MVLWB Permits

From: Tyree Mullaney <tyree@mvlwb.com>
Sent: Monday, November 18, 2013 10:12 AM
To: 'Permits'
Subject: FW: October 7, 2013 Incident and Arsenic Emission at Site During Roaster Complex Demolition
Attachments: YELLOWKN-#593225-v2-GIANT_-_RESPONSE_TO_AN_QUESTIONS_ON_OCT_7_2013_AIR_EXCEEDANCES.DOCX; GM AS SCREEN3 at 15m.pdf

MV2012L8-0010

Reports and Studies – Other

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From: Jane Amphlett [mailto:Jane.Amphlett@aandc-aadnc.gc.ca]
Sent: November 15, 2013 4:00 PM
To: Adrian Paradis; Erika_Nyyssonen@gov.nt.ca; kevin o'reilly
Cc: Tara Kramers; Morag.McPherson@dfo-mpo.gc.ca; gordon.hamre@gmail.com; Aileen_Stevens@gov.nt.ca; tyree@mvlwb.com; reganalyst@nsma.net; kkronstal@yellowknife.ca; jblack@ykdene.com; tslack@ykdene.com
Subject: re: October 7, 2013 Incident and Arsenic Emission at Site During Roaster Complex Demolition

Hi Kevin, attached is a response to your questions below as well as a copy of the model as requested. Apologies for the delay but a lot of work went into the technical response. I recognize that the response document is detailed and may be difficult to work through. Given this I propose we work through this at a future working group meeting in person if people have further questions and we can ensure we have key technical people on air available to explain.
Thanks
Jane

>>> kevin o'reilly <kor@theedge.ca> 10/27/2013 4:37 PM >>>
Adrian/Erika

In the last two weekly air quality monitoring program reports there has been some coverage of an incident that happened on site where a silo was taken down on October 7, 2013 resulting in an arsenic emission. I have some questions that I am hoping you can answer.

1. When will the roaster complex work be completed for the season, if it has not already? What measures are underway to properly winterize the site?

2. The October 7 incident resulted in arsenic emissions that exceeded the Ontario 24 hour standard of 0.3 ug/cubic metre for two stations around the roaster complex. Both stations were apparently close to the highway with one showing an exceedance of more than 10 times the Ontario standard.

The PM10 data for station 1 shows it was upwind of the silo at 4:15 pm when visible dust was noted, station 3 was downwind when visible dust was noticed at 4:45 pm, station 4 was downwind of the silo but no visible was reported (PM10 appears to have peaked about 5:15 pm), station 5 was downwind and visible dust was reported at 4:15 pm but no wind direction or upwind/downwind reading was available for 4:30 pm (PM10 peaked at 4:15 pm at 49 ug/cubic metre, 15 minute average).

PM10 data for the N'dilo community station peaked between 2-5 pm on October 7 (the highest maximum level for the reporting period Oct. 6-12). Arsenic was above detect level for the N'dilo station on October 7 as well (no other stations had anything above detect level for the reporting period).

Why was visible dust seen upwind of the silo and not downwind during this incident and some downwind stations did not report any visible dust? Is the same observer responsible for recording whether dust is visible or not? Why was there no wind direction available for station 5 right after the incident (this station appears to have been the one closest to the incident)?

Is it safe to assume that some of the arsenic emitted during this incident actually made it to N'dilo?

What was the source of the dust and arsenic? Was the silo properly decontaminated before it was demolished?

3. The AECOM report dated October 12, 2013 states that the prime contractor conducted air dispersion modelling of the October 7th incident and that no human health safety concerns were identified for anyone using the highway. Please provide a copy of this report.

4. What was learned and has there been any more detailed analysis of the monitoring results from the three networks to see what actually happened in terms of air quality and environmental impacts? Are there any photos of this incident? If so, please provide them. Will AANDC be reviewing its risk-based action levels as a result of this incident?

Thanks.

