



Public Health Consultation
Evaluation of Exposure to Contaminants in Ambient Air
from the Bright Feeds facility
Berlin, Connecticut

FINAL October 30, 2025

Executive Summary

Bright Feeds is a food recycling facility located in Berlin, CT that started their operations in late October of 2022. The facility accepts food waste and processes the waste into animal feed. Since the time the facility began operating, some members of the surrounding community reported experiencing odors from the facility and expressed concern about potential health impacts from their exposure to air emissions from the facility. In response to questions and concerns expressed by the community, the CT Department of Public Health (DPH) was asked by local health leaders in Berlin to evaluate health risks from exposure to contaminants in air emissions from the Bright Feeds Facility.

DEEP used an air dispersion model to estimate ambient air concentrations of contaminants measured in stack emissions from Bright Feeds. DPH used the modeled ambient air concentrations developed by DEEP to estimate cancer and noncancer risks from exposure and to qualitatively evaluate odor exposures. The key conclusions reached by the DPH are as follows:

- On initial screening, the concentrations of two chemicals (ethanol and acetaldehyde) in the modeled ambient air concentrations exceeded health protective screening values.
- Results of further evaluation using site-specific exposure information show that breathing acetaldehyde and ethanol at the ambient air concentrations modeled by DEEP from the startup of the Bright Feeds Facility to the installation of the RTO is not expected to harm the health of community members.
- The ambient air concentration of one contaminant (acetaldehyde) is within the range that could be detected as odors.

In conclusion, breathing contaminants at the ambient air concentrations modeled by DEEP is not expected to harm the health of community members. These conclusions are based on DPH's risk assessment of the ambient air concentrations modeled by DEEP from stack test emission results and subject to the limitations noted later in this report.

I. Purpose

The purpose of this health consultation is to report DPH's assessment of potential health impacts from exposure to contaminants detected in stack emissions from the Bright Feeds facility in Berlin, CT, based on testing performed by a third-party test contractor and audited by DEEP.

II. Background

Bright Feeds, located at 76 Fuller Way, Berlin, CT is a food recycling facility. It takes a variety of different food wastes and applies a drying technology to turn the waste food into animal feed. Bright Feeds has been operating in its Berlin location since October 2022 (email from DEEP, June 3, 2025). During 2023 and 2024, DEEP received a number of complaints from the community about noise and odors, resulting in multiple inspections of the facility by DEEP staff. During an inspection in May 2024, DEEP documented nuisance odors and issued a notice of violation (NOV) to Bright Feeds. After the NOV was issued, DEEP continued to document odors, sometimes at nuisance levels, from the Bright Feeds facility (email from DEEP, June 3, 2025). On November 4, 2024, DEEP issued a requirement to Bright Feeds to test its dryer stack emissions.

Bright Feeds conducted a test of their dryer stack emissions on January 10, 2025. As specified by DEEP, the testing was performed by a third-party test contractor and was audited by DEEP. The emissions were analyzed for total volatile organic compounds (VOCs), speciated VOCs and particulate matter. Per DEEP's requirement, the testing occurred under representative facility operating conditions and used Environmental Protection Agency (EPA) approved test methods.

In mid-January 2025, based on preliminary stack emissions results, Bright Feeds implemented interim mitigation measures until a Regenerative Thermal Oxidizer (RTO) could be installed. An RTO is an air pollution control device that destroys volatile pollutants and odors via heat, before exhausting them through the stack. The interim measures implemented by Bright Feeds were: (1) reducing the number of hours that the facility operated each day and (2) rejecting certain feedstocks such as uncooked dough that could be reasonably anticipated to generate odors when processed. Bright Feeds completed installation and commissioning of the RTO on April 4, 2025.

DEEP received the verified stack test results in early February 2025. Using the stack test results, DEEP ran an air dispersion model to estimate the highest concentrations of individual VOCs at the location of the most impacted receptor (i.e. person) at or beyond the Bright Feeds property line. On May 5, 2025, DEEP provided the modeled ambient air VOC concentrations to DPH for evaluation.

