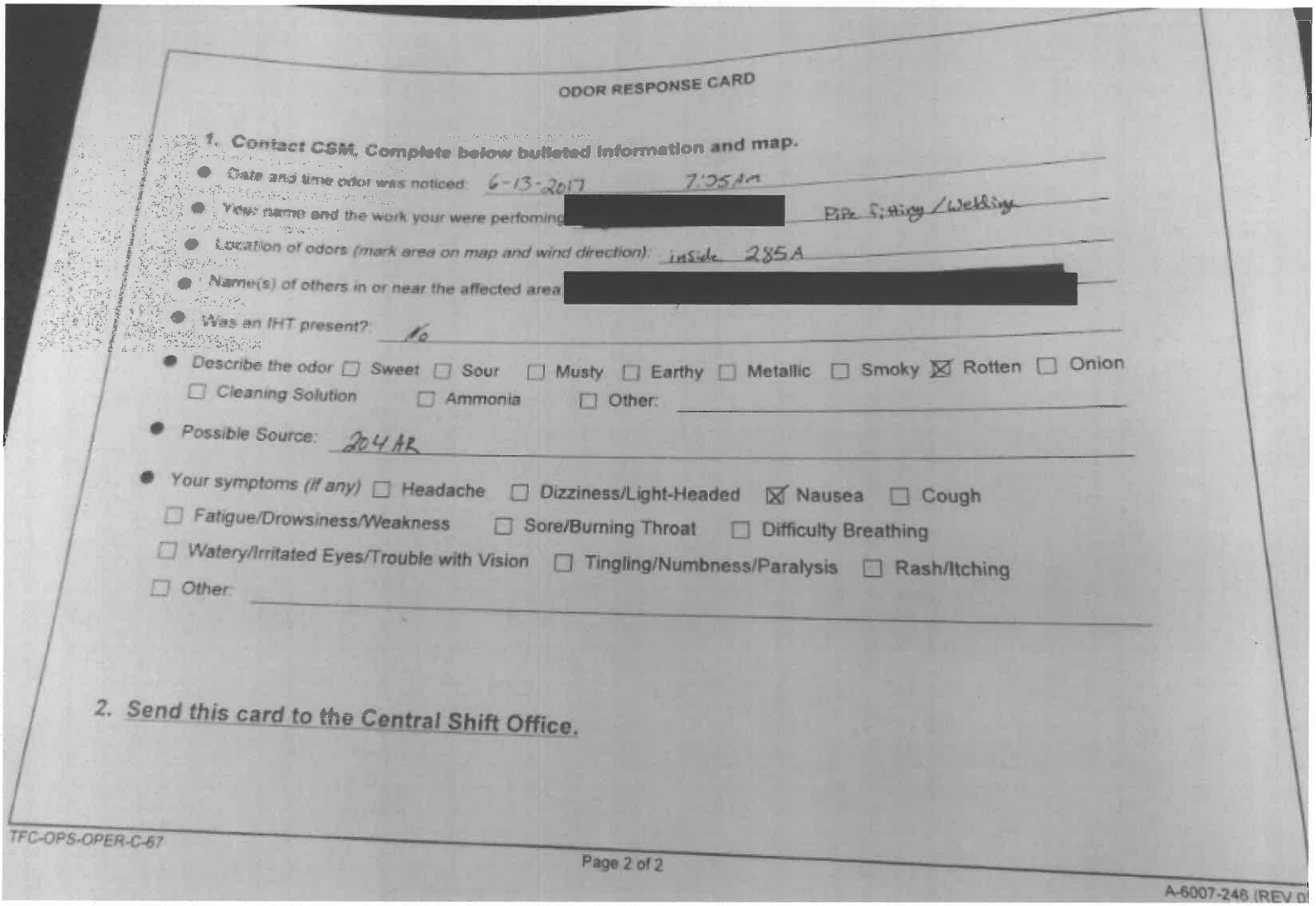
Attachment 6: Odor Response Cards (Cont.)



ODOR RESPONSE CARD

1. **Contact CSM, Complete below bulleted information and map.**
   - Date and time odor was noticed: 6-13-2017 7:05Am
   - Your name and the work your were perfoming: [redacted] Pipe Fitting / Welding
   - Location of odors *(mark area on map and wind direction)*: inside 285A
   - Name(s) of others in or near the affected area: [redacted]
   - Was an IHT present? No
   - Describe the odor ☐ Sweet ☐ Sour ☐ Musty ☐ Earthy ☐ Metallic ☐ Smoky ☒ Rotten ☐ Onion
     ☐ Cleaning Solution ☐ Ammonia ☐ Other:
   - Possible Source: 204 AR
   - Your symptoms *(if any)* ☐ Headache ☐ Dizziness/Light-Headed ☒ Nausea ☐ Cough
     ☐ Fatigue/Drowsiness/Weakness ☐ Sore/Burning Throat ☐ Difficulty Breathing
     ☐ Watery/Irritated Eyes/Trouble with Vision ☐ Tingling/Numbness/Paralysis ☐ Rash/Itching
     ☐ Other:

2. **Send this card to the Central Shift Office.**

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