Illinois Environmental Protection Agency
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JB Pritzker, Governor **James Jennings**, Acting Director

MEMORANDUM

Date: 3/4/2026

To: Pinto Veliyath, FESOP/State Permits/BOA

From: Jason Tran and Zach Lythgoe, Modeling Unit, Permits/BOA

Subject: International Paper Co Northlake, ID 031471AAT, Permit Application 25030004

International Paper Co Northlake (IP Northlake) submitted a Construction Permit application (# 25030004) on March 6th, 2025, to update emission factors and emission limits for existing emission units at the facility. IP Northlake currently operates the existing facility under a state lifetime operating permit (ID # 031471AAT, Application # 73060019).

The facility is located at 401 Northwest Avenue, Northlake, Cook County, IL 60164. The center of the facility is in Universal Transverse Mercator (UTM) Zone 16, at approximately 423,093 (m) Easting and 4,640,404 (m) Northing.

As of the date of this permitting decision, IP Northlake is in an area of Environmental Justice (EJ) concern as identified using Illinois EPA EJ Start. The issued permit would provide for changes in permitted emissions of nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compounds (VOCs), particulate matter (PM), sulfur dioxide (SO_2), and hazardous air pollutants (HAPs). Consequently, the Illinois EPA requested ALL4 to submit an air quality analysis as part of its permit application to ensure the project would not threaten or compromise existing National Ambient Air Quality Standards (NAAQS) for any pollutant with an increase in permitted emissions.

In response to Illinois EPA's request, IP Northlake had ALL4 conduct an air quality review of $PM_{2.5,}$ PM_{10}, SO_2, NOx, CO, and HAPs. ALL4 also conducted an analysis for ozone (O_3) and secondary $PM_{2.5}$ impacts from the facility for emissions of VOCs, NOx, and SO_2.

Modeling Unit Review

ALL4 submitted an air quality analysis summary for IP Northlake along with its modeling files to the Modeling Unit electronically on May 12th, 2025. ALL4 also submitted an updated air quality analysis summary and modeling files on June 26th, 2025. The following main dot entries identify key aspects of the modeling methodology used in this analysis.

- ALL4 used AERMOD (v. 24142), the AMS/USEPA Regulatory Model. AERMOD is a federally approved regulatory model appropriate for use in an air quality analysis of this nature. The audit runs conducted by the Modeling Unit used v. 24142.
- Modeling inputs utilized IEPA- and USEPA-recommended default regulatory options, which simulate phenomena such as atmospheric stability, plume rise, and downwash. The modeling analysis

incorporated five years of locally representative meteorology. The Modeling Unit obtained National Weather Service (NWS) meteorological data files for years 2020 through 2024 from the National Centers for Environmental Information (NCEI) which consisted of surface data collected at the Chicago O'Hare International Airport surface station in Chicago, Illinois, and upper air data collected at the Davenport Municipal Airport office in Davenport, Iowa. Surface and upper air stations were selected because of their proximity and representativeness to the project site in Northlake. The Modeling Unit used 2020 through 2024 files processed with AERMET (v. 24142) in its review.

- ALL4 processed National Elevation Data (NED) terrain elevations from USGS using the most recent version of AERMAP (v. 24142) to develop the receptor terrain elevations and hill height scales required by AERMOD. The elevation at the project site is approximately 202 meters above mean sea level.
- ALL4 used a Cartesian grid in their distribution of 2,348 receptors. The following receptor grid densities were used:
    - 25 m spacing of receptors from the facility's boundary out to 250 meters.
    - 50 m spacing of receptors from 250 meters to 500 meters.
    - 100 m spacing of receptors from 500 meters to 1000 meters.
    - 250 m spacing of receptors from 1000 meters to 3000 meters.
    - 500 m spacing of receptors from 3000 meters to 5000 meters.
    - 1000 m spacing of receptors from 5000 meters to 10000 meters.
- ALL4 selected the urban modeling option in their analysis. The Modeling Unit conducted an Auer's Analysis as part of its review to characterize the area surrounding ALL4 and to determine whether the AERMOD urban option should be implemented. The Modeling Unit developed its Auer's Analysis using 2024 National Land Cover Data (NLCD) within a 3-km radius of the facility. Results of the analysis showed that the surrounding area is approximately 38.4% rural and 61.6% urban. The Modeling Unit audit also utilized the urban modeling option.
- ALL4 used USEPA's Building Profile Input Program (BPIPPRM) to account for downwash effects of on-site structures. All on-site nearby buildings were included in the modeling analysis.
- NO_2 modeling options consist of multiple tiers. Tier 1 assumes that all NOx emitted from emission units at the source converts to NO_2. Tier 2 is based upon a representative atmospheric equilibrium default value that was developed using conversion ratios generated from monitored concentrations of NOx and NO_2. Tier 3 allows the user to perform a detailed analysis using either the Ozone Limiting Method (OLM) or the Plume Volume Molar Ratio Method (PVMRM) regulatory screening options in AERMOD. These options consider the chemical mechanism of ozone titration and the resulting NO_2 concentrations. Based on the submitted modeling files, ALL4 selected the regulatory default Ambient Ratio Method (ARM2) option in AERMOD which uses a range of ambient NO_2/NOx ratios, with 0.5 as the lower limit and 0.9 as the upper limit.

