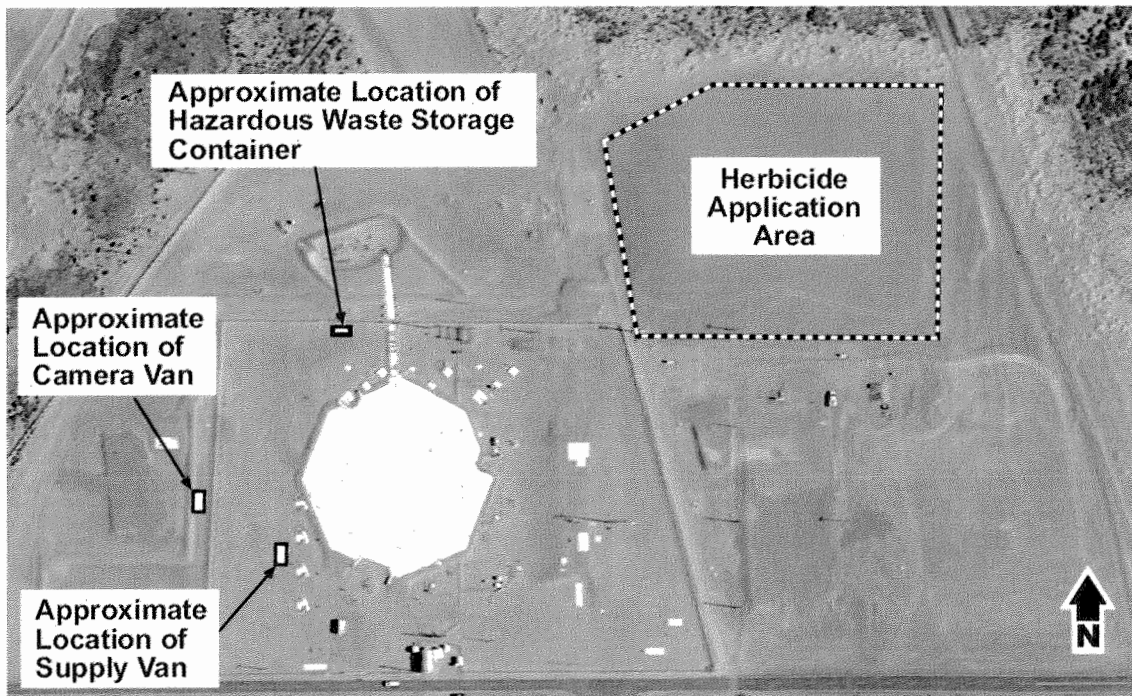


EVENT INVESTIGATION REPORT

241-T-201 Primary Tank Video Vapor Event EIR-2014-008



[Redacted Signature]

Event Investigation Team Lead

4/14/14

Date

[Redacted Signature]

PER Responsible Manager

4/15/14

Date

PER No. WRPS-PER-2014-0554

241-T-201 Primary Tank Video Vapor Event

Investigation Summary

Tank Farm Projects Field Crew was in the process of performing a primary tank video inspection at single-shell tank 241-T-201 when workers reported smelling vapors and two (2) workers reported symptoms. Personnel were directed to leave the tank farm. Notifications were made and the Central Shift Office entered into TF-AOP-015, Response to Reported Odors or Unexpected Changes to Vapor Conditions, for T farm. Three (3) tank farm personnel were initially taken to the site medical provider (HPMC). Two (2) were subsequently transported to the hospital by ambulance with the third being redirected to HPMC (South). All were returned to work.

The 241-T-201 primary tank video inspection was the thirteenth single-shell tank (SST) video performed this fiscal year. The work package in use was TFC-WO-13-6117, T-201 Video Riser 7 Inspection.

Close proximity work included the loading of a waste box in T farm and herbicide spraying outside of the tank farm by Mission Support Alliance (MSA) resources. A MSA Boilermaker from the waste box crew also reported to HPMC on the day of the event after reporting the smell of vapors and was returned to work without restriction.

An event investigation Fact Finding meeting was held on March 31, 2014.

On April 1, 2014, another support worker from the video crew also reported to HPMC for evaluation and was returned to work.

[See the sketch of the 241-T-201 work area. The waste box was located to the north of the T-201 primary video work area and herbicide was being applied to an area northwest of the work location.]

