
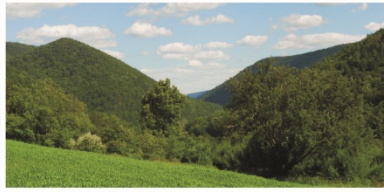

Chrin Brothers, Inc. Landfill

Risk Assessment of Ambient Air Collected Near the Chrin Brothers, Inc., Sanitary Landfill

MARAMA Air Toxics Training Workshop

Swarthmore, PA

August 21 - 23, 2018

Background

Chrin Brothers Inc. ("Chrin Brothers" or "Chrin") performed a risk assessment at the Chrin Brothers Landfill based on ambient air data they collected and analyzed.

The Department (PA DEP) reviewed their risk assessment and developed comments. This is the follow up to those comments.

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Risk Assessment and Review Process

Chrin Brothers, Inc. ("Chrin Brothers") commissioned an ambient air sampling study and risk assessment which resulted in a report titled *Risk Assessment of Ambient Air Collected Near the Chrin Brothers, Inc., Sanitary Landfill Report* ("Risk Assessment"), authored by Dr. Gary Lage, and its supporting document, *the Ambient Air Monitoring Report* ("Monitoring Report"), authored by EarthRes Group, Inc.

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Risk Assessment and Review Process

Members of the Department's Northeast Regional Office originally met with Chrin Brothers and their representatives, including the report's authors, on March 25, 2009, at which time both reports were provided to the Department. On December 28, 2009, the Department issued a document entitled "*DEP Comments and Recommendations on Chrin Brothers Sanitary Landfill Risk Assessment*" ("Department's Comments").

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Risk Assessment and Review Process

After reviewing the Department's Comments, Chrin, through its counsel, in correspondence dated January 20, 2010, provided additional information responding to the Department's Comments and requested additional clarification regarding some of the Department's Comments. Therefore, representatives of Chrin Brothers and the Department met on September 30, 2010 to discuss issues raised in the Department's Comments and Chrin Brothers' subsequent response.

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Risk Assessment and Review Process

On October 28, 2010, counsel for Chrin sent a follow up letter to the Department which included resolutions to issues raised in the Department's Comments as communicated by the Department during the September 30, 2010 meeting.

After evaluating Chrin's October 28, 2010 letter, the Department issued this follow up evaluation to its December 28, 2009 comments.

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Conservative Estimates in the Risk Assessment

As discussed during the September 30, 2010 meeting, several of the assumptions used by Dr. Lage in performing the Risk Assessment were more conservative than those used by the Department in performing its own risk assessments. One of the most important distinctions is that Dr. Lage used the *highest* sampled value for each detected pollutant; whereas the Department's standard operating practice is to use the *average* value of all sample results for each detected pollutant in performing a risk evaluation.

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Conservative Estimates in the Risk Assessment

As described in the Department's Ambient Air Toxics Data Report Guidelines, long term studies (10 samples or more) use the arithmetic mean of the samples for calculating risk. The arithmetic mean is calculated by summing all of the sample concentrations and then dividing by the number of samples in the study. For example, if the following 10 sample concentrations were measured then the arithmetic mean (average value) would be calculated as follows:

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Conservative Estimates in the Risk Assessment

1.0 ug/m3, 2.0 ug/m3, 3.0 ug/m3, 4.0 ug/m3, 5.0 ug/m3, 6.0 ug/m3, 7.0 ug/m3, 8.0 ug/m3, 9.0 ug/m3, and 10.0 ug/m3

Adding all ten samples together yields 55.0 ug/m3
Arithmetic mean = 55.0 ug/m3 by 10 = 5.5 ug/m3

Highest sampled concentration = 10.0 ug/m3
10.0 ug/m3 divided by 5.5 ug/m3 = 1.8 (the highest value is 1.8 times the average value).

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Conservative Estimates in the Risk Assessment

Because Dr. Lage used highest sample values in the Chrin Risk Assessment, as opposed to an average of the sample values, the results of the study were more conservative. Had average values, as opposed to highest values, been used, the resulting risk levels would have been reduced by a factor greater than one.