Kevin O'Reilly
Alternatives North

----- Original Message -----
From: Tara Kramers <Tara.Kramers@aandc-aadnc.gc.ca>
Date: Friday, October 25, 2013 11:18
Subject: Weekly summary for the Giant Mine AQM program - Oct 13-19th, 2013
To: Nahum Lee <Nahum.Lee@aandc-aadnc.gc.ca>
Cc: Lisa Colas <Lisa.Colas@aandc-aadnc.gc.ca>

> Please find attached the weekly summary for the Giant Mine AQM program for the week ending October 19, 2013.

> In summary:

> There were no exceedances of the established criteria for airborne particulate matter measured at any of the fenceline locations during the week ending October 19, 2013;

> There were no exceedances of the established criteria for airborne particulate matter measured at any of the community monitoring stations locations during the week ending October 19, 2013;

> Laboratory results indicated there were no exceedances of the established criteria for airborne trace metal and arsenic concentrations measured at any of the community monitoring stations from sampling conducted on October 1, 4, and 7, 2013. A detectable arsenic concentration was measured at NDL on October 7, 2013;

> Laboratory results indicated there were no exceedances of the established criteria for asbestos measured at any of the community monitoring stations from sampling conducted on October 1 and 4, 2013;

> The AQM program operated as specified during the week ending October 19, 2013. However ten hours of PM2.5 and PM10 data from the YCC station on October 17 was lost as a result of the generator and heater failing. The TSP sample collected from NAPS on October 7, 2013 was deemed invalid as the sampler ran past the maximum allowable time period.

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> Regards,

> Tara Kramers

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Q1. When will the roaster complex work be completed for the season, if it has not already? What measures are underway to properly winterize the site?

A1. Deconstruction and decontamination work at the roaster complex was completed November 13, 2013, with some potential winterization work being anticipated for the following week. A winterization plan has been developed by the contractor and reviewed by the QA consultant. The winterization plan is summarized as follows:

- All water lines and tanks will be drained.
- All accessible building openings will be sealed with poly or shrink wrap, thereby reducing the potential for releases of arsenic dust or asbestos fibres.
- The shrink wrap currently surrounding the whole Cottrell Precipitator building will be left in place.
- Weekly inspections of the facilities will be conducted to check the integrity of the seals and shrink wrap, with repairs done as needed.

Significant progress was made this operating season and overall there is significantly less risk to the environment and public due to the deconstruction work. Deconstruction of priority structures within the roaster complex including the exterior flues and stack was completed. In addition, the remaining structures are now more fully contained and sealed than they had been previously, and contain less hazardous waste. The remaining risks posed by standing roaster structures will be mitigated starting Spring 2014.

Q2. The October 7 incident resulted in arsenic emissions that exceeded the Ontario 24 hour standard of 0.3 ug/cubic metre for two stations around the roaster complex. Both stations were apparently close to the highway with one showing an exceedance of more than 10 times the Ontario standard.

a) The PM_{10} data for station 1 shows it was upwind of the silo at 4:15 pm when visible dust was noted, station 3 was downwind when visible dust was noticed at 4:45 pm, station 4 was downwind of the silo but no visible was reported (PM_{10} appears to have peaked about 5:15 pm), station 5 was downwind and visible dust was reported at 4:15 pm but no wind direction or upwind/downwind reading was available for 4:30 pm (PM_{10} peaked at 4:15 pm at 49 ug/cubic metre, 15 minute average).

Why was visible dust seen upwind of the silo and not downwind during this incident and some downwind stations did not report any visible dust? Is the same observer responsible for recording whether dust is visible or not? Why was there no wind direction available for station 5 right after the incident (this station appears to have been the one closest to the incident)?

