

Health Consultation

Ashland Petroleum Company:
Air Permit Review

CERCLIS# MND006162820

Saint Paul Park, Washington County, Minnesota

February 1999

Prepared by:

The Minnesota Department of Health
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

FOREWORD

This document summarizes potential public health concerns at an industrial or hazardous waste site in Minnesota. It is based on a formal site evaluation prepared by the Minnesota Department of Health (MDH). A number of steps are necessary to do such an evaluation:

- ! Evaluating exposure: MDH scientists begin by reviewing available information about environmental conditions at the site. The first task is to find out how much contamination is present, where it's found on the site, and how people might be exposed to it. Usually, MDH does not collect its own environmental sampling data. We rely on information provided by the Minnesota Pollution Control Agency (MPCA), U.S. Environmental Protection Agency (EPA), and other government agencies, businesses, and the general public.
- ! Evaluating health effects: If there is evidence that people are being exposed—or could be exposed—to hazardous substances, MDH scientists will take steps to determine whether that exposure could be harmful to human health. The report focuses on public health—the health impact on the community as a whole—and is based on existing scientific information.
- ! Developing recommendations: In the evaluation report, MDH outlines its conclusions regarding any potential health threat posed by a site, and offers recommendations for reducing or eliminating human exposure to contaminants. The role of MDH in dealing with industrial and hazardous waste sites is primarily advisory. For that reason, the evaluation report will typically recommend actions to be taken by other agencies — including EPA and MPCA. However, if there is an immediate health threat, MDH will issue a public health advisory warning people of the danger, and will work to resolve the problem.
- ! Soliciting community input: The evaluation process is interactive. MDH starts by soliciting and evaluating information from various government agencies, the organizations responsible for cleaning up the site, and the community surrounding the site. Any conclusions about the site are shared with the groups and organizations that provided the information. Once an evaluation report has been prepared, MDH seeks feedback from the public. *If you have questions or comments about this report, we encourage you to contact us.*

Please write to: Community Relations Coordinator
 Site Assessment and Consultation Unit
 Minnesota Department of Health
 625 Robert St. N.
 Box 64975
 St. Paul, MN 55164-0975

OR call us at: (651) 201-4897 or 1-800-657-3908
 (toll free call—press "4" on your touch tone phone)

Introduction

Minnesota Department of Health (MDH) commented on the Minnesota Pollution Control's (MPCA's) 1998 Air Permit for the Ashland Petroleum Company (Ashland) refinery in St. Paul Park, Minnesota, when it was placed on review in October 1997. The refinery is on the Mississippi River in Washington County, about 6 miles south-southeast of St. Paul. The refinery is on the Minnesota Permanent List of Priorities (State Superfund list) due to soil and groundwater contamination associated with the site. Further information about the site, site background and regulatory history can be found in an MDH Health Consultation from August 1996 (MDH, 1996). This Health consultation is confined to MDH's review of the 1998 Air Permit (Attachments # 1 Memo to MPCA November 7, 1997 (MDH, 1997b); Attachment #2 Memo to MPCA December 17, 1997 (MDH, 1997c)).

Site Demographics

Ashland is located in the southeastern portion of the Minneapolis - St. Paul metropolitan area in the city of St. Paul Park (population 5,024) (see Figure #1). It is in a predominantly residential area located on the east bank of the Mississippi River one block south of the Newport City line. Single family houses lie to the north and south - southeast of the site. Routes US 61 and US 10, as well as a major north - south railroad line, run about ½ mile east of the site. Steep bluffs, running south - southeast, rise out of the floodplain just east of the highways. Zoning in the area of the facility is industrial or commercial / residential.

Permitting Background

Air issues, as well as groundwater and soil issues at Ashland have been previously reviewed by MDH. Staff undertook a review of the Ashland Draft Air Permit in October 1997.