Similarly, Dr. Lage's Risk Assessment used all the monitoring values as if their source was the landfill alone, not accounting for the fact that background concentrations of contaminants exist.

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Conservative Estimates in the Risk Assessment

The effect of this assumption is that the landfill is considered the sole source for all measured air contaminants and all risk despite the fact that there are a number of other air contaminant sources within a 1-mile radius of the landfill that contribute to measured air contaminant levels, including several that emit pursuant to air permits issued by the Department, as well as gasoline stations and an expressway carrying car and truck traffic.

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Conservative Estimates in the Risk Assessment

Dr. Lage's risk assessment is also conservative in that it treats all sample results as if they are directly downwind of the landfill, despite weather data to the contrary in some instances. The effect of this assumption in the Risk Assessment is that risk unassociated with the landfill is attributed to the landfill.

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Conservative Estimates in the Risk Assessment

In summary, there are other sources of emissions in the area other than the landfill that contribute to ambient air concentrations.

Considering the landfill to be the sole source of all measured air contaminants, using the highest values from sample results and assuming that all sample results are directly downwind of the landfill, which is not always the case, results in very conservative estimates in the risk assessment.

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Issues Identified and Responses

The Department identified certain concerns in its original review of Chrin's risk assessment. Those concerns were presented to and discussed with Chin. Following those discussions, the Department has developed certain conclusions as set forth below.

30 year vs. 70 year exposure assumption

Original Department Comment (12/28/2009): *In calculating the exposure to the measured ambient*

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Issues Identified and Responses

concentrations an individual would expect to experience the author of the risk assessment report utilized the assumption that a person would reside at the same location for 30 years. In order to be protective for individuals who were exposed to carcinogens during their childhood the Department follows the EPA guidance which recommends assuming an exposure duration of 70 years. It has been found that exposure to mutagenic compounds can have a multiplicative effect on cancer risk to

Issues Identified and Responses

individuals exposed while children. Thus, the 30 year assumption may not conservatively account for the cancer risks to residents who have lived near this facility their whole lives.

Chrin Original Response (1/20/2010): The reference to a 70 year exposure duration is indicated without a citation to any EPA Risk Assessment Guidance documents. The newest EPA published guidance is the Risk Assessment Guidance for Inhalation Risk Assessments, which was released

Issues Identified and Responses

on January 28, 2009, after the Chrin Risk Assessment was initiated. This guidance is titled: "Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment) ("RAGS Part F"). RAGS Part F continues the long-standing EPA guidance of using a 30-year exposure duration for a residential receptor (See RAGS Part F, page 24). Although this document does outline a somewhat different approach to inhalation risk assessment,

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Issues Identified and Responses

it does not in any way indicate that residential risk assessment should assume a 70 year exposure duration.

EPA has recently conducted a number of ambient air risk assessments pursuant to the Clean Air Act's "residual risk" NESHAP requirements. In those assessments, EPA has used a 70-year exposure as part of a screening analysis to determine if further assessment is required. Where this 70-year exposure indicates "a potential for risk,"

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Issues Identified and Responses

EPA typically performs an additional, more refined analyses to more closely approximate the true risk from sources that do not "screen out". For example, in the risk assessment supporting development of the recent Halogenated Solvent Degreasing NESHAP rulemaking, EPA used a 70-year exposure modified by Monte Carlo analysis. In this assessment methodology, the analysis is repeated many times using the distribution of years spent in one residence in the US (i.e. population mobility).

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Issues Identified and Responses

By using this method in this rulemaking, the exposure duration is effectively reduced from the standard EPA period of 30 years (which is the 95th percentile for residence) to about 9 years (which is the 50th percentile). Accordingly, the risk was reduced greater than 3-fold (30/9). The Department is familiar with EPA's methodology and assumptions as the Department has submitted numerous documents to EPA regarding this rulemaking.

