Article

Dynamics and Numerical Simulation of Contaminant Diffusion for a Non-Flushing Ecological Toilet

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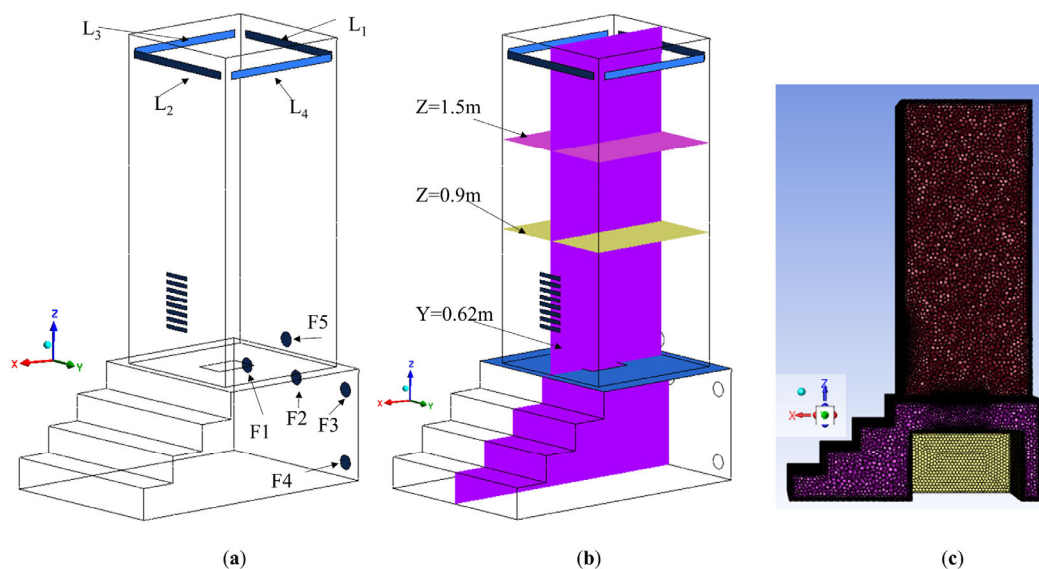

Figure S1. Grid condition of CFD model and plane of observation. (**a**): CFD model; (**b**): Observation plane; (**c**): Grid condition of CFD model.
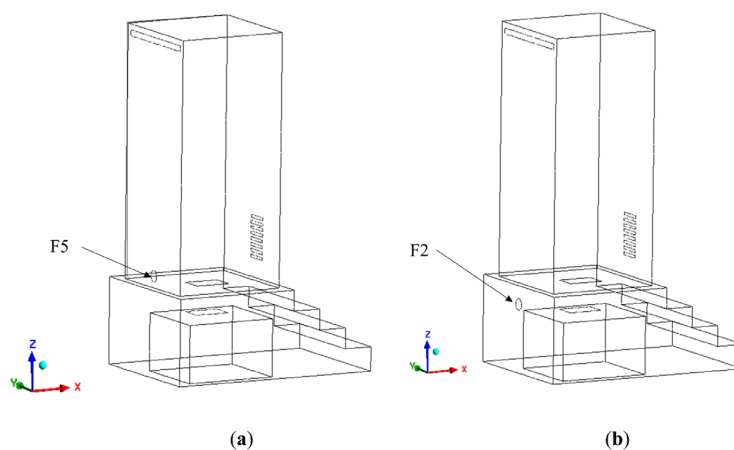