Source Impact Analysis

ALL4 performed a source impact analysis to determine if more detailed modeling would be required for any NOx, SO_2, $PM_{2.5}$, PM_{10} or CO averaging period. ALL4 modeled allowable emission increases from the project, which are the difference between the proposed permitted emissions and current actual emissions of existing units at the facility. The results of this analysis are compared against significant impact levels (SILs) for each pollutant and averaging period. The results of this analysis can be found in **Table 1** below.

Table 1
Source Impact Analysis Results

Pollutant	Averaging Period	Maximum Modeled Impact ($\mu g/m^3$)	Significant Impact Level ($\mu g/m^3$)
NO_2	1-hour	34.51	7.52
	Annual	2.72	1
SO_2	1-hour	0.56	7.85
	3-hour	0.53	25
$PM_{2.5}$	24-hour	0.69(1)	1.2
	Annual	0.09(1)	0.13
PM_{10}	24-hour	6.20	5
CO	1-hour	43.91	2000
	8-hour	34.55	500

(1) The maximum model impact also includes secondary $PM_{2.5}$ concentrations.

Ozone and Secondary $PM_{2.5}$ Formation

ALL4 considered the precursor emission increases of NO_x, SO_2, and VOCs to evaluate the impact on the NAAQS from secondarily formed O_3 and $PM_{2.5}$. Results from the analysis were compared against SILs for O_3 and $PM_{2.5}$ to determine if further analysis should be completed.

To estimate the O_3 and secondary $PM_{2.5}$ formation, a Tier 1 demonstration was performed following guidance[1,2,3] from USEPA on modeled emission rates for precursors (MERPs). This approach utilizes air quality modeling results from hypothetical sources with precursor emission estimates to evaluate the project's impacts against SILs for O_3 and $PM_{2.5}$.

To demonstrate the worst-case scenario of O_3 and secondary $PM_{2.5}$ formation, ALL4 used the highest MERPS values from Putnam County and Stephenson County in Illinois, and Porter County in Indiana. Illinois EPA elected to use a more representative hypothetical source located in Stephenson County, Illinois at approximately 95 kilometers away from the IP Northlake facility. Stephenson County is approximated 51 kilometers away from the Chicago Rockford International Airport, making it a suitable representative of the air quality in Northlake. Illinois EPA's analysis concluded ALL4's MERPs approach provided more conservative results. Both the Illinois EPA analysis and ALL4's analysis concluded that impacts were less than significant for all averaging periods of $PM_{2.5}$ and O_3.

Table 2 shows the comparison of Illinois EPA's and ALL4's estimated facility secondary $PM_{2.5}$ impacts. The calculated concentrations were based on project emissions of 3.13 tons per year (tpy) of NOx and 0.05 tpy of SO_2.

[1] USEPA (2024). *Clarification on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program*. Office of Air Quality Planning and Standards, Research Triangle Park, NC.
[2] USEPA (2019). *Guidance on the Use of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program*. Publication No. EPA 454/R–19–003. Office of Air Quality Planning and Standards, Research Triangle Park, NC.
[3] USEPA (2022). *Guidance for Ozone and Fine Particulate Matter Permit Modeling*. Publication No. EPA 454/R–22–005. Office of Air Quality Planning and Standards, Research Triangle Park, NC.

Table 2
MERPs Analysis for Secondary $PM_{2.5}$

Pollutant	Averaging Period	Concentration ($\mu g/m^3$)		SIL ($\mu g/m^3$)
		ALL4	Illinois EPA	
$PM_{2.5}$	24-hour	0.001629	0.001018	1.2
	Annual	0.000071	0.000058	0.13

Table 3 shows the comparison of Illinois EPA's and ALL4's estimated facility O_3 impacts compared to the SIL. The calculated concentrations were based on project emissions of 3.13 tpy of NOx and 24.22 tpy of VOCs.