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Department's Conclusion

The Department agrees that EPA has used a 70-year exposure duration as part of screening analyses to determine if further risk assessment in certain cases is required and recognizes that the risk assessment finalized on May 17, 2010 by the Agency for Toxic Substances and Disease Registry ("ATSDR") for the Imperial Landfill located in western Pennsylvania used a 30-year exposure duration. It also recognizes that more current US EPA guidance recommends using a 30-year exposure duration.

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Department's Conclusion

In its initial review, the Department recommended using a 70-year duration in an effort to have a conservative approach to the assessment. As discussed in this response following further review with Chrin, the Risk Assessement is conservative in several respects, including Chrin's use of the highest rather than average sampled values, the assumption that all sample results were from the landfill as opposed to other local sources, the assumption that all sample results were obtained directly downwind of the landfill,

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Department's Conclusion

and the accounting for seasonal variability and increases in landfill gas emissions as described below. These conservative assumptions have yielded conservative results and the Department is satisfied with Chrin's use of a 30-year exposure duration in its risk assessment.

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Sufficiency of the number of days of sampling

Original Department Comment (12/28/2009):
Seven days of sampling over January and February are not sufficient to represent the foreseeable landfill gas emissions over the course of a year. Nor were the MAU sampling runs conducted over a wide enough variety of weather conditions which influence landfill gas generation rates. Landfill gas generation is dependent on several factors including temperature and moisture. During the summer when there are periods of rainy days it's quite possible that the landfill gas

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Sufficiency of the number of days of sampling

generation rate could be higher. Thus, a longer duration sampling program would need to be put into place to determine representative concentrations of the measured compounds.

Original Chrin Response (1/20/2010): Chrin Brothers agrees with the Department that landfill gas generation rates can vary based on weather and other related factors, including seasonality. The ambient air monitoring program conducted during January and February 2009 provided

Sufficiency of the number of days of sampling

site specific information regarding wind direction and velocity, potential off-site sources of VOCs and laboratory analytical data from seven (7) ambient air sampling stations surrounding the landfill site. Composite 24-hour samples were collected on various days of the week over a nearly two-month period to allow for variability in gas generation, site conditions, weather conditions or any other variable condition that may affect ambient air quality. Precipitation in the form of rain did occur at the site during the sampling period.

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Sufficiency of the number of days of sampling

Based upon the low levels of VOCs quantified in ambient air during the sampling period and the small percentage of these compounds that are typically present in landfill gas (0.05% by volume), seasonal variation in weather conditions should not result in significantly higher concentrations of detected compounds in areas surrounding the landfill site.

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Department's Conclusion

The Department subsequently expanded upon its original comments and indicated that it typically targets 61 samples, each 24 hours in length, for use in its long-term risk assessments. By contrast, the Chrin monitoring program collected 47 samples, each 24 hours in length, for use in its analysis. Chrin, however, used seven sampling sites surrounding the landfill and captured a more representative picture than one sampling site located at a single location. Over an entire year, a single-site sampling program will track the seasonal variability of

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Department's Conclusion

the concentration data because of the variation in wind speed and wind direction and averages out the variability using the arithmetic mean. The Chrin Risk Assessment used seven sampling sites and chose the highest sampled value to perform the risk assessment and did therefore assume that the highest sampled value was the annual average value (arithmetic mean) which is a conservative (over estimated) approach. This approach used 47samples to determine the highest sampled value and the 47 samples were not averaged.

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Department's Conclusion

The use of 47 samples in this context appears to present a representative or valid data set that allowed for chronic (long-term) risk to be calculated. The Department further noted that, based on a review of Chrin's landfill gas collection efficiency data, it believed that overall gas collection was lower in the summer months and that the decrease in collection was equivalent to a 10-15% increase in uncaptured landfill gas emissions in the summer months; therefore a risk assessment assuming a 20% increase in detected volatile

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Department's Conclusion

organics during the summer months would be appropriate and conservative.