A2.a) There were errors in the AECOM report data tables and these have been corrected and re-issued. The “yes” for “visible dust” should have been “no” for all stations except unit 5 at 16:15. Visible dust was not present at the upwind station, nor was it observed at any station other than unit 5. Furthermore, unit 5 had been reported “n/a” in terms of upwind/downwind after 16:15 because it was looked at from the perspective of directional relation to the main building complex itself, such that when the wind was directly from the east, it would not strictly be downwind or upwind. However, it was downwind of the area north of the complex, within the fence line, where work is being conducted as well, and which was also the location that the silo was lowered to. In this context, unit 5 was downwind, even when the wind was directly from the east, as it was from 16:15 onward for the rest of the day.

b) PM_{10} data for the N'dilo community station peaked between 2-5 p.m. on October 7 (the highest maximum level for the reporting period October 6-12). Arsenic was above detect level for the N'dilo station on October 7 as well (no other stations had anything above detect level for the reporting period).

Is it safe to assume that some of the arsenic emitted during this incident actually made it to N'dilo?

A2.b) Real-time PM_{10} data in N'Dilo from 0900 until 1900 on October 7th ranged from 14 – 36 ug/m^3, the highest hourly concentration of 36ug/m^3 at 1400, hours before the silo incident. The wind was blowing from 80 – 120^o (ENE to ESE) throughout the day on October 7th. N'Dilo is located to the SE of the Giant site (i.e. in line with a NW wind). The elevated PM_{10} levels are not attributed to the incident with the Silo, but instead to local sources (e.g. unpaved surfaces in the area). Again, the wind direction throughout the monitoring period does not indicate a source directly from the Giant Mine site.

c) What was the source of the dust and arsenic? Was the silo properly decontaminated before it was demolished?

A2.c) The accessible portion of the silo was decontaminated as per project specifications. There was no safe approach to access the interior of the silo hopper (feed cone) section without creating a hazardous environment for workers, both from a potential arsenic exposure and a physical safety perspective. A vacuum loader was used to remove as much free arsenic as possible; however some hardened material could not be removed. Following removal of all loose arsenic dust with the vacuum, the structure was sealed and prepared to be lowered to the ground in a controlled manner by making strategic cuts in the base such that the upper half would fold over on itself. However, the structure did not behave as expected following cutting – progressive additional cutting and weakening would not cause it to fold over and it eventually reached a point where it was no longer structurally stable in an erect position and had to be pushed over. The dust emission was a combination of a ground release and a slight puff released from the upper hopper section where a pipe fell off creating a small hole.

3. The AECOM report dated October 12, 2013 states that the prime contractor conducted air dispersion modelling of the October 7th incident and that no human health safety concerns were identified for anyone using the highway. Please provide a copy of this report.

A3. A copy of the model is provided. To determine if a potential arsenic concentration in the Highway 4 right-of-way at the time of the dust release posed an acute health hazard to anyone passing by on the highway at the time, the contractor applied measured air concentrations along with air dispersion modeling to estimate the potential concentration of arsenic in the dust plume. The U.S. EPA's SCREEN3 model provided a simple and conservative means of calculating pollutant concentration estimates directly downwind of emission sources. In this case SCREEN3 was used to estimate the degree of additional dilution that is likely to have occurred between Monitoring Station #5, located 40 metres from the release, and Highway 4, located between 15 and 25 metres further downwind. The dilution factor was estimated by running SCREEN3 and computing the ratio of the modeled concentration at 55 and 65 metres downwind and dividing by the modeled concentration at 40 metres downwind. Applying SCREEN3 in this context the only parameters that affect the dilution factor are the initial vertical and horizontal dimensions of the ground-level volume source, the dispersion environment (rural or urban), atmospheric stability category and downwind distance. The dimensions of the initial volume with a cross-wind width equal to the diameter of the silo (8 metre) and a height equal to half of the silo diameter (4 metres). Corresponding to the setting, the dispersion environment was specified as rural. Because the release occurred during the late afternoon (16:15 local daylight time) when the sun elevation is low such that

there is little solar heating and meteorological data from the on-site meteorological station indicated a moderate to strong wind speed at of 5.5 metres per second (19.8 km/h), the atmospheric stability category D (neutral) was applied. The dilution factor derived from the SCREEN3 analysis is 0.82 at 15 m away and 0.73 at 25 m away, indicating that the concentration at Highway 4 resulting from this event would be expected to be between 82% and 73% of the measured concentration at Monitoring Station #5.