Event Timeline

March 26, 2014

- 0745 Pre-job briefing was held for work package TFC-WO-13-6117, T-201 Video Riser 7 Inspection. T Farm was closed (not routinely surveyed) and the Field Work Supervisor (FWS) obtained permission from the Radiological Control and Area Team management to enter the tank farm and perform the video.
- 0900 Equipment pickup by work crew. The camera used was from 272-S.
- 0930 The crew entered the T farm. Radiological Control Health Physics Technicians (HPTs) surveyed the crew into the work area. The crew entered from the north gate and south change trailer.

Setup included installing ropes/chains, applying ground cover, and posting the work area. The Riser 7 flange bolts, except for one, were removed before posting the work area. Initial setup did not breach the tank system. There was both Industrial Hygiene

Technician (IHT) and HPT coverage. Flammable gas reading taken at the Enraf was less than detectable and the oxygen reading was 20.9%.

- 1007 The camera supply van entered T farm.
- 1015 The IHT monitored the posted work area from the outside with a wand, ahead of the HPT entering the area. One HPT entered the work area after posting to survey for hard to detect (HTD) radionuclides. When the riser was breached a source sample was taken from inside of the riser, the IHT readings were 5 ppb for volatile organic compounds (VOCs) and 0 ppm for ammonia. The weather conditions were calm and cold. The wind direction was reportedly from the south. [The goal for the morning was to setup and obtain HTD samples.] [Hanford Metrological Data: average temperature 53.5 degrees F, peak wind speed 9.8 mph from the southwest blowing northeast.]

Since all of the flange bolts except for one were removed, the riser flange was then swung open and the HPT reached inside the 12 inch riser to obtain HTD samples. The riser was subsequently closed by swinging the flange back over the riser and securing it with a second bolt. The riser was open for approximately 30 minutes.

The area was then exited. No easy to detect contamination (ETD) radionuclides were detected. In addition, no ETD contamination was detected on the IHT's wand.

The IHT was monitoring the entire time and was very close to the riser opening.

[Also in the tank farm, another work crew was adding waste to a waste box all morning.]

- 1115 The work crew exited the farm. No odors were detected by any personnel prior to stopping for lunch.
- A NCO checked the entire boundary and detected no odors.
- 1240 The work crew returned to the tank farm work area. The radiological survey results were 140 dpm/100cm² alpha, with no beta was detected in the field. HTD results were 180 dpm/100 cm². A decision was made to take a minimum number of workers into the Airborne Radiation Area (ARA) as a result of the HTD.
- 1300 Three (3) workers, a Nuclear Chemical Operator (NCO), a HPT, and a Pipefitter, entered the work area wearing powered air purifying respirators (PAPRs) with hoods.
- The outside support crew inside of the tank farm consisted of an additional eighteen (18) workers. The majority of the crew was in the farm west of work area near the supply van. Three (3) workers were in the camera van directly west of the work area outside of the tank farm.
- 1315 The riser was breached. A top hat and camera were installed. The IHT reported general readings of less than detectable. Everyone reported smelling something. Reported smells included: an NCO reporting both paint and glue type smells, a Pipefitter smelled a musty vapor smell – like rotten apples, another NCO reported a metallic smell, and the

Radiological First Line reported a sweet musty smell. A HPT located directly downwind of the work area (west) at the survey table reported not feeling well.

Workers observed the herbicide being applied and a waste box being filled.

An HPT moved to a slightly elevated area southeast of the riser. The wind was blowing toward the work area (west) at approximately 7 mph. The HPT encouraged workers to move upwind, having used a talcum bottle to check wind direction. A NCO noticed the wind sock blowing south. [The wind appeared to shift several times.] The weather was reported to be much warmer than the morning, with a couple of rain sprinkles. [Hanford Metrological Data: average temperature 57.2 degrees F, peak wind speed 14.4 mph from the southwest blowing northeast.]

Symptoms were experienced by two (2) workers within several minutes. A HPT felt nauseous and a NCO experience headache symptoms.

Workers were directed to leave the tank farm. [A discussion was held on how to get people out of the zone with HTD present.]

Since housekeeping work was also occurring in the tank farm, the FWS also told the crew loading the waste box to exit the tank farm.