Following the September 30, 2010 meeting, the Department provided an additional analysis of gas collection rates over a multi-year period. For purposes of this risk assessment, Chrin is willing to accept the Department's assertion that summer gas emissions are higher than other months.

The Risk Assessment was revised and in the updated analysis Dr. Lage increased the measured air

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Department's Conclusion

contaminant values by 20% over the entire year resulting in a 20% increase in risk. This revision adequately addressees the Department's concern that emissions from the landfill can be higher in the summer months as opposed to when the risk assessment sampling was conducted in the winter months.

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Inclusion of chemicals in the sampling

The inclusion of acrylonitrile, tetrachloroethylene, and trichloroethylene in the sampling

Original Department Comment (12/28/2009): *The basis for the compounds included in, and those excluded from, the tested analytes list was not presented in the Risk Assessment or the Ambient Air Monitoring Report. Other compounds which might be reasonably expected to be released from the landfill included in the analysis, such as semi-volatile*

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Inclusion of chemicals in the sampling

organics and aldehydes, should have been included in the sampling. In the Ambient Air Monitoring Report submitted by Chrin some of the typical compounds found in landfill gas were listed. However, not all of these chemicals were included at the sampling program at Chrin. These compounds, known to cause adverse human health effects, include acrylonitrile, tetrachloroethylene, and trichloroethylene.

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Inclusion of chemicals in the sampling

Original Chrin Response (1/20/2010): The samples were analyzed by Air Toxics, Ltd. for a list of volatile organic compounds (VOCs) using an EPA-approved method (T0-15 modified). Method T0-15 includes compounds typically included in landfill gas characterizations and ambient air analyses for landfill gas risk assessment....

... The ambient air monitoring project completed for the Chrin Site included the analysis for sixty-two (62) VOCs. The list of compounds included in the report

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Inclusion of chemicals in the sampling

was limited to those that were reported by the laboratory as quantifiable based on the EPA-approved test method.

With two exceptions, all of the non-methane organic compounds ("NMOC") listed on Page 7 of the EarthRes Report were included in the sampling program. One exception was carbonyl sulfide, which requires a separate sampling and test method than TO-15. However, the analysis did include carbon disulfide, which is typically present at similar concentrations in landfill gas.

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Inclusion of chemicals in the sampling

Because the concentrations of these two compounds closely track, using carbon disulfide results as an indication of the levels of carbonyl sulfide, particularly on a detection/non-detection level, is appropriate and commonly accepted. The second exception is acrylonitrile, which is a semi volatile compound. Based on the Department's comment, Air Toxics, Ltd. has been reviewing the list of Tentatively Identified Compounds ("TICs") generated during their laboratory analysis. To date, Air Toxics, Ltd has

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Inclusion of chemicals in the sampling

reviewed the TICs data from the first four sampling events and confirmed that acrylonitrile was not on the TICs list. Air Toxics, Ltd. review of the other three sampling events is on-going.

The Department states that tetrachloroethylene and trichloroethylene were not included in the sampling program. The compounds tetrachloroethylene and trichloroethylene were analyzed and reported by the laboratory and EarthRes using the common chemical synonyms of tetrachloroethene and trichloroethene.

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Department's Conclusion

The issue of compounds included in the Risk Assessment was discussed during the September 30, 2010 meeting. Following those discussions, the Department determined that the use of Method T0-15 canister sampling addressed necessary and appropriate compounds, including tetrachloroethylene and trichloroethylene. These two compounds were, in fact, reported using chemical synonyms tetrachloroethene and trichloroethene, as discussed during the meeting.

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Department's Conclusion

In addition, subsequent to Chrin's January 20, 2010 response to the Department's original comments on the Risk Assessment, Air Toxics, Ltd. confirmed that acrylonitrile was not on the TIC list for any sampling event conducted by Chrin. Therefore, its inclusion in the Assessment was not necessary.