Based on the measured 24-hour average arsenic concentration of 3.5 µg/m^3 at air Monitoring Station #5, a short-term 1-minute average concentration of 5.04 mg/m^3 was calculated by assuming that the entire loading of arsenic on the air sampling filter was collected in during a 1-minute period after the silo release. This is consistent with observations of the release as a short-term discrete "puff" at the time. This is also a worst-case scenario assumption, since assuming a longer release duration would result in a lower short-term ambient concentration of arsenic for comparison with acute exposure guidelines. The assumption that all of the arsenic was released from the incident is consistent with the monitoring data so far this season (which has been relatively low) and the observations at the time of the release, indicating that the sampler was directly downwind at the time of the release. The ratio of the modeled concentrations (at 65 m, 55 m and 40 m downwind) for the SCREEN3 dispersion model run indicates that for the release scenario which caused a one-minute airborne arsenic concentration of 5.04 mg/m^3 at Monitor #5 (40 m from the release source), the concentration 15 and 25 metres further downwind (i.e., at Highway 4) would be between 4.14 mg/m^3 and 3.68 mg/m^3.

For such a short-term exposure it is appropriate to compare the modeled arsenic concentration to acute exposure criteria. One criterion that is used to protect workers from acute exposure is the Immediately Dangerous to Life or Health (IDLH) developed by U.S. National Institute for Occupational Safety and Health (NIOSH). The one-minute average arsenic concentration of 4.14 mg/m^3 and 3.68 mg/m^3 are less than the IDLH for arsenic which is 5 mg/m^3. However, because IDLH values represent exposure for up to 30-minutes rather than 1-minute, it is appropriate to estimate the 30-minute arsenic concentration at Highway 4 when comparing it to the IDLH. The analysis shows that estimated arsenic concentration on a 30-minute basis was between 0.12 mg/m^3 and 0.14 mg/m^3, or about 2.5% to 2.8% of the IDLH. Since the NIOSH IDLH applies to workers, a comparison to the Environmental Protection Agency (EPA) Acute Exposure Guideline Levels (AEGL) was also conducted as a measure of the potential risk to the public. The AEGL-2 values represent the airborne concentrations of a substance below which it is considered that the general population, including susceptible individuals, would not experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape AEGLs have been developed for exposure periods ranging from 10-minutes to 8-hours. Because this was a short-duration event, it is appropriate to apply the 10-minute AEGL-2 for Arsenic Trioxide which is 3.7 mg/m^3. The estimated arsenic concentration at Highway 4 over a 10-minute period was between 0.368 mg/m^3 and 0.414 mg/m^3, or about 10% to 11% of this AEGL-2.

The dispersion modeling was reviewed by QA air quality team and deemed to be rightly overly cautious in its approach. The modeling software assumes one direction of transport which does not account for lateral dilution moving away from the source, or for the fact that the highway is several metres lower in elevation than the source location. Again the process taken is considered conservative.

4. What was learned and has there been any more detailed analysis of the monitoring results from the three networks to see what actually happened in terms of air quality and environmental impacts? Are there any photos of this incident? If so, please provide them. Will AANDC be reviewing its risk-based action levels as a result of this incident?

There are only photos before and after the incident. At the time of the release, the on-site team was fully focused on trying to control the dust and limit migration. As with any environment, health or safety

incident, a full investigation was completed and corrective measures have been put in place moving forward. These include, but are not limited to: a thorough wetting of all surrounding ground prior to deconstruction; the need to inspect and/or remove any peripheral structures (such as the external pipe) prior to deconstruction; the need to potentially suspend deconstruction work above a certain wind speed; the need for better dust suppression equipment to more effectively immobilize any release; and the need for to plan for a potential release, regardless of the extent of decontamination prior to deconstruction.