Table 3
MERPs Analysis for Ozone

Pollutant	Averaging Period	Concentration (ppb)		SIL (ppb)
		ERM	Illinois EPA	
O_3	8-hour	0.030	0.016	1.0

The project would not significantly impact concentrations of O_3 or $PM_{2.5}$ from secondary formation estimated in the MERPs analysis tables above.

NAAQS Analysis

Based on the results from the source impact analysis, ALL4 conducted a NAAQS analysis for NO_2 (1-hour and annual averaging period), and PM_{10} (24-hour averaging period). For NO_2 (both 1-hour and annual averaging periods), ALL4 conducted the NAAQS analysis based on the full receptor grid.

ALL4 utilized representative background data collected from Illinois's air monitoring network. Background values include:

- NO_2 data for use in the 1-hour and annual NO_2 modeling were obtained from the air quality monitor located in Schiller Park, Illinois (AQS ID: 17-031-3103). Schiller Park was chosen due to its proximity at approximately 7 km away from the site. The monitor is also approximately 3 km away from Chicago O'Hare International Airport, which concentrations are expected to be representative of background for the site location. ALL4 used the NO_2 data from 2021 to 2023 due to the lack of completeness of the 2024 data at the time of its modeling. The Modeling Unit audit used the more recently available NO_2 data from the period of 2022 to 2024.

- PM_{10} data for use in the 24-hour PM_{10} modeling was collected from the monitor station located at Washington High School (AQS ID: 17-031-3103) for 2021 to 2023. This monitor was chosen based on the relative proximity to the IP Northlake site at approximately 44 kilometers. The PM_{10} monitor station at Village Hall (AQS ID: 17-031-1016) was initially selected, but the monitor has missing data. The Modeling Unit also confirmed this finding during this review. In addition, the ambient condition of the Washington High School monitor is in a similar environment to the IP Northlake facility. Both locations are located in an area that contains a mix of residential, commercial, and industrial

facilities. Therefore, the Washington High School monitor is considered representative of conditions at the site. ALL4 used the PM_{10} data from 2021 to 2023 due to the lack of completeness of the 2024 data at the time. As previously discussed, the Modeling Unit audit used the more recently available PM_{10} data from the period of 2022 to 2024.

For the NO_2 analysis, intermittent sources were excluded from the nearby source inventory based on a guidance[4] memorandum issued by the USEPA in 2024 that allows for exclusion of nearby intermittent sources when modeling for the 1-hour and annual NO_2 standard. The IP Northlake facility, Chicago O'Hare International station, and the NO_2 monitor station in Schiller Park are near each other. Given that these three locations are in close proximity to each other, local NO_2 sources were already accounted in the background concentrations. As a result, these sources listed in the inventory were excluded to avoid double counting the NO_2 concentrations from these local sources.

The PM_{10} analysis included impacts from the facility and nearby emission inventory sources. The total concentrations were the summation of the modeled concentrations and background concentrations. These impacts were compared to the respective NAAQS, as shown in **Table 4**. The results shown in the following table display the NO_2 modeling results provided by ALL4. The modeling analysis indicated that both hourly and annual NO_2 emissions would be below their respective NAAQS values.

Table 4
NAAQS Modeling Results

Pollutant	Averaging Period	Modeled Concentration (µg/m³)	Background Concentration (µg/m³)	Total Concentration (µg/m³)	NAAQS (µg/m³)
NO_2	1-Hour	34.51(1)	102.11(a)	137.52	188.14
	Annual	2.72(2)	35.40(b)	38.12	100
PM_{10}	24-Hour	12.3(3)	120(c)	132.3	150

(1) Average of the 8th highs over five years.
(2) Highest annual high value over five years.
(3) Highest sixth high over 5 years.
(a) Three-year average of the 98th percentile daily max 1-hour values.
(b) Highest annual concentration over three years of monitoring data.
(c) Highest second high over three years of monitoring data.