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Compounds detected and not detected

Compounds detected by MAU and not EarthRes Group

Original Department Comment (12/28/2009): *The MAU sampling detected approximately 19 compounds, not detected by the EarthRes Group sampling conducted on behalf of the landfill, which have known health effects toxic endpoints. The EarthRes Group testing did sample for 12 of those 19 compounds which is further indication of the need to conduct long term sampling to*

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Compounds detected and not detected

account for the variability in the emissions from the landfill. Eight of those compounds have been found to have carcinogenic properties. These compounds are listed in Table 2 [Department's Comments]. Compounds which were sampled with the MAU for which concentrations were reported are included in the table along with the sampling method detection levels.

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Compounds detected and not detected

Chrin Response: The compounds reported by EarthRes are those that were detected in concentrations sufficient to be quantified by the test method. The use of Method T0-15 using summa canisters for sample collection is the accepted EPA-approved method for quantification of VOCs at detection limits in the parts per billion range.
It appears that most of the 19 compounds reported present by Department were only "tentatively identified", but not quantified in "grab" samples.

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Compounds detected and not detected

As the Department is aware, tentatively identified compounds are those that can be seen by the analytical testing method, but whose identity and concentration cannot be confirmed without further analytical investigation; they are compounds that the instrumentation can detect but the analysis is not targeting specifically. Furthermore, although the DEP data does not include a description of the locations for each sample, at least some of the data appears to have been collected using the Open Path Fourier

Compounds detected and not detected

Transform Infrared Spectrometer (OPFTIR), a unit which was observed as being stationed and used by the Department in the landfill. It is not clear from the DEP data that any of these compounds were detected at off-site locations or if they were detected at quantifiable concentrations. The data collected from directly above the landfill surface (especially where the results appear to all be unquantifiable) cannot be reasonably compared to data from ambient air sampling conducted at the seven (7) surrounding off-site locations.

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Department's Conclusion

From Table 2 in Department's Comments, the compounds not detected by ERG were acetaldehyde, acrolein, ammonia, benzene, chloroform, ethyl benzene, triethylamine, trichloroethene, benzene, 1,2-dichlorobenzene isomer, 1,3-dichlorobenzene isomer, 1,4-dichlorobenzene isomer, furfural, naphthalene, pentane, propylbenzene, styrene, hexane, tetrachloroethene, 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene. The Department has reviewed the ERG lab sheets and has determined that the January and February 2009

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Department's Conclusion

sampling appears to present a representative or valid data set for the compounds that were properly sampled. All of the compounds listed above were properly sampled for by ERG except the following, which the Department believes are addressed as follows:

1. Acetaldehyde and Triethylamine: These compounds were detected by the OPFTIR on the landfill, but not found in any of the bag samples taken by the Department on or off of the landfill.

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Department's Conclusion

After further inquiry into the capability of the MAU's GC/MS, the Department has determined that even if acetaldehyde and triethylamine were present in the bag samples taken by the Department they would not have been identified. ERG's sampling conducted in January and February of 2009 utilized 24 hour summa canisters that were tested for the presence of acetaldehyde and triethylamine. The results showed that no acetaldehyde or triethylamine was present.

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Department's Conclusion

It is the opinion of the Department that summa canisters are not an appropriate sampling method for acetaldehyde or triethylamine, so the fact that acetaldehyde and triethylamine were not detected in the summa canisters is not definitive proof that acetaldehyde and triethylamine were not present off-site.

However, by looking at guidance on this issue, particularly, New Jersey's risk assessment guidance, the 4-hour concentration data collected by the MAU for acetaldehyde and triethylamine

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Department's Conclusion

can be converted to I-hour concentrations and compared to California Environmental Protection Agency (CalEPA) Office of Environmental Health Hazard Assessment's (OEHHA's) I-hour Reference Exposure Levels (RELs).