III. Discussion/Methods

1. Environmental Data

DEEP provided DPH with modeled annual average and maximum 1-hour, 8-hour and 24-hour ambient concentrations for each VOC contaminant detected via the TO-15 stack emissions analysis (email from DEEP, June 3, 2025). DEEP reported that they modeled the location with the highest ambient air impact at or beyond the Bright Feeds property line for each of the averaging periods (annual average, highest 1-hour, highest 8-hour and highest 24-hour). Further, DEEP used the results of the highest emitting stack test run (of the three test runs) for each pollutant. Each stack test run was 1-hour long and each run was conducted with the plant operating at or near the maximum process rate. For the stack flow rate, DEEP used the value from the stack test run with the lowest flow rate, even though such run was not necessarily the highest emitting run for a given pollutant (email from DEEP, June 3, 2025). Lower flow inhibits dispersion so this assumption will result in a more conservative estimate of ambient air impact for the most impacted receptor located directly outside Bright Feed's property line. Further, instead of modeling ethanol concentrations based on TO-15 results, DEEP used the total VOC result from the flame ionization detector (FID), conservatively adjusted the result to account for the weak response factor of ethanol to the FID and assumed that all the detected VOC was ethanol, per DEEP (email from DEEP, June 3, 2025). These assumptions will also result in a more conservative (i.e. health protective) estimate of ambient air impact. DEEP used the air dispersion model AERMOD (version 24142) to estimate the ambient air concentrations.

2. Selection of Contaminants of Potential Concern

DPH followed the Agency for Toxic Substances and Disease Registry (ATSDR) Public Health Assessment Guidance Manual for this evaluation of public health exposures and risks from Bright Feeds emissions (ATSDR 2022). As described in the Guidance Manual, the first step in the process is the screening

analysis. The screening analysis identifies contaminants of potential concern by comparing the maximum contaminant concentrations at the site with health-based screening values, also known as comparison values (CVs). Contaminants whose concentrations are below CVs are unlikely to pose health risks. Contaminants whose concentrations meet or exceed a CV do not necessarily pose a health risk but require further evaluation.

Based on the EPA-approved test methods used by Bright Feeds, there were 19 VOCs detected in Bright Feeds' stack emissions. For each of the 19 VOCs, Table 1 provides the maximum stack emission concentration, the highest modeled ambient air concentration at or beyond the property line, the CV and the CV source. There are two chemicals (acetaldehyde and ethanol) whose modeled ambient air concentrations exceed the CVs. Based on this screening evaluation, DPH further evaluated these two chemicals.

It is important to recognize that stack emissions do not represent the concentrations to which people would be exposed because of the dilution and dispersion that occurs once contaminants leave the stack. However, DPH notes that even the highest stack emission concentration for most chemicals does not exceed the CV (as shown in Table 1).

The CVs DPH used for screening are the recommended CVs from ATSDR's Public Health Assessment Site Tool (PHAST) (ATSDR PHAST, accessed May 30, 2025) and from other sources when there were no CVs available in PHAST. DPH notes that there are two chemicals (propanoic acid and n-octane) that did not have CVs or toxicity values available from the hierarchy of acceptable sources (CT DEEP 2018). In order to perform the health-based screening for these two chemicals, DPH used the Recommended Exposure Limits (RELs) developed by the National Institute for Occupational Safety and Health (NIOSH) to be health protective of workers' exposure up to a 10-hour workday during a 40-hour workweek. DPH modified the NIOSH RELs for propanoic acid (30,000 $\mu\text{g}/\text{m}^3$) and n-octane (350,000 $\mu\text{g}/\text{m}^3$) to account for residential exposure (assuming 24-hours per day, 7-days per week) and used additional safety factors to account for possible healthy worker effect (10) and higher inhalation exposure in children (2). These adjusted occupational values are included in Table 1 as CVs.

3. Outdoor Air Exposure Point Concentration

An exposure point concentration (EPC) is the representative contaminant concentration to which people are exposed under past, current or future conditions. DPH identified EPCs for the two chemicals (acetaldehyde and ethanol) whose ambient air concentrations exceed CVs. The EPCs DPH used in this assessment are the estimated concentrations in ambient air as calculated by DEEP's modeling. Table 2 includes the EPCs.