Air Toxics Analysis

As part of the air quality analysis for IP Northlake, the Modeling Unit requested the facility evaluate the impacts of toxic air pollutant emissions from the facility. ALL4 provided the Modeling Unit with emission calculations for potential HAP emissions from the facility. The largest source of HAP emissions would come from the use of Methanol from the project. The Modeling Unit performed a screening analysis using the Air Emissions Risk Analysis (AERA) Guidance.[5] It was determined from the use of the Minnesota Pollution Control Agency's Risk Assessment Screening Spreadsheet (RASS) that IP Northlake should conduct a dispersion modeling analysis for emissions of Acetaldehyde, Acrylic acid, 3,3-Dichlorobenzidene, Diethylene glycol monoethyl ether, Ethylene oxide, Formaldehyde, and Polychlorinated biphenyls. The initial risk screening determined that modeled impacts from Methanol would be minimal.

[4] USEPA (2024). *Guidance on Developing Background Concentrations for Use in Modeling Demonstration.* Office of Air Quality Planning and Standards, Research Triangle Park, NC.
[5] Minnesota Pollution Control Agency. (2024) *Air Emissions Risk Analysis (AERA) Guidance.*

The Modeling Unit provided ALL4 with reference concentration levels for these pollutants from California's Office of Environmental Health Hazard Assessment (OEHHA), Michigan's Department of Environment, Great Lakes and Energy (EGLE), USEPA's Integrated Risk Information System (IRIS), Minnesota's Department of Health (MN), and USEPA's Provisional Peer-Reviewed Toxicity Values (PPRTV). The results of ALL4'S analysis are displayed in **Table 5** below. All modeled concentrations were below their respective reference concentrations.

Table 5
HAPs Modeling Results

Pollutant	CAS Number	Averaging Period	Threshold ($\mu g/m^3$)	Maximum Modeled Impact ($\mu g/m^3$)	Reference
Acetaldehyde	822-06-0	1-hour	470	0.3	OEHHA REL(1)
		8-hour	300	0.06	OEHHA REL(1)
		Annual	9	0.2	IRIS RFC (3)
Acrylic Acid	79-10-7	1-hour	6000	6.3	OEHHA REL(1)
		Annual	1	0.627	IRIS RFC (3)
3,3-Dichlorobenzidene	91-94-1	Annual	0.002	0.00051	EGLE ITSL(2)
DGME	111-90-0	24-hour	3	0.687	PPRTV (5)
		Annual	0.3	0.168	PPRTV (5)
Ethylene Oxide	75-21-8	Annual	0.005	0.00209	IRIS RFC(3)
Formaldehyde	50-00-0	24-hour	50	1.86	MN (4)
		Annual	9	0.457	MN (4)
PCB	1336-36-3	Annual	0.01	0.00611	EGLE ITSL(2)

(1) OEHHA Reference Exposure Levels (REL) are established for pollutants based on exposure durations.
(2) EGLE Initial Threshold Screening Level (ITSL) are established for pollutants based on exposure durations.
(3) IRIS Reference Concentrations for Inhalation Exposure (RFC) are established for pollutants based on exposure durations.
(4) MN Health Based Values (HBV) are established for pollutants based on exposure durations.
(5) Provisional Peer-Reviewed Toxicity Values (PPRTV) are established for pollutants based on exposure durations.

The maximum predicted five-year average ethylene oxide concentration in the domain is 0.00209 micrograms per cubic meter (µg/m3). To determine an "in a million" risk estimate for this maximum predicted non-residential impact, Illinois EPA adhered to calculation procedures outlined in the OAQPS August 2019 risk report for another ethylene oxide emitting facility in Illinois (p. 16). [6] These calculations yield a maximum lifetime risk of **0.5 in a million** for non-residential workers. The maximum predicted residential concentration is 0.0001 micrograms per cubic meter (µg/m3). This impact represents a maximum residential lifetime risk of approximately **0.5 in a million**. All receptor locations within one-square kilometer of the facility for all scenarios, predict overall risk attributable to IP Northlake to be below U.S. EPA's upper limit of acceptable lifetime cancer risk for the most exposed person of 100 in a million.

[6] Risk Assessment Report for the Sterigenics Facility in Willowbrook, Illinois; August 2019. EPA's Office of Air Quality Planning and Standards Office of Air and Radiation

Summary

The Modeling Unit has reviewed the air quality analysis provided by ALL4 on behalf of IP Northlake. The Modeling Unit audit of this analysis confirms that IP Northlake's proposed operation would not exceed the NAAQS for any NO_2, $PM_{2.5}$, $PM_{10,}$ CO or SO_2 averaging times. The audit also confirms that emissions of SO_2, VOCs, and NO_2 would not have significant impacts on $PM_{2.5}$ and O_3 formation. Lastly, the audit also confirms the proposed emissions of HAPs should not exceed reference concentrations for the toxic pollutants of concern.

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