From Section 3.3.3.3 of NJ DEP's TECHNICAL MANUAL 1003, Guidance on Risk Assessment for Air Contaminant Emissions:

Many short-term reference concentrations (RfCs) have exposure periods less than 24 hours. They must be

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Department's Conclusion

compared with air concentrations with corresponding averaging times. The appropriate short-term maximum average air concentration is calculated from the maximum 24-hour average air concentration using the following factors:

1 Hour: 24-hour average concentration x 2.5

4 Hour: 24-hour average concentration x 2.25

6 Hour: 24-hour average concentration x 2

7 Hour: 24-hour average concentration x 2

8 Hour: 24-hour average concentration x 1.75

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Department's Conclusion

Our Examples:

Acetaldehyde

256 ppb = 468.48 ug/m3

*468.48 ug/m3 (4-hr) / 2.25 *2.5 = 520.53 ug/m3 (I-hr)*

*520.53 ug/m3 / 470 ug/m3 (I-hr REL)= **1.11 Hazard Quotient***

Triethylamine

66 ppb = 277.86 ug/m3

*277.86 ug/m3 (4-hr) / 2.25 *2.5 = 308.73 ug/m3 (1-hr)*

*308.73 ug/m3/2,800 ug/m3 (1-hr REL)= **0.11 Hazard Quotient***

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Department's Conclusion

Note that the terms REL and RfC are used interchangeably.

The Hazard Quotient (HQ) is a ratio of estimated exposure to a chemical over a specified period of time to the estimated exposure level at which no adverse health effects are likely to occur. According to EPA, it is the ratio of the potential exposure to the substance and the level at which no adverse effects are expected. If the HQ is calculated to be equal to or less than 1,

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Department's Conclusion

then no adverse health effects are expected as a result of exposure. Additionally, a HQ exceeding 1 does not necessarily mean that adverse effects will occur. Based on the fact that these readings were taken on the face of the landfill which is not an off-site receptor, it can be assumed that the I-hour concentrations at off-site receptors would be even lower due to dispersion. Also if we use New Jersey's approach of truncating the acetaldehyde Hazard Quotient from 1.11 to I (see below), the Department believes that by

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Department's Conclusion

using these risk management practices we can say that these measured concentrations are acceptable to the Department.

From Section 3.4 of NJ DEP's TECHNICAL MANUAL 1003, Guidance on Risk Assessment for Air Contaminant Emissions:

Note that incremental risk or hazard quotient values less than or equal to 1.5 should be rounded down to 1.

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Department's Conclusion

It is also important to note that following the September 30, 2010 meeting, Chrin's contracted laboratory analyzed all of the canister samples to determine the presence of acetaldehyde and triethylamine and did not find these two compounds present in any of the samples.

2. Ammonia: This compound was detected by the OPFTIR on the face of the landfill and was not sampled for off-site. If it is conservatively assumed that the 8 ppb (5.68 ug/m3) observed

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Department's Conclusion

by the OPFTIR is an annual average concentration value, the chronic hazard quotient for ammonia would be calculated using the IRIS reference value of 100 ug/m3 and yields a value of 0.0568 which is well below 1.0. The Department has determined that the low levels of ammonia found on site do not pose a health risk to the public and that additional sampling for this compound is not necessary.

3. Furfural: This compound was found only as a TIC in one Department bag sample taken off

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Department's Conclusion

landfill property. Because the same sampling technique was used to sample on and off the property and furfural was not detected anywhere on the landfill, it is not clear that this compound is being emitted from the landfill. The off-site detection of furfural may have been due to another source. Accordingly, the Department has determined that no additional sampling for this compound is necessary.

4. Pentane: This compound was found only as a TIC in

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Department's Conclusion

several Department bag samples taken on landfill property, but not in bag samples taken off landfill property. Therefore the Department has determined that the unquantified low levels of pentane found on site do not appear to be migrating offsite and that additional sampling for this compound is not necessary.

Therefore the Department believes that all of the identified compounds have been satisfactorily addressed.

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Additional Sampling

Original Department Comment (12/28/2009): *More detailed ambient sampling should be conducted which would be capable of detecting the compounds detected by the MAU. This would allow a better representation of the cancer and non-cancer risks posed by compounds which may be emanating from the site.*

Chrin Response: See previous responses.