4. Exposure Pathways

We determine exposure to a contaminant of concern by examining human exposure pathways. A completed exposure pathway consists of five elements: a source, a contaminated environmental medium and transport mechanism, a point of exposure, a route of exposure, and a receptor population. There is one completed exposure pathway at this site: inhalation of contaminants in outdoor air (or outdoor air that has entered the indoor air of structures near the Bright Feeds facility). Adults and children living or working near the Bright Feeds facility could be exposed via inhalation of air while outdoors or in their homes or workplaces. People could have been exposed to contaminants from the

Bright Feeds facility up to 24 hours per day and 7 days per week, since the time Bright Feeds began its operations in Berlin in October 2022.

We evaluated exposures via inhalation in accordance with ATSDR inhalation guidance (ATSDR 2021). We adjusted the EPC by an exposure factor (EF) to account for the time individuals are exposed to emissions in the air from Bright Feeds. If the exposure is assumed to be continuous (such as in a home), the EF is 1. For this evaluation, we assumed continuous exposure (i.e. 24 hours per day, 365 days per year) to emissions from Bright Feeds. This is a conservative (health protective) assumption considering that people would not be expected to continuously breathe the air at the location of the highest impact from Bright Feeds at or beyond their property line. It was also assumed that the exposure duration is two and a half years. This represents the period of time from when Bright Feeds began operations (October 2022) to the time when the RTO was operational (April 4, 2025). Table 2 includes the exposure factors, exposure assumptions and adjusted EPCs. It should be noted that for the cancer risk calculation, the exposure duration of 2.5 years is averaged across a 78-year lifetime so the EF for the cancer risk calculation is not one, even though it is assumed that exposure during the 2.5-year exposure duration is continuous.

IV. Public Health Implications

1. Cancer Risk Estimate

Of the two contaminants evaluated in this assessment, only acetaldehyde has been identified as a likely human carcinogen by the inhalation pathway. Acetaldehyde is classified as “reasonably anticipated to be a human carcinogen” by the National Toxicology Program (NTP) and a “probable human carcinogen” by EPA (ATSDR PHAST 2025). Ethanol is considered by the International Agency for Research on Cancer (IARC) to be a carcinogen when ingested in alcoholic beverages (IARC 2010), but there is no evidence for its carcinogenicity when inhaled.

In accordance with ATSDR inhalation guidance (ATSDR 2021), we calculated inhalation cancer risks using the EPC (adjusted by the EF) multiplied by an inhalation unit risk (IUR) for cancer. We used the IUR from the EPA Integrated Risk Information System (IRIS). The IUR is the incremental cancer risk posed by a specific concentration in air (typically 1 microgram per cubic meter [$\mu\text{g}/\text{m}^3$]). The cancer risk calculation yields the relative increase in cancer risk (above background cancer rates) from exposure to the pollutant for a specified duration. This is also referred to as the excess lifetime cancer risk (ELCR).

Chemicals that cause cancer by a mutagenic mode of action are evaluated differently from those that are not mutagenic. These chemicals require an additional step in the cancer evaluation because they might result in a higher cancer risk for children than for adults. Acetaldehyde is not identified as a mutagen (EPA Regional Screening Levels [RSL], November 2024).

Table 3 presents the IUR and the estimated cancer risk to residents who could have been exposed to acetaldehyde in emissions from Bright Feeds. The estimated lifetime cancer risk (ELCR) is $5\text{E-}8$ (5×10^{-8}), or 5 excess cancer cases in 100 million exposed people. This risk estimate is much less than one excess cancer in one million exposed ($1\text{E-}6$).