- 1320 The attending Radiological Control First Line Supervisor, upon exiting the tank farm, drove his truck toward the weed abatement (herbicide) truck to tell the Mission Support Alliance (MSA) workers to stop spraying. The First Line Supervisor reported smelling similar odors at the herbicide location.
- 1347 The primary tank video was started from outside of the tank farm.
- 1350 The Central Shift Office was notified of vapor reports in T farm and that two (2) workers (HPT and NCO) were reporting symptoms while performing video inspection at T-201. FWS reported a truck spraying weeds between T farm and T-Plant. See Attachment A for Shift Logbook entries.
- 1355 Central Shift Manager contacted MSA to stop spraying. MSA reported to Central Shift Manager that herbicide is non-toxic and forwards a copy of the Material Safety Data Sheet (MSDS).
- 1358 Central Shift Office entered TF-AOP-015, Response to Reported Odors or Unexpected Changes to Vapor Conditions, for T farm.
- 1403 Shift Office Event Notification (SOEN) and radio announcement sent for TF-AOP-015 entry for T farm. T farm access restricted. ST Area Day Shift Manager sent to implement SWIMS (stop work, warn others, isolate the area, and minimize exposure).
- 1410 ST Area Day Shift Manager reported to Central Shift Manager that T farm was evacuated and SWIMS completed.

[Everyone was out before the video was done. The video took 36 minutes to complete.]

1418 FWS reported to the Central Shift Manager that two (2) workers were being taken to the site medical provider (HPMC). All other members of the work crew were offered medical surveillance and declined.

The Radiological First Line escorting the workers to HPMC reported symptoms on the ride over to HPMC in West Area.

The NCO and the Radiological First line were turned away by HPMC in West Area and told to report to HPMC in town on Snyder (HPMC South).

- The NCO returned to T farm to retrieve his government vehicle and then reported to his supervisor. His supervisor transported him to HPMC South.
- The Radiological First Line returned to HPMC in West Area, after dropping off the NCO at T farm.

1423 Primary tank video was completed.

1432 The Radiological First Line reported to the Central Shift Manager that he was experiencing symptoms.

1447 Herbicide MSDS was faxed to HPMC by the ST Area Day Shift Manager.

Radiological Control manager reported to ST Area Day Shift Manager that HTD radionuclide surveys were not performed and no barriers were erected due to TF-AOP-015 entry. Access to T farm restricted until surveys can be performed. Central Shift Manager notified.

1508 The HPT, seen by HPMC in West Area upon arrival, was transported by ambulance to the hospital. Emergency Operations Center (EOC) notified of ambulance transport by the Central Shift Manager.

1518 Radiological First Line was transported to hospital by ambulance. The Tank Farm Projects Radiological Control Manager was reporting to the hospital as the management representative.

1520 The EOC was notified of second ambulance run.

1605 The ST Area Day Shift Manager reported to Central Shift Manager that the MSA Boilermaker from waste box activity was taken to HPMC by his management for evaluation after reporting smelling vapors in T farm.

1615 MSA Boilermaker was released to return to work.

1938 The Central Shift Manager was notified by the Safety Manager that the individuals taken to the hospital have been released and returned to work without restriction.

March 27, 2014

- 0529 Field Crew Manager reported that the NCO was evaluated at HPMC South and returned to work without restriction.
- 1331 Exited TF-AOP-015 for T farm. T farm remained restricted access due to HTD surveys not being complete.
- 1400 Safety Stand Down – AOP-015 Events initiated (T farm event one of four (4) discussed). Briefings commenced for all of Washington River Protection Solutions (WRPS).

March 31, 2014

- 0800 Fact Finding meeting held. See Attachment B for attendees.
- 1000 Pictures of the work area taken from outside of the tank farm. Access to the tank farm was still restricted. See Attachment C.

April 1, 2014 (update)

- 0854 An additional HPT reported to HPMC for evaluation. The HPT was from the support crew inside of T farm. No symptoms were reported. The HPT was returned to work without restriction.

Compensatory Measures

- Entered TF-AOP-015 for T farm.
- Restricted access to T farm.
- Safety Stand Down – AOP-15 Events initiated (T farm event one of four (4) discussed). Briefings commence for all of Washington River Protection Solutions (WRPS).