Draft Ashland Air Permit

MDH received copies of Air Emission Permit No. 16300003-001 and Technical Support Documentation from MPCA in October 1997. On October 23, 1997 MDH notified MPCA that it had concerns about the permit and Ashland's air emissions. These concerns were enumerated in an email to the MPCA permitting engineer, Amrill Okonkwo (MDH, 1997a) as well as in discussions which took place on November 6, 1997 as described in a November 7, 1997 memo (MDH, 1997b). MDH's concerns included:

- very high carbon monoxide (CO) emissions
- no requirement to use lowest achievable emission rate (LAER) technology to limit CO emissions, although such technology is being installed
- very high lead emissions
- failure of the permit to address air toxics in addition to the six criteria pollutants
- delay in required work on a risk assessment
- delay in implementation of a leak detection and repair (LDAR) program

Discussion

Discussions between MDH and MPCA on the draft air permit have been focused on questions raised by MDH in the email and memo referenced above. Each of the six questions raised are

discussed below.

1. MDH is concerned about the high level of CO emissions from the facility. In 1997, emissions were about 3.4 % of the total state-wide emissions of CO. While the actual CO emissions are extremely high, emissions are through a high stack and are therefore well dispersed. Furthermore, Ashland is in the process of installing LAER technology to control the CO emissions and anticipates a decrease in emissions of 83 - 85 % during operation of the new technology. This will reduce current actual emissions from about 55,000 tons per year to about 10,000 tons per year.

Computer dispersion modeling was performed by the MPCA to assess the potential impact of Ashland's CO emissions on the surrounding area.. In order to consider a worst case scenario, the modeling was performed assuming the current potential emissions of 62,500 tons per year, not the lower anticipated 10,000 tons per year. The dispersion modeling determined that the highest exposure levels in the vicinity of the facility which can be attributed to Ashland should be about 5,268 micrograms per cubic meter ($\mu\text{g} / \text{m}^3$) for an eight-hour average (see Figure # 2 for graphic representation) and 11,538 $\mu\text{g} / \text{m}^3$ for a one-hour average. The predicted impacts from Ashland, but not considering other sources, are below the CO National Ambient Air Quality Standard (NAAQS) of 10,000 $\mu\text{g} / \text{m}^3$ and 35,000 $\mu\text{g} / \text{m}^3$ for eight hours and one hour, respectively.

Mobile sources (including non-roadway sources) are believed to be the origin of 87 % of CO found in ambient air in Minnesota (MPCA, 1997). Because Ashland is within the seven county Minneapolis - St. Paul metro area MDH expects that the mobile source contribution of CO may be significant near the Ashland facility. MPCA supplied MDH with CO monitoring data for the metro area. Unfortunately, there is no monitoring station near Ashland. Monitoring stations in other locations in the metro area record from 2,000 - 9,400 $\mu\text{g} / \text{m}^3$ CO for eight hour averages and from 2,300 - 15,300 $\mu\text{g} / \text{m}^3$ for one hour averages. It may be reasonable to assume that the ambient air CO concentrations in the area of the Ashland facility are at or below the median concentrations in the metro area given its location. Furthermore, the highest modeled concentrations of CO of Ashland origin may not be spatially or temporally superimposed on the highest ambient CO concentrations. However, it is not known if other additional CO sources, such as the railroad, significantly increase the ambient CO concentrations in the area of the refinery.

MDH believes that it is important to monitor air concentrations in areas where there are multiple sources because ambient CO may in fact be higher than is suggested by only considering Ashland emissions. Therefore, MDH believes that it might be appropriate to monitor CO levels in residential areas near this facility, especially when LAER is not operating.

The carbon monoxide NAAQS is an old standard which is not considered to be very conservative. Therefore, MDH would be concerned if emissions from Ashland added to

the additional urban sources cause the actual total CO concentration in the area near the facility to approach the CO NAAQS when the LAER equipment is not operating. Consistent use of new LAER equipment is recommended.