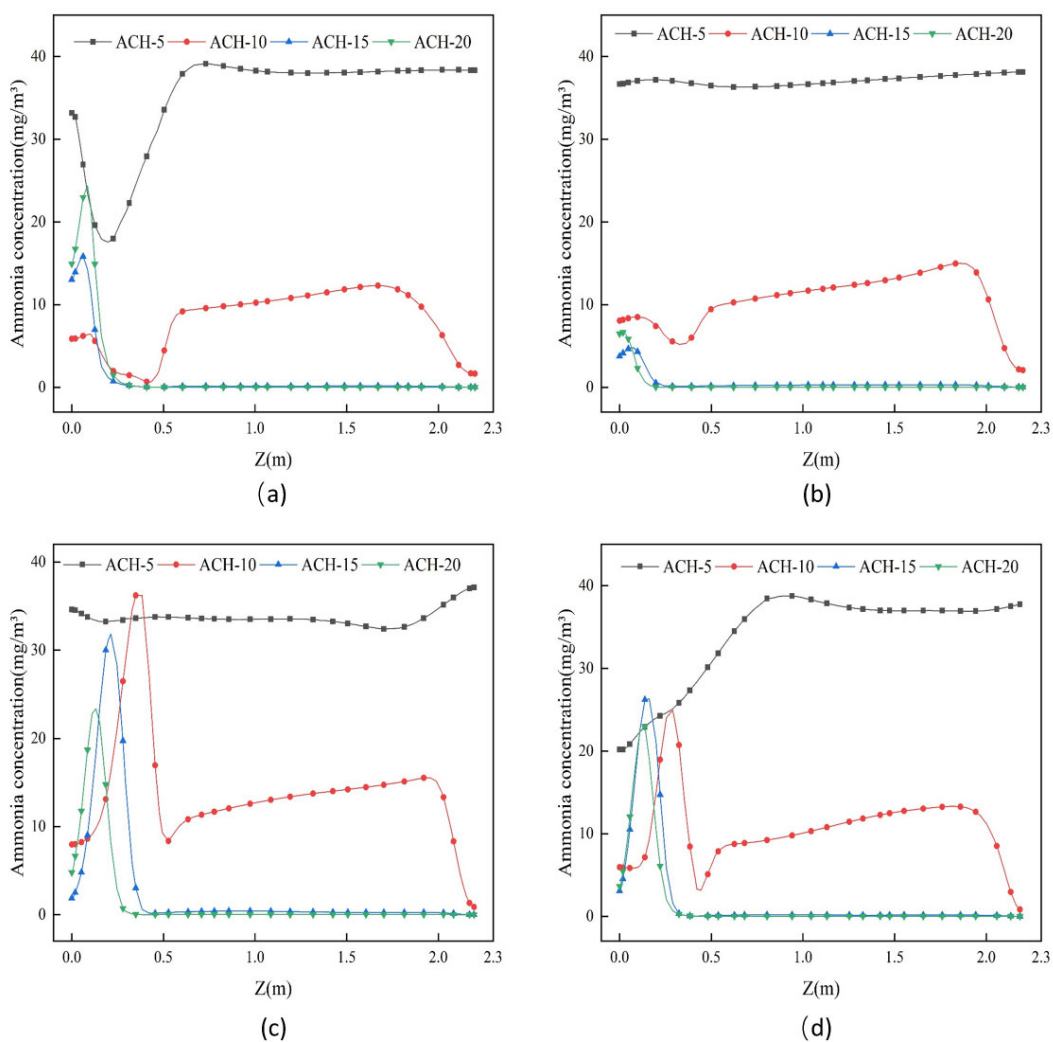**Figure S2.** Case descriptions. Case 1-F (0,0.62,0.59), Case 2-F (0.07,0.62,0.85); unit: m.(**a**) Case 1;(**b**) Case 2.

Figure S3. Ammonia concentration at ABCD four-point vertical line in Case 1; ACH unit: h⁻¹. (**a**): Point A (**b**): Point B; (**c**): Point C, (**d**): Point D.
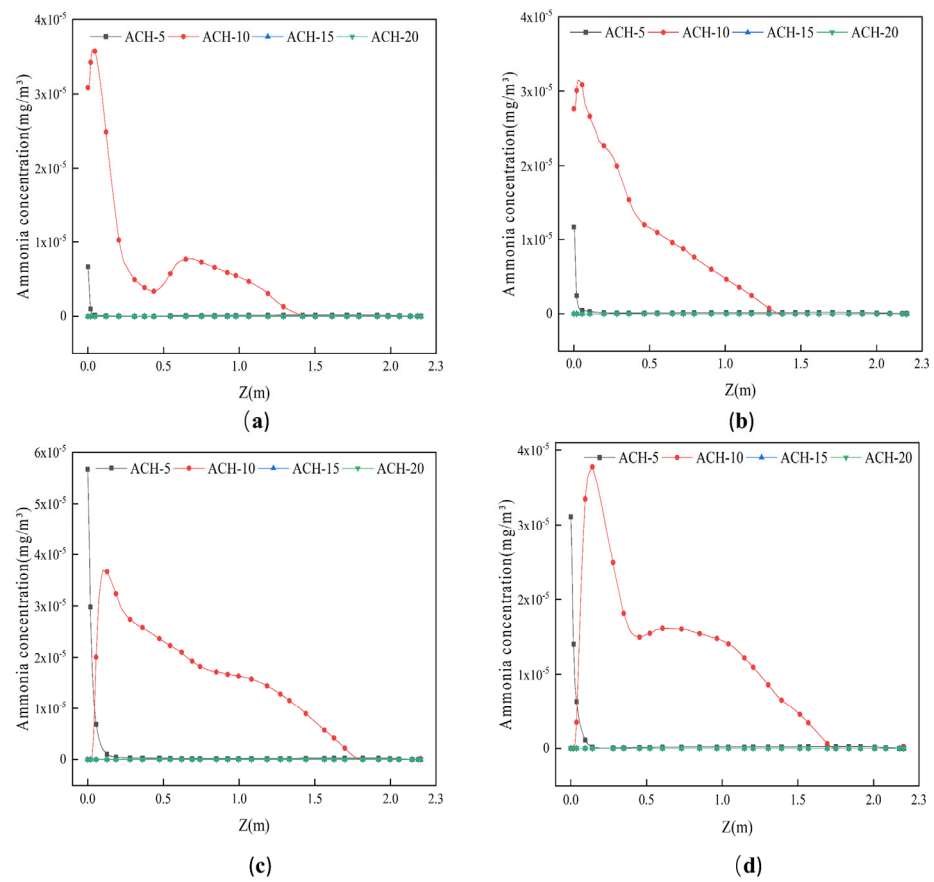
Figure S4. Ammonia concentration at ABCD four-point vertical line in Case 2; ACH unit: h⁻¹. (**a**): Point A (**b**): Point B; (**c**): Point C, (**d**): Point D.

Figure S5. Hydrogen sulfide concentration at the ABCD four-point vertical line in Case 1; ACH unit: h^{-1}. (**a**): Point A (**b**): Point B; (**c**): Point C, (**d**): Point D.