Preliminary Extent of Condition Review

A review of the close proximity work included discussion with the FWS for the ST Area Team work crew also working in T farm who were disposing of guzzler hoses into the waste box. An overview of the work being performed included setup occurring in the morning (box preparations and staging of the forklift), with work to fill the box in the afternoon. The work crew consisted of a FWS, one (1) Boilermaker, two (2) HPTs, and two (2) NCOs. As discussed in the timeline, the MSA Boilermaker reported to HPMC following his return to his duty station at the completion of work. The FWS reported no vapor smells (the waste box did not smell of paint, nor did the glue adhesive used on the waste box gasket smell), but the FWS did point out that the T Farm Interim Barrier does smell. This could account for the paint smell reported by the video crew.

Other vapor events are also being reviewed separately.

Discussion of Potential Causes

As discussed above, vapors could have been emanating from the open tank riser, the waste box, and/or the vegetation spraying operation occurring outside of the tank farm.

Discussion of Barriers That Could Have Impacted the Cause

The engineering and administrative barriers in place that could have impacted the cause include:

1. Pre-job Briefing. Review of close proximity work may have heightened awareness of hazards outside of the work area.
2. Project Planning/Review/Approval. The project team may have failed to fully recognize the vapor potential from the tank and/or the impact of close proximity work on the work activity.

Recommendations/Proposed Corrective Actions

1. Evaluate better ways to communicate/integrate work to avoid potential impacts from close proximity work.
2. Evaluate the use of upwind setup actions. Determine the predominant wind direction prior to setup of the work area.
3. Evaluate the use of combination cartridges, instead of P100 (particulate) cartridges.
4. Conduct an ALARA review of support personnel.

Lessons Learned

To be addressed, if required, by the causal analysis via a corrective action under WRPS-PER-2014-0554.

Ideas captured at the fact finding meeting included:

- Multiple jobs in a farm should be evaluated for compatibility.
- Stop spraying during planned work. Notices use to be sent out notifying of spraying.
- Work in closed (not routinely surveyed) farms is a bad practice. This condition does not provide an operating personnel contamination monitor (PCM) or bench monitors/instruments.
- Allow sufficient time for gathering supplies and setup. HTD preparations influenced setup. HTD surveys took longer. HTD surveys should have their own work package.
- Some tank farms need wind socks.
- Personnel should get upwind promptly as soon as odors are detected. Olfactory senses can be overloaded.
- Evaluate the report of strong paint odors from waste boxes.
- Do barometric conditions impact or correlate to the smell of vapors?
- Does internal tank temperature contribute to the smell of vapors?
- Evaluate reusable valves for re-performing videos.
- More IHTs required on the job for second readings or taking a real time bag sample at the time of the event.

Attachments

- A. Shift Manager's Logbook Entries
- B. Interviewed/Attendance Rosters
- C. Photographs of T Farm Work Area

Attachment A
Shift Manager's Logbook Entries

- 1300- [REDACTED] reports that MSA Fleet Services supervisor, [REDACTED] and [REDACTED] were supporting work @ A-106 on 3/25/14 at the time of the AOP-015 entry. [REDACTED] reported that sometime after evacuating the farm he developed a metallic taste in his mouth. [REDACTED] reported this to his manager today. [REDACTED] and [REDACTED] are being taken to HPMC for evaluation. Notified [REDACTED] ORP on-call FR, [REDACTED] On-Call Senior Manager, and [REDACTED] MSA. SHQ+T. SOEN complete.
- 1325- Environmental notified WDOH of the AW Farm VTP unplanned shutdown, [REDACTED] that occurred on 3/25/14. SOEN complete, [REDACTED] ORP On-call FR, notified of [REDACTED] 3/26/14
- 1350- [REDACTED] reports that 2 members of her work crew are reporting symptoms (headache and nausea) while performing video inspection @ T-201. [REDACTED] also reported that there is a truck spraying weeds between T-Farm and T-Plant.
- 1355- Contacted [REDACTED] MSA Biological Controls, to have weed spraying stopped. [REDACTED] indicated that the herbicide is non-toxic and will forward a copy of the MSDS.
- 1358- Entering AOP-015 for T-Farm. SOEN and radio announcement complete. [REDACTED] ST ADM, notified to restrict access to T-Farm. Assigned [REDACTED] as field lead to implement SWIMS at T-Farm.
- 1407- [REDACTED] ORP On-Call FR, and [REDACTED] On-Call Senior Manager, notified of 1358 entry.
- 1410- [REDACTED] reports that T-Farm has been evacuated and SWIMS is complete.
- 1417- [REDACTED] American Electric Heavy Equip Operator, reported that when exiting A-Farm yesterday, at the time of the AOP-015 entry, he experienced a metallic taste in his mouth. [REDACTED] to HPMC.