2. MDH asked MPCA to explain why Ashland was not required to operate CO emissions controls upon installation. The MPCA explained that there are no applicable federal or state rules that will require Ashland to reduce CO emissions from the Fluid Catalytic Cracking (FCC). The FCC is the refinery's main source of CO emissions. Also, installation of new technology in an old refinery can be problematic. While it is Ashland's intent and MPCA's understanding that, upon installation, the new CO control technology will be operated at all times, problems may arise during the installation or break-in operation. Because Ashland is unsure of its ability (at least at first) to maintain operation of the equipment, the permit does not require Ashland to operate the LAER CO controls. Again, MDH remains concerned that the additional urban sources, especially mobile sources, may cause the actual total CO concentration in the area near the facility to approach or exceed the CO NAAQS when the LAER equipment is off-line.
3. MDH is concerned about the emission of large quantities of lead from Ashland (4.29 tons per year). MPCA modeled the stack emissions (100 % lead emitted from a stack) and determined the contribution of Ashland to ambient air levels of lead to be between 16 % and less than 1 % (best estimate probably 1% or less) of the quarterly NAAQS of $1.5 \mu\text{g} / \text{m}^3$. Some concern about lead emissions still remains. However, since emitted lead will increase soil concentrations to some extent due to deposition (wet and dry) of lead in the area, and a threshold level for the health effects of lead has never been demonstrated. Furthermore, emission of this quantity of lead makes Ashland one of the largest contributors to environmental lead pollution in the state.
4. Volatile organic compounds (VOCs) are typically emitted by Ashland as fugitive emissions. Releases of these air toxics and other hazardous air pollutants (HAPs) have been calculated but have not been measured. Calculated data on emissions of these 189 air toxics of concern is available. Furthermore, the Pine Bend Monitoring Network has 2 monitoring sites located near the Ashland facility (Figure # 1). These data show levels of benzene in the vicinity of the refinery to be significantly elevated above levels measured at other sampling stations (MPCA, 1995a; MPCA, 1995b; MPCA, 1995c; MPCA, 1996). The average twenty-four hour sample from the two monitoring stations near Ashland (0436 and 0438) in 1995 was $2.7 \mu\text{g} / \text{m}^3$ compared with approximately $1.5 \mu\text{g} / \text{m}^3$ at monitoring stations in the Pine Bend area. MDH has a draft proposed Health Risk Value (HRV) of $1.0 \mu\text{g} / \text{m}^3$ for benzene. Typical benzene concentrations monitored in the Minneapolis - St. Paul metropolitan area are similar to the MDH HRV and levels found near the Ashland facility. Since Ashland is a point source for benzene in the area of elevated concentrations, its contribution should be investigated.

The National Emissions Standards for Hazardous Air Pollutant (NESHAP) for petroleum

refineries was promulgated on August 18, 1995. The Agency believes the NESHAPS which Ashland was required to comply with by August 18, 1998 addressed these fugitive emissions. MPCA has provided MDH with a completed emissions inventory for the facility. MDH believes that emissions after implementation of NESHAP standards need to be evaluated to ensure that residual health risks are low.

5. In September 1992 Ashland submitted a work plan for a total refinery risk assessment to MPCA. Due to numerous delays, work on this document may begin as late as January 1999. MDH believes that timely completion of the risk assessment is necessary to determine if there are residual health risks after NESHAPs are implemented.
6. In June 1992, Ashland was required to develop a plan for a hydrogen sulfide (H₂S) Leak Detection and Repair (LDAR) program. While the LDAR program for H₂S has been slow getting started, the workplan is scheduled to be submitted to MPCA for review in February 1999. MDH has two draft HRVs for H₂S; a subchronic and an acute (10 µg / m³ and 90 µg / m³, respectively). MDH will review any data on ambient air concentrations.