Department's Conclusion: This comment was addressed in C and D above and the Department refers the reader to those sections.

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Dispersion Modeling

Original Department Comment (12/28/2009): *As reported in the risk assessment analysis the Department agrees that the terrain around the Chrin landfill area could significantly impact the chemical concentrations to which the surrounding residents would be exposed. If dispersions modeling was conducted to take into account the influence of terrain the residential exposures could be more accurately estimated. Off site residential locations may well experience lower concentrations than those measured by the ambient sampling.*

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Dispersion Modeling

Chrin Response: Chrin Brothers agrees with the Department that dispersion modeling of off-site residential locations likely would show lower exposure concentrations and risk levels (if any) than are indicated in the Chrin Brothers Risk Assessment.

Department's Conclusion: The Department has not indicated that the dispersion modeling would likely show lower exposure concentrations and risk levels, rather it stated that off site residential locations may well experience lower concentrations.

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Dispersion Modeling

After reviewing this comment at the September 30, 2010 meeting and information that Chrin has provided, the Department agrees that the seven-site ambient air monitoring program carried out at the Chrin Landfill discussed in greater detail above, coupled with the 20% increase to account for seasonal variability in emissions, which is also discussed above is a representative, acceptable approach and addresses the Department's comment.

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Effect of Compounds on Risk

Effect of Compounds detected by MAU and not EarthRes Group on Risk

Original Department Comment (12/28/2009): Based upon the omission of several compounds with known human health effects from the ambient sampling conducted by EarthRes Group conclusions with respect to potential health risks cannot be drawn. The risk assessment report concluded that the total excess cancer risk associated …

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Effect of Compounds on Risk.

with the data collected during the EarthRes Group sampling was 7.3 in a million and the non-cancer risk hazard index was 0.38. These numbers would be higher if the contribution from the other compounds detected at the site by the MAU were included in these risk assessment numbers.

Chrin Response: As stated above, most of the compounds listed in Department Table 2 were included in the analysis by Air Toxics or were not detected in concentrations to be quantifiable per the EPA-approved test method.

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Effect of Compounds on Risk.

Additional compounds would likely be eliminated through a review of the Tentatively Identified Compounds. A risk assessment using the new EPA RAGS Part F risk assessment guidance would be somewhat different, but would not materially alter the risk values presented in the March 2009 Risk Assessment. There are no obvious chemicals listed in Table 2, and not analyzed by Air Toxics, that would significantly change the Risk Assessment results previously calculated.

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Effect of Compounds on Risk.

Department's Conclusion: As stated above, the Department believes that all of the identified compounds have been satisfactorily addressed. Dr. Lage has re-analyzed the monitoring data in accordance with the Department's comments, as discussed on September 30, 2010, and kept all of the conservative assumptions that were included in the original risk assessment. He further increased the values of the measured concentrations by 20% to account for seasonal variations in gas collection.

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Effect of Compounds on Risk.

As a result of this re-analysis the total excess cancer risk associated with the data collected during the EarthRes Group sampling was reported as 8.8 in a million and the non-cancer risk hazard index is 0.46. The Department agrees with the cancer risk results of 8.8 in a million. With respect to the non-cancer risk hazard index, the Department believes that Dr. Lage's analysis is conservative and that a more accurate number would actually be below 0.46.

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Conclusion

In reviewing the information provided by Chrin, including the original Risk Assessment, Chrin's response to the Department's comments, and information provided during and after the September 30, 2010 meeting, the Department has determined that Chrin used a number of conservative assumptions in performing the Risk Assessment. Although the Assessment is different in certain respects from how the Department would typically perform a risk assessment,

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Conclusion

the application of the assumptions Chrin used is acceptable and the results of Dr. Lage's Risk Assessment are below the levels of risk that the U.S. EPA generally considers as acceptable (i.e., 1 in 10,000 cancer risk and a hazard index of 1.0).

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Questions?

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