A cancer risk of $1\text{E-}6$ is meaningful because it is the cancer risk limit Connecticut uses to derive cleanup criteria for individual chemicals at hazardous waste sites (CT Remediation Standard Regulations). A

cancer risk level of less than $1E-6$ is considered insignificant or *de minimus*.¹ Chemicals present at concentrations less than CT's cleanup criteria are considered to pose insignificant risks. Thus, they do not need to be cleaned up, and exposure to the chemical does not need to be reduced or stopped. Cancer risks from inhalation of acetaldehyde in outdoor air near the Bright Feeds facility are extremely low (20 times less than the *de minimus* level of $1E-6$). Therefore, exposures are not expected to pose cancer impacts in the community.

2. Noncancer Risk Estimates

In accordance with ATSDR guidance (ATSDR 2021), we evaluate the likelihood of noncancer health effects from inhalation by calculating hazard quotients (HQ) for individual chemicals identified as contaminants of potential concern. The inhalation HQ is the ratio of the EPC (adjusted by the exposure factor) to a noncancer toxicity value. For inhalation, this is a minimal risk level (MRL) or a reference concentration (RfC). A MRL or a RfC is the concentration of a contaminant in air that is unlikely to cause noncancer health impacts for the specified duration of exposure. MRLs and RfCs can be developed for long exposure durations (chronic), intermediate durations (subchronic) and brief durations (acute). We evaluated noncancer health impacts from acute and chronic exposures to ethanol and acetaldehyde. For acetaldehyde, we used EPA's chronic RfC (EPA IRIS 1991) and an acute 8-hour reference exposure level (REL) from California's Office of Environmental Health Hazard Assessment (OEHHA 2013); both values are based on nasal effects in rodents. For acute exposure to acetaldehyde, we selected the acute 8-hour REL of $300\text{ }\mu\text{g}/\text{m}^3$ based on nasal effects in rodents because it is more health protective than the acute 1-hour REL of $470\text{ }\mu\text{g}/\text{m}^3$ based on data in humans (bronchoconstriction in asthmatics). For ethanol, we used a chronic RfC derived by DPH in 2024 (CT DPH 2024) extrapolated from a DPH-derived oral RfD based on developmental effects (CT DEEP 2018). There is no acute RfC available for ethanol, so acute exposures were not evaluated.

If the HQ is equal to or less than 1, noncancer health impacts are unlikely to result from exposure to the contaminant. If the HQ is greater than 1, further evaluation may be warranted by reviewing the principal and supporting studies used to develop the health guideline. We calculated HQs for chronic health effects for acetaldehyde and ethanol. We calculated an acute HQ for acetaldehyde. Inhalation toxicity values and HQs are shown in Table 4.

As shown in Table 4, the chronic HQ for acetaldehyde is 0.07 and the acute HQ is 0.02. Both HQs are below 1. A HQ of 1 is significant because it is the noncancer risk limit Connecticut uses to develop cleanup criteria for individual chemicals at hazardous waste sites (CT Remediation Standard Regulations). Chemicals at concentrations equal to or less than a HQ of 1 are not considered to pose significant risks and therefore do not need to be addressed. Exposures from chronic and acute inhalation of acetaldehyde in outdoor air near the Bright Feeds facility are below a HQ of 1. Therefore, chronic and acute noncancer health impacts from acetaldehyde are unlikely.

¹ For perspective, according to the National Cancer Institute, approximately 40% (400,000 in one million) of men and women in the United States will be diagnosed with cancer at some point in their lifetimes. <https://www.cancer.gov/about-cancer/understanding/statistics#:~:text=Approximately%2039.5%25%20of%20men%20and,on%202015%E2%80%932017%20data>).

Table 4 also shows that the chronic HQ for ethanol is 1. As stated above, if the HQ is equal to or less than 1, noncancer health impacts are unlikely to result from exposure to the contaminant. Therefore, chronic exposure to ethanol in outdoor air near the Bright Feeds facility is unlikely to pose noncancer health impacts to community members.

3. Odor Evaluation

Many substances in the environment can produce odors. People may smell and react to chemicals in the air before they are at harmful levels. These odors can become a nuisance and cause temporary symptoms such as headache, nausea, eye, nose, throat and lung irritation, cough, nasal congestion, chest tightness and shortness of breath. These symptoms generally occur at the time of exposure. Their intensity depends on the strength of the odors in the air, how frequently the odors are present and how long the exposure lasts. Symptoms generally resolve when the level of the odor in the air is reduced or when the person moves to an area without the odor. Some groups of people may be more sensitive to nuisance environmental odors. These include people with asthma, children, older adults and people who are pregnant (ATSDR 2024).