Conclusions

- ! The Ashland Petroleum Company St. Paul Park facility has been one of the largest emitters of carbon monoxide in the state.
 - " Carbon monoxide emissions from the facility have been modeled for expected concentrations in ambient air in the surrounding community. Results demonstrate that carbon monoxide concentrations remain below National Ambient Air Quality Standards and levels of negligible health-based risk during times of maximal release. Mobile and other sources are not included in the modeling results
 - " Installation of 'lowest achievable emission rate ' equipment should reduce carbon monoxide emissions by 83 - 85 %.
 - " Use of the 'lowest achievable emission rate ' equipment is not required in the air permit.
 - " Carbon monoxide has many sources; notably mobile sources and, potentially, other industrial sources
- ! The Ashland Petroleum Company St. Paul Park facility is one of the largest emitters of lead in the state.
 - " Lead emissions from the facility have been modeled for expected concentrations in ambient air in the surrounding community. Results demonstrate that lead concentrations remain below National Ambient Air Quality Standards during times of maximal release.
 - " However, MDH is concerned about the introduction of large quantities of lead into the environment.
- ! Monitoring stations which are part of the Pine Bend Monitoring network show levels of benzene at locations near the Ashland refinery are higher than at other monitors. Since Ashland is potentially a large point source for benzene in the area, its contribution should be investigated.

- ! Ashland will begin work on a whole facility risk assessment by January 29, 1999.
- ! The hydrogen sulfide leak detection and recovery program will be submitted to MPCA by February 1999.

Recommendations

- ! MDH recommends that ambient carbon monoxide monitoring stations be established in the vicinity of Ashland.
- ! MDH recommends that Ashland be required to use the installed CO emissions limiting equipment.
- ! MDH recommends that benzene sources and ambient air concentrations of benzene be investigated in the area of the Ashland facility.
- ! MDH recommends that when the whole facility risk assessment becomes available, MDH has the opportunity to review it.

This consultation was prepared by:

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Toxicologist
Site Assessment and Consultation Unit
Environmental Surveillance and Consultation Section
Minnesota Department of Health

References

- Minnesota Department of Health. (1996) Health Consultation for the Ashland Oil Refinery Site. Health Consultation. MDH, Minnesota Department of Health, Site Assessment and Consultation Unit, St, Paul. August 9, 1996.
- Minnesota Department of Health, (1997a) Email Concerning: Ashland Draft Air Permit. From: Carl Herbrandson, MDH, St. Paul. To: Amrill Okonkwo, Minnesota Pollution Control Agency. October 23, 1997.
- Minnesota Department of Health, (1997b) Memo Concerning: Ashland Petroleum permit review. From: Carl Herbrandson, MDH, St. Paul. To: Amrill Okonkwo, Minnesota Pollution Control Agency. November 7, 1997.
- Minnesota Department of Health, (1997c) Memo Concerning: Ashland Air Permit Review. From: Carl Herbrandson, MDH, St. Paul. To: Amrill Okonkwo, Minnesota Pollution Control Agency. December 17, 1997.
- Minnesota Pollution Control Agency. (1995a) Data Summary for Pine Bend Monitoring Network: First Quarter 1995. MPCA, Air Quality Division, St. Paul. July 21, 1995.
- Minnesota Pollution Control Agency. (1995b) Data Summary for Pine Bend Monitoring Network: Second Quarter 1995. MPCA, Air Quality Division, St. Paul. September 25, 1995.
- Minnesota Pollution Control Agency. (1995c) Data Summary for Pine Bend Monitoring Network: Third Quarter 1995. MPCA, Air Quality Division, St. Paul. December 1, 1995.
- Minnesota Pollution Control Agency. (1996) Data Summary for Pine Bend Monitoring Network: Fourth Quarter 1995. MPCA, Air Quality Division, St. Paul. February 16, 1996.
- Minnesota Pollution Control Agency. (1997) Minnesota's Air Quality and Emissions Trends. Fardin Oliaei MPCA, Air Quality Division, St. Paul. September 1997.