3/26/14

B-Shift

1418- [REDACTED] reports that [REDACTED] TFP HPT, reported experiencing nausea. [REDACTED] TFP NCO, reported experiencing a headache. Both individuals taken to HPMC for evaluation by [REDACTED] No other [REDACTED] All other members of the work crew were offered medical surveillance and declined. Work crew was approximately 10-15 people.

1420- [REDACTED] notified of 1418 and 1417 entries.

1432- [REDACTED] reports that once he got to HPMC with [REDACTED] and [REDACTED], he started experiencing symptoms.

1447- Herbicide MSDS forwarded to HPMC by [REDACTED]

1508- [REDACTED] is being transported from HPMC to KADLEC via ambulance. EDC Shift Office notified.

1510- [REDACTED] notified. [REDACTED] notified.

1518- [REDACTED] is being transported to KADLEC from HPMC via ambulance. [REDACTED] is going as management representative.

1520- EDC Shift Office notified of 1518 entry.

1525- SOEN complete for 1508 + 1520 entries.

1530- [REDACTED] and [REDACTED] notified.

1605- [REDACTED] reports that additional BR work was occurring in F Farm. [REDACTED] Boiler makes, has requested evaluation at HPMC.

1612- [REDACTED] notified of 1605 entry.

1615- [REDACTED] was released to return to work. [REDACTED] notified. SOEN complete.

1719- As part of corrective actions after the SST Flam Gas TBR violation, an extent of condition review was conducted. Part of that review raised questions about the use of conical polyurethane drain plugs to block pit wall nozzles instead of leaving them open during work activities. Further review indicated that an Flam Gas Equipment Advisory Board review was not conducted. The FGEAB review is now complete and

3/26/14

B-Shift

1719 Cont'd - indicates that ignition controls were not satisfied.

This is a SAC 6-B.2, Flam Gas control for waste-
Introducing Equipment, violation.

1740: Declared 1719 event as a Group 3A (S) SC-3, T3R
Violation, OCCURRENCE

1755- [REDACTED] ORP On-Call FR, notified of 1719 & 1740 entries.

1800- [REDACTED] On-Call Senior Manager, notified of 1719 & 1740 entries.

1802: EOL shift office, [REDACTED] notified of ~~1802~~ ^{3/26/14} entries.
1719, 1740, 1755, and 1800 entries.

1826- SOEN complete for T3R violation occurrence report.

1844- Relieved as CSM by [REDACTED]

1844- Assumed CSM duties [REDACTED]
[REDACTED] acting BED

1938- Notified by [REDACTED] (Safety) that individual taken
to KADLEC from 15084 (1518) entries have been
released and return to work with no restrictions.

2004- DOE FR [REDACTED] and EOS [REDACTED] notified
of 1938 entry, SOEN sent.

3/27/14 A-Shift

0500- Relieved as CSM by [REDACTED]

0500- Assumed duties as CSM [REDACTED]

0529- [REDACTED] reports that [REDACTED] was evaluated
at HPMC yesterday and released to return to work.

0539- SOEN complete for 0529 entry. [REDACTED] ORP On-Call FR,
notified.

0753- [REDACTED] reported having respiratory congestion and
believes this is a result of the A-106 cab event that
occurred on 3/25/14. [REDACTED] is taking [REDACTED] to
HPMC for evaluation. Notified [REDACTED] ORP On-Call FR,
[REDACTED] On-Call Senior Manager, [REDACTED] Safety;
SOEN complete.

0929- [REDACTED] was evaluated at HPMC and referred to
an outside medical provider. He was not released to return
to work. SOEN complete. [REDACTED] notified.

3/25/2014

SI-TEAM

0600 ASSUMED DUTIES OF ADM. [REDACTED]

0908 NOTIFIED ENV. FAC. REP. THAT GREATER FILTER ISOLATION VALUES ON 241-U-102, 103, 105, 106, 108 AND 112 WILL BE CLOSED DURING THE DAY TO SUPPORT AEROSOL TESTING.