Importantly, everyone reacts to odors differently. Some people are much more sensitive to odors than others. People who are more sensitive to an odor may be able to detect an odor and may experience symptoms at lower concentrations than other people. In general, as the odor level increases, more people will be able to detect the odor, and more people may experience symptoms. Environmental odors are not necessarily toxic. As stated above, people may be able to detect odors in the air at concentrations well below harmful or toxic levels. However, if the concentration of a substance in the air is high enough, is present often enough and lasts a long time, an odor can become toxic (ATSDR 2024).

Because of the complaints from the community about odors from the Bright Feeds facility and the fact that DEEP documented nuisance odors from the facility, DPH evaluated air data from the Bright Feeds facility using odor thresholds. The purpose of this comparison with odor thresholds is to better understand the magnitude of odor impacts from Bright Feeds. For this comparison, DPH used the highest modeled ambient air concentration (Table 1) at or beyond the property fence line for each of the 19 VOCs detected in stack emissions and compared it to odor thresholds from the peer-reviewed literature (Amoore 1983; EPA 1992, Hellman 1974; Hodgson 2003, Leonardos 1969, NJ Department of Health 2012, Ruth 1986). An odor threshold is the minimum concentration of a chemical that is perceivable by the human sense of smell. As stated previously, there is a large degree of variability in people's ability to detect odors. Therefore, odor thresholds are typically reported as ranges rather than a specific concentration. DPH's evaluation, using the lowest level in the odor threshold range, shows that there is only one chemical (Acetaldehyde) whose highest modeled ambient air concentration was above its odor threshold (Table 5). A variety of studies indicate that acetaldehyde's odor, described as "pungent" and "fruity", becomes detectable in the 0.20-4140 $\mu\text{g}/\text{m}^3$ range (EPA 1992, Ruth 1986). Of note, all four of the modeled ambient concentrations for acetaldehyde (annual average (0.67 $\mu\text{g}/\text{m}^3$), maximum 1-hour (6.82 $\mu\text{g}/\text{m}^3$), 8-hour (4.84 $\mu\text{g}/\text{m}^3$), and 24-hour (3.71 $\mu\text{g}/\text{m}^3$) were well above the lower end of the odor detection range. This supports the finding by DEEP that odors were present at and beyond the Bright Feeds facility and also supports the experience of community members who reported odors.

With regard to health impacts from odors, as stated previously, exposure to environmental nuisance odors does not necessarily result in harmful permanent or long-term health impacts (as opposed to the short-term symptoms described above). Levels of odor chemicals must be high enough and be present

frequently enough and for a long enough duration to have the potential for harmful health impacts. As explained above, DPH's evaluation of cancer and non-cancer risks from exposure to acetaldehyde at modeled ambient air concentrations concludes that exposures are not expected to harm the health of community members.

V. Uncertainties and Limitations

DPH has identified the following uncertainties and limitations in this evaluation:

- DPH's cancer and noncancer risk estimates are not based on measured ambient air data, rather they are based on ambient air data that was modeled by DEEP using results of stack emission tests. DEEP used a number of conservative assumptions in their modeling. DPH also used conservative assumptions in their exposure assessment to estimate health risks.
- The stack emission tests were conducted on one day, and DEEP took steps to ensure that testing was conducted while the facility was operating within 90 percent of its maximum process rate and using representative feedstocks. However, emissions could have been higher or lower on other days.
- The analytical method used for the stack emissions test (TO-15) measures a wide range of volatile organic compounds but does not measure every possible volatile contaminant that could be emitted.
- DEEP used a Gaussian dispersion model to estimate ambient pollutant concentration. This model does not account for any chemical reactions that occur after each pollutant is emitted from the stack.
- DPH's evaluation is limited to exposure to VOCs.
- DPH's evaluation assumes that exposure to VOCs in air emissions from Bright Feeds does not continue after the RTO was operational (April 4, 2025), as properly operating RTOs typically achieve a VOC destruction efficiency in the mid- to high-90 percent range by volume and as this particular RTO will be subject to permit-required destruction efficiency testing.
- DPH's evaluation does not include a quantitative evaluation of odors because there is no established risk assessment process to quantify odor impacts. Instead, DPH evaluated odors qualitatively.