CERTIFICATION

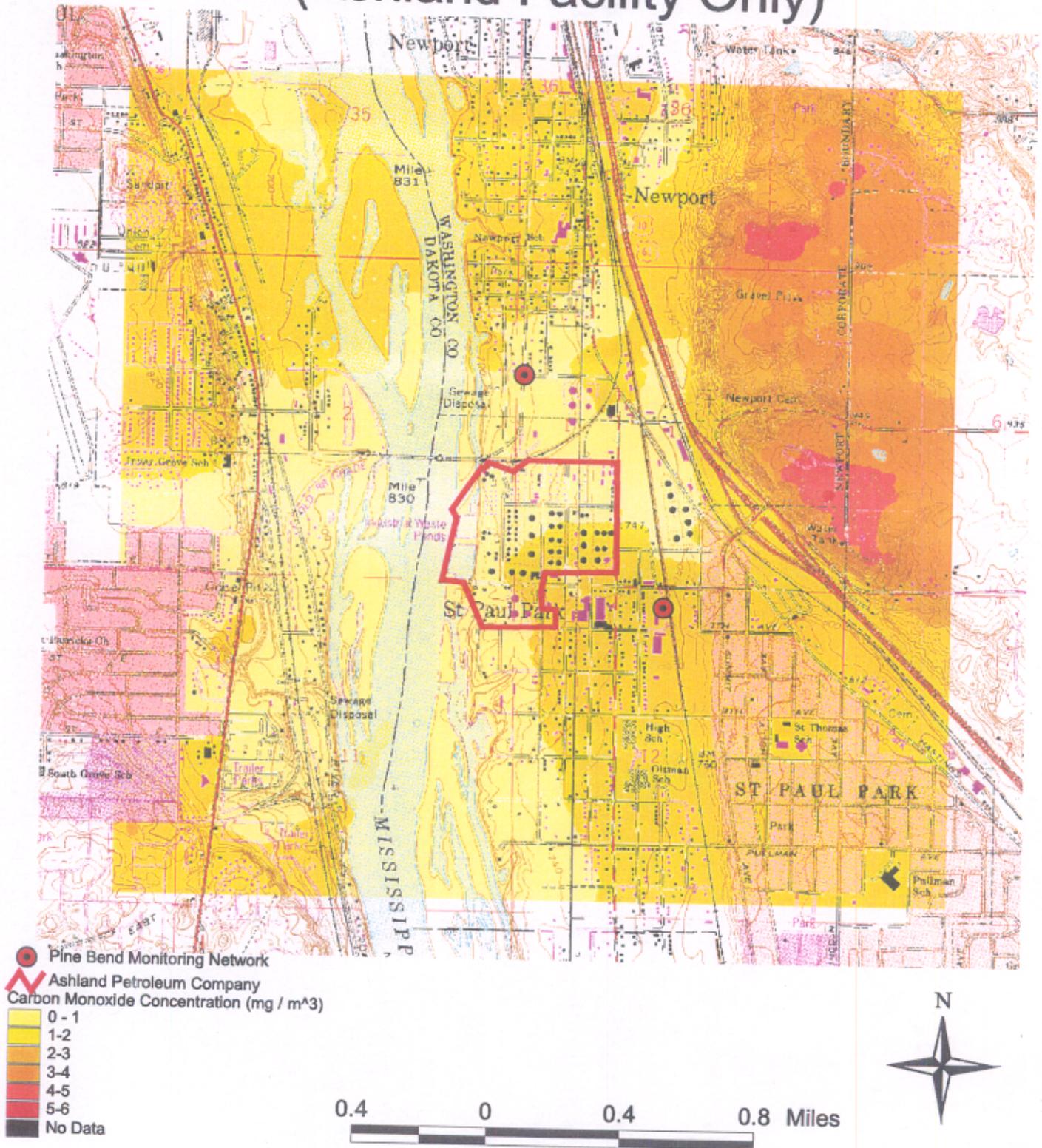
This Health Consultation for the Ashland Oil Refinery Air Permit Review was prepared by the Washington Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the Health Consultation was initiated.

Technical Project Officer
Superfund Site Assessment Branch (SSAB)
Division of Health Assessment and Consultation (DHAC)

The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this Health Consultation and concurs with its findings.