1025 RESPONDED TO PERSONAL ENTRY AT 241-SX CHANGE TRAILER. TWO EMPLOYEES SHOWED STRONG SYMPTOMS OF VAPOR IRRITATION WHILE SURVEYING CONCRETE COVER BLOCKS FOR DISPOSAL. NCO CALLED 911, BOTH EMPLOYEES TRANSPORTED BY AMBULANCE TO KALEC. ENTERED ADP-15 FOR 241-S AND 241-SX. ACCESS RESTRICTED TO FARMS VIA HORN AND KEY CONTROL. CSM NOTIFIED.

1449 NOTIFIED ENV. FAC. REP. THAT ALL ISOLATION VALUES CLOSED FOR 241-U HAVE BEEN REOPENED AND U-103 WAS NOT AEROSOL TESTED AS A RAG HAS BEEN TAPED INTO THE TESTING PORT OF THE G/1 MANIFEST. REF; 0508 ENTRY.

1630 RELIEVED BY CSM. [REDACTED]

3/26/2014 0559 ASSUMED DUTIES OF ADM. [REDACTED]

0900 FERRIS ENTERED 241-F

1007 CAMERA VAN ENTERED 241-T

1008 INFORMED CSM THAT RESTRICTED ACCESS ZONE OF APPROXIMATELY 30 FEET BY 30 FEET HAS BEEN ESTABLISHED AROUND COVER BLOCK FOR 241-S THAT WAS SOURCE OF UNUSUAL ORDERS ON 03/25/2014, 1025 ENTRY. CSM EXITED ADP-15 FOR 241-S AND 241-SX.

01-10777

1030 FORKLIFT AND DRELL RE-ENTERED
241-TX.

1405 TWO EMPLOYEES PERFORMING
IN-TANK VIDEO AT T-201 REPORTED
SYMPTOMS FROM UNUSUAL ODORS
AT T-201. EMPLOYEES BEING
TRANSFERRED TO HPMC. CSM ENTERED
AOP-15 FOR 241-T.

1447 RAD-CON MANAGER REPORTED THAT
HARD TO DETECT RADIONUCLIDE
SURVEYS WERE NOT PERFORMED AND
NO BARRIERS WERE ERECTED DUE TO
AOP-15 ENTRY. ACCESS TO 241-T
RESTRICTED UNTIL SURVEYS CAN BE
PERFORMED. CSM NOTIFIED

1704 RELIEVED BY CSM [REDACTED]

3/22/14 0610 Assumed ADM [REDACTED]
1339 Exited AOP-15 for T-Farm, T-Farm
remains restricted Access due to
Hard to detect Surveys not yet
complete

1710 Relieved by CSM [REDACTED]
0617 Assumed ADM [REDACTED]

1045 CSM declared AOP-015 in 54 Farm,
54 Farm evacuated

1051 Discussions with CSM and Sampling
Revealed that 6 persons from the
Sampling group smelled odors at the
202-G Rock Slinger, Assumed it was
from SP and reported it that way

1110 Personal dispatches to relieve the
Sampling crew at the 202-G rock slinger
so they can report to HPMC

1145 Exiting AOP-015 for 54 Farm

Attachment B
Interviewed/Attendance Rosters

1. Field Work Supervisors (3) [ST Team, Biological Controls, MSA Support Services]
2. Nuclear Chemical Operators (2)
3. Health Physics Technician
4. Boilermaker

WRPS ATTENDANCE ROSTER

Subject: AOP-015 CONCERNS		Date: 3/31/2014	
Leader: T-201 VIDEO INSPECTION		Location: 2104HV/6133	
Shift: Days		Job Position (e.g. NCO, HPT, Manager, Engineer)	
HID	Print Name (Last, First, MI)	Signature	Manager's Name (print)
1	[REDACTED]	[REDACTED]	[REDACTED]
1	[REDACTED]	[REDACTED]	[REDACTED]
1	[REDACTED]	[REDACTED]	[REDACTED]
1	[REDACTED]	[REDACTED]	[REDACTED]
1	[REDACTED]	[REDACTED]	[REDACTED]
1	[REDACTED]	[REDACTED]	[REDACTED]
15			
16			
17			
18			
19			
20			

A-6003-211 (REV 2)

Attachment C
Photographs of T Farm Work Area



Photograph 1. From the West Looking toward 241-T-201 Work Area – from Location of Camera Van.

Photograph 2. Looking West toward 241-T-201 Work Area – from Location of Herbide Spraying.