In terms of action levels, visible dust remains the primary initial action level and has been demonstrated to be entirely appropriate; any visible dust requires the implementation of mitigative measures. The Roaster Complex had adopted the fenceline action level but it was recognized that the RBAL was designed for the fenceline program in consideration of the whole of the site. It has been agreed the Roaster Complex real time action level should be re-examined to consider the conditions and exposure at the perimeter of the Roaster Complex. Re-evaluation of the monitoring programs is a normal and planned process.

The RBAL real-time action level established for the Giant Mine fenceline program is considered appropriate for the site-wide program to ensure arsenic concentrations in the community remain within the established target levels (criteria). To date this has proven to be successful as arsenic levels in the community remain, on average, at least one hundred times lower than the target levels and are, in most cases, not even detectable.

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 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 13043 ***

Giant Mine Arsenic Release - Update

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE               =       VOLUME
   EMISSION RATE (G/S)       =      5.36000
   SOURCE HEIGHT (M)         =       0.0000
   INIT. LATERAL DIMEN (M)   =       8.0000
   INIT. VERTICAL DIMEN (M)  =       4.0000
   RECEPTOR HEIGHT (M)       =       0.0000
   URBAN/RURAL OPTION        =        RURAL

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.


BUOY. FLUX =    0.000 M**4/S**3;  MOM. FLUX =    0.000 M**4/S**2.

*** STABILITY CLASS  4 ONLY ***
*** ANEMOMETER HEIGHT WIND SPEED OF   5.50 M/S ONLY ***

*********************************
*** SCREEN DISCRETE DISTANCES ***
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*** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

  DIST     CONC              U10M   USTK  MIX HT   PLUME   SIGMA   SIGMA
   (M)   (UG/M**3)   STAB   (M/S)  (M/S)   (M)   HT (M)   Y (M)   Z (M)  DWASH
-------  ----------  ----  -----  -----  ------  ------  ------  ------  -----
    10.    0.000        0    0.0    0.0     0.0    0.00    0.00    0.00
    20.    6791.        4    5.5    5.5  1760.0    0.00    9.49    4.82    NO
    30.    5812.        4    5.5    5.5  1760.0    0.00   10.23    5.22    NO
    40.    5037.        4    5.5    5.5  1760.0    0.00   10.98    5.61    NO
    50.    4412.        4    5.5    5.5  1760.0    0.00   11.71    6.00    NO
    55.    4143.        4    5.5    5.5  1760.0    0.00   12.08    6.20    NO
    60.    3900.        4    5.5    5.5  1760.0    0.00   12.45    6.39    NO
    65.    3678.        4    5.5    5.5  1760.0    0.00   12.81    6.58    NO
    70.    3475.        4    5.5    5.5  1760.0    0.00   13.18    6.77    NO
    80.    3118.        4    5.5    5.5  1760.0    0.00   13.91    7.15    NO
    90.    2815.        4    5.5    5.5  1760.0    0.00   14.63    7.53    NO
   100.    2556.        4    5.5    5.5  1760.0    0.00   15.35    7.91    NO

 DWASH=   MEANS NO CALC MADE (CONC = 0.0)
 DWASH=NO MEANS NO BUILDING DOWNWASH USED
 DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
 DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
 DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

 *******************************************
 *  SUMMARY OF TERRAIN HEIGHTS ENTERED FOR  *
 *    SIMPLE ELEVATED TERRAIN PROCEDURE     *
 *******************************************

      TERRAIN        DISTANCE RANGE (M)
       HT (M)       MINIMUM     MAXIMUM
      -------      --------    --------
           0.           10.         --
           0.           20.         --
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0.	30.	--
0.	40.	--
0.	50.	--
0.	55.	--
0.	60.	--
0.	65.	--
0.	70.	--
0.	80.	--
0.	90.	--
0.	100.	--

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*** SUMMARY OF SCREEN MODEL RESULTS ***
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CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	6791.	20.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
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