VI. Conclusions

DPH has reached the following conclusions based on its assessment of exposure to contaminants in outdoor air from the Bright Feeds facility.

- Concentrations of most of the contaminants measured in the Bright Feeds stack emissions are below conservative health screening values.
- Modeled ambient air concentrations, which represent community exposure better than stack emissions, are much lower than stack emissions because there is dilution and dispersion that occurs after contaminants leave the stack.
- On initial screening, two chemicals (ethanol and acetaldehyde) whose ambient air concentrations exceeded health protective screening values were identified as potential contaminants of concern that required further evaluation using site-specific exposure information.
- Results of further evaluation show that breathing ethanol and acetaldehyde at the ambient air concentrations modeled by DEEP from the startup of the Bright Feeds Facility to the installation of the RTO is not expected to harm people's health. There are two reasons for this:
 1. Cancer risk associated with site-specific exposure of 2.5 years is extremely low, much lower than the screening value risk based on a default exposure assumption of 78 years, and well below the *de minimus* (insignificant) level, and

2. Noncancer risks from exposure are at a level where health impacts are unlikely to occur.
- Concentrations of one contaminant in stack emissions and ambient air (acetaldehyde) are within the range that could be detected as odors and could have resulted in short-term health symptoms, but the odors themselves are unlikely to cause long-term or permanent health effects.

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Authors:

Margaret Harvey, MPH
Supervisor, Toxicology Unit
CT Department of Public Health
Margaret.harvey@ct.gov

Cheryl Fields, MPH
Toxicologist, Toxicology Unit
CT Department of Public Health

CT Department of Public Health Reviewers:

Sharee M Rusnak, MSPH, ScD
Epidemiologist, Toxicology Unit

Xun Che, PhD
Toxicologist, Toxicology Unit

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Attachments

Figure, Tables and Risk Calculations

Table 1: Highest Stack Concentrations, Modeled Ambient Air Concentrations, and Health Comparison Values, Bright Feeds Facility.

Chemical	Highest Stack Concentration (µg/m ³)	Modeled Ambient Air Concentration (µg/m ³) ^{&}	Comparison Value (µg/m ³)	Comparison Value Source
Acetaldehyde	2690	6.82	0.45	ATSDR CREG [^]
Acetone	7962	20.18	19,000	ATSDR acute MRL [^]
Acetonitrile	50.4	0.13	60	EPA RfC [^]
Benzene	26.3	0.07	0.13	ATSDR CREG [^]
Carbon disulfide	38.7	0.1	310	ATSDR chronic MRL [^]
Chloromethane (Methyl Chloride)	7	0.02	62	ATSDR chronic MRL [^]
Ethanol	1,863,690	4619.98	410	DPH RfC [*]
Ethyl acetate	231	0.59	70	PPRTV RfC ⁺
Ethylbenzene	9.41	0.02	260	ATSDR chronic MRL [^]
Heptane	25.5	0.06	400	PPRTV RfC ⁺
Hexane	273	0.80	700	EPA RfC [^]
Isopropyl Alcohol (Isopropanol)	5.54	0.01	200	PPRTV RfC ⁺
Methyl ethyl Ketone (2-butanone)	696	1.73	5,000	EPA RfC [^]
Methyl methacrylate	21.5	0.02	700	EPA RfC [^]
Propanoic Acid	163	0.41	360	NIOSH REL, adjusted [#]
Propylene	46.9	0.12	3,000	OEHHA REL (2000) [§]
Octane, n-	12	0.03	4200	NIOSH REL; adjusted [#]
Toluene	17,300	42.88	3,800	ATSDR MRL [^]
Xylenes, m-/p-	13.6	0.03	100	EPA RfC [^]

Chemicals whose ambient air concentration exceeds the CV are bolded.