Richard E. Gillig, M.C.P.
Chief, SPS, SSAB, DHAC, ATSDR

Figure # 2 Modeled 8-Hour Carbon Monoxide Concentrations (Ashland Facility Only)



Attachment #1

DEPARTMENT: HEALTH
DATE: NOVEMBER 7, 1997
TO: AMRILL OKONKWO, PCA
FROM: CARL HERBRANDSON
PHONE: 215-0925
SUBJECT: ASHLAND PETROLEUM PERMIT REVIEW

STATE OF MINNESOTA
OFFICE MEMORANDUM

This memo is to summarize points discussed in our meeting at PCA yesterday. The basis of our discussion was MDH's comments on the Ashland Petroleum Permit which were noted in the email I sent you on October 23, 1997.

MDH is concerned about six issues in the permit: high carbon monoxide emissions from the plant; the failure of the permit to require the use of CO lowest achievable emission rate (LAER) technology, even though it will be installed; high emissions of lead; the delay in developing a risk assessment for the site; the failure of the permit to address air toxics in addition to the 6 criteria pollutants; and the delay in implementing the leak detection and repair (LDAR) program until July 1999.

The projected annual emissions of CO by Ashland are 55,558 tons per year (63,006.28 tpy potential to emit). A quick back-of-envelope calculation shows this amount to be greater than 1/8 of the total CO emissions by automobiles (and possibly all motor vehicles) in the metro area. While this is an estimate, it points out the huge contribution of Ashland to the overall ambient CO levels in this small section of the metropolitan area. Since Ashland is in a non-attainment area for CO, the potential health risk from CO may be above levels which MDH considers negligible. MDH believes that Ashland's emissions should be significantly decreased and controlled to conform with tighter CO emission standards. Furthermore, MDH does not understand how Ashland can be required to install LAER technology for CO and not required to use it, monitor its effectiveness, and maintain it in good working order.

The projected annual emissions of lead by Ashland are 4.29 tons per year (4.40 tpy potential to emit). This is a very significant emission of a highly toxic criteria pollutant. MDH recommends that PCA or Ashland conduct air modeling on this heavy metal prior to proceeding with the draft permit. This is to ascertain if the National Ambient Air Quality Standard (NAAQS) for lead is likely to be exceeded. However, we would hope that permitted Pb emissions would be decreased substantially because of its persistence in the environment.

MDH believes that it is very important that air toxics inventory, modeling and subsequent risk assessment on the Ashland site begin as soon as possible. We

acknowledge that the facility is undergoing major changes with regard to the treatment and release of air toxics. However, MDH is very concerned about potential health risks to nearby residents which may be caused by the release of pollutants, especially carbon monoxide and lead. MDH has information from the Koch Refinery permit which details Koch's "actual emissions" as 1,460 tons per year CO and 0.07 tons per year lead. These quantities are a very small percentage of the emissions from Ashland. Furthermore, MDH notes that Ashland is located in a area of denser population than Koch and, therefore, has more potential receptors closer to the pollution source.

MDH believes that Ashland should be required to submit data on specific air emissions other than the 6 criteria pollutants. This is an important first step towards identifying individual compounds on which to perform modeling / risk assessments. The August 1996 MDH Health Consultation, authored by Daniel Symonik, mentions that the proposed Ashland permit was to contain a list of 189 additional air toxics for which data would be acquired. I believe, in our meeting yesterday, we both agreed that we would try to find further reference to what specific compounds this statement referred and why mention of other chemicals was not included in the draft permit.

Lastly, MDH is concerned about the delays in the implementation of a LDAR program at Ashland. If the pilot program was designed in 1993, we fail to see why a review of the project is not due until July 1999. However, MDH does not have data on the amount of fugitive (or controlled) emissions of H₂S, or an H₂S risk assessment for the facility, and therefore we do not have a yardstick with which to gauge any potential health benefit from the LDAR program.

It was my understanding that you would respond to our questions within the next week, and that I would consult with Dan on his recollections about the air toxics list.