[&]For all chemicals this was the highest 1-hour concentration.

[^]ATSDR Public Health Assessment Site Tool (PHAST), accessed May 30, 2025.

^{*}DPH RfC (CT DPH 2024).

⁺PPRTV RfC for Ethyl Acetate (EPA PPRTV 2013), Heptane (EPA PPRTV 2016), Isopropanol (EPA PPRTV 2014).

[#]NIOSH RELs (NIOSH 2019).

[§]OEHHA REL (OEHHA 2008).

Table 2. Exposure Assumptions, Exposure Point Concentration, Exposure Factors and Adjusted Exposure Point Concentration, Bright Feeds Facility.

Contaminant	Exposure Assumptions	Exposure Point Concentration (µg/m³)	Exposure Factor	Adjusted Exposure Point Concentration (µg/m³)
Acetaldehyde	24 hours/day, 365 days/year, 2.5 years	0.67 (annual average)	0.03 (cancer)	0.02 (cancer)
		0.67 (annual average)	1.0 (chronic noncancer)	0.67 (chronic noncancer)
		6.82 (max 1-hour)	1.0 (acute noncancer)	6.82 (acute noncancer)
Ethanol	24 hours/day, 365 days/year, 2.5 years	451.77 (annual average)	1.0 (chronic noncancer)	451.77 (chronic noncancer)

µg/m³ = micrograms of contaminant per cubic meter of air

Table 3. Inhalation Unit Risk and Excess Lifetime Cancer Risk from Exposure to Acetaldehyde, Bright Feeds Facility.

Inhalation Unit Risk (risk per µg per m³)	Excess Lifetime Cancer Risk
2.2E-6 [^]	5E-8

[^]EPA Integrated Risk Information System, accessed 5/30/25.

Table 4. Hazard Quotients for non-Cancer Risks, Bright Feeds Facility.

Chemical	Inhalation Toxicity Value (µg per m³)	Hazard Quotient
Acetaldehyde	9 [^] (chronic)	0.074 (chronic)
	300* (acute)	0.023 (acute)
Ethanol	410 [#] (chronic)	1.0 (chronic)

[^]EPA Chronic Reference Concentration (EPA Integrated Risk Information System, accessed 5/30/25).

*California Office of Environmental Health Hazard 8-hour REL (OEHHA 2013).

[#]CT Department of Public Health Chronic RfC, (CT DPH 2024).

Table 5. Comparison of Odor Thresholds with Ambient Air Concentrations, Bright Feeds Facility.

Chemical	Highest Modeled Ambient Air Concentration ($\mu\text{g}/\text{m}^3$)	Minimum Odor Threshold ($\mu\text{g}/\text{m}^3$)	Odor Threshold Source
Acetaldehyde	6.82	0.20	Ruth 1986
Acetone	20.18	30880	Amoore 1983
Acetonitrile	0.13	70000	EPA 1992
Benzene	0.07	4500	Ruth 1986
Carbon disulfide	0.1	24	Ruth 1986
Chloromethane (Methyl Chloride)	0.02	20650	Leonardos 1969
Ethanol	4619.98	18842	Leonardos 1969
Ethyl acetate	0.59	20	Ruth 1986
Ethylbenzene	0.02	8700	Ruth 1986
Heptane	0.06	200000	Ruth 1986
Hexane	0.80	229000	NJDOH 2012
Isopropyl Alcohol (Isopropanol)	0.01	7866	Hellman 1984
Methyl ethyl Ketone (2-butanone)	1.73	5899	Hellman 1984
Methyl methacrylate	0.02	205	Hellman 1984
Propanoic Acid	0.41	84	Ruth 1986
Propylene	0.12	38724	Hellman 1984
Octane, n-	0.03	725000	Ruth 1986
Toluene	42.88	641	Hellman 1984
Xylenes, m-/p-	0.03	1389	Hodgson 2003

Inhalation Risk Assessment Equations (from ATSDR 2021)