Thanks

Carl

Attachment #2

DEPARTMENT: Health
DATE: December 17, 1997
TO: Amrill Okonkwo
FROM: Carl Herbrandson
PHONE: 215-0925
SUBJECT: Ashland Air Permit Review

STATE OF MINNESOTA Office Memorandum

This memorandum is a review of the meeting between MPCA and MDH on November 19, 1997, at which the Ashland Refinery Air Permit was discussed. The discussion was focused on answering questions raised by MDH in an email of October 23, 1997 and a subsequent memo dated November 7, 1997. Six questions were raised in the previous memo, and each question was discussed.

1. MDH is concerned about the high level of CO emissions from the facility. Currently emissions are about 3.4 % of the total state-wide emissions of CO. While the actual CO emissions are extremely high, emissions are through a high stack and are therefore well dispersed. Furthermore, Ashland is in the process of installing LAER technology to control the CO emissions and anticipates a decrease in emissions of 83 - 85 % during operation of the new technology. This will reduce current actual emissions from about 55,000 tons per year to about 10,000 tons per year.

Computer dispersion modeling was performed by the MPCA to assess the potential impact of Ashland's CO emissions on the surrounding area. In order to consider a worst case scenario, the modeling was performed assuming the current potential emissions of 62,500 tons per year, not the lower anticipated 10,000 tons per year. The dispersion modeling determined that the highest exposure levels in the vicinity of the facility which can be attributed to Ashland should be about 5,268 $\mu\text{g}/\text{m}^3$ for an 8-hour average and 11,538 $\mu\text{g}/\text{m}^3$ for an 1-hour average. The predicted impacts are below the standards (10,000 $\mu\text{g}/\text{m}^3$ and 35,000 $\mu\text{g}/\text{m}^3$ respectively). However, we are concerned that the addition of other urban sources, especially mobile sources, to the modeled concentration may cause the actual total CO concentration in the area near the facility to exceed the standard. Accordingly, it was agreed upon that:

- MPCA will investigate the availability of CO monitoring data in areas near Ashland and will provide this data to MDH

- MPCA will provide MDH with the actual graphic results of the modeling performed on CO emissions from Ashland.
2. MDH asked MPCA to explain why Ashland was not required to operate CO emissions controls upon installation. The MPCA explained that there are no applicable federal or state rules that will require Ashland to reduce CO emissions from the Fluid Catalytic Cracking (FCC). (The FCC is the refinery's main source of CO emissions). Also, installation of new technology in an old refinery can be problematic. While it is Ashland's intent and MPCA's understanding that, upon installation, the new CO control technology will be operated at all times, problems may arise during the installation or break-in periods. Because the Agency lacks regulatory authority and because Ashland is unsure of its ability (at least at first) to maintain operation of the equipment, the permit does not require Ashland to operate the LAER CO controls.
 3. MDH is concerned about the emission of large quantities of lead from Ashland (4.29 tons per year). MPCA modeled the stack emissions (100 % lead emitted from a stack) and determined the contribution of Ashland to ambient air levels of lead to be between 16 % and less than 1% of the quarterly standard (with the best estimate probably 1% or less). Some concern about lead emissions still remains however, since emitted lead will increase soil concentrations to some extent due to deposition (wet and dry) of lead in the area.
 4. VOCs are typically emitted from Ashland as fugitive emissions. Releases of these air toxics are calculated and not measured. Information about the 189 air toxics of concern is available. The National Emissions Standards for Hazardous Air Pollutant (NESHAP) for petroleum refineries was promulgated on August 18, 1995. The Agency believes the NESHAPS which Ashland will be required to comply with by August 18, 1998 will address these fugitive emissions. We agreed that:
 - MPCA will provide MDH with a completed emissions inventory for the air toxics
 5. MDH generally believes that risk assessments of air emissions should be timely and complete. Nevertheless, we have no reason to believe that the timeline for developing a risk assessment laid out in the permit could result in any additional health risk to area residents.
 6. Hydrogen sulfide is not an NAAQS or HAP pollutant, yet it is released in fugitive emissions from Ashland. There is no reason to believe that it is being released by the facility at concentrations of concern to MDH. While the LDAR program for H₂S was slow getting started, the pilot project is set to begin in 1998 and will be reviewed in 1999.