Cancer:

$$\text{ELCR} = \text{IUR} * \text{EPC} * \text{Exp. Fctr} * \text{ADAF}$$

$$\text{Exp Fctr} = \text{site exp}/24 \text{ hours} * \text{site exp}/7 \text{ days} * \text{site exp}/52.14 \text{ weeks} * \text{ED}/\text{AT}$$

Where:

ELCR = Excess Lifetime Cancer Risk

IUR = inhalation Unit Risk (risk per $\mu\text{g}/\text{m}^3$, chemical-dependent)

EPC = exposure point concentration at the site ($\mu\text{g}/\text{m}^3$, chemical-dependent)

Exp Fctr = Exposure Adjustment Factor (unitless)

ADAF = age-dependent adjustment factor for mutagenic chemicals (unitless)

Site Exp = hours, days or weeks of exposure at the site (receptor-dependent)

ED = exposure duration in years (receptor-dependent)

AT = averaging time (78 years)

Term	Value
IUR (risk per $\mu\text{g}/\text{m}^3$)	Acetaldehyde= $2.2\text{E}-6^{\wedge}$
EPC ($\mu\text{g}/\text{m}^3$)	Acetaldehyde = 0.67 (AERMOD Annual Average concentration)
ADAF	Acetaldehyde = 1
Site Exp	24 hours/day, 7 days/week, 52.14 weeks/year
ED	2.5 years
AT	78 years

[^]EPA Integrated Risk Information System (EPA IRIS 1988), accessed May 30, 2025

Chronic Noncancer:

$$\text{HQ} = \text{EPC} * \text{Exp Fctr} * 1/\text{Inhal MRL or RfC}$$

$$\text{Exp Fctr} = \text{site exp}/24 \text{ hours} * \text{site exp}/7 \text{ days} * \text{site exp}/52.14 \text{ weeks} * \text{ED}/\text{AT}$$

Where:

HQ = Hazard Quotient

EPC = exposure point concentration at the site ($\mu\text{g}/\text{m}^3$, chemical-dependent)

Inhal MRL or RfC = inhalation Minimum Risk Level or Reference Concentration ($\mu\text{g}/\text{m}^3$, chemical-dependent)

Exp Fctr = Exposure Adjustment Factor (unitless)

Site Exp = hours, days or weeks of exposure at the site (receptor-dependent)

ED = exposure duration in years (receptor-dependent)

AT = averaging time (years, scenario-dependent)

Term	Value
Inhal RfC ($\mu\text{g}/\text{m}^3$)	Acetaldehyde = 9 [^] Ethanol= 410 [#]
EPC ($\mu\text{g}/\text{m}^3$)	Acetaldehyde = 0.67 (AERMOD Annual Average Concentration) Ethanol = 451.77 (AERMOD Annual Average Concentration)
Site Exp	24 hours/day, 7 days/week, 52.14 weeks/year
ED	2.5 years
AT	2.5 years

[^]EPA Chronic Reference Concentration (EPA IRIS, 1988), accessed 5/30/25

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Acute Noncancer:

$$\text{HQ} = \text{EPC} * \text{Exp Fctr} * 1/\text{Inhal MRL or RfC}$$

$$\text{Exp Fctr} = \text{site exp}/24 \text{ hours}$$

Where:

HQ = Hazard Quotient

EPC = exposure point concentration at the site (μ/m^3 , chemical-dependent)

Inhal MRL or RfC = inhalation Minimum Risk Level or Reference Concentration ($\mu\text{g}/\text{m}^3$, chemical-dependent)

Exp Fctr = Exposure Adjustment Factor (unitless)

Site Exp = hours, days or weeks of exposure at the site (receptor-dependent)

Term	Value
Inhal RfC ($\mu\text{g}/\text{m}^3$)	Acetaldehyde = 300 [^]
EPC ($\mu\text{g}/\text{m}^3$)	Acetaldehyde = 6.82 (AERMOD maximum 1-hour concentration)
Site Exp	24 hours/day

[^]California Office of Environmental Health Hazard 8-hour REL (OEHHA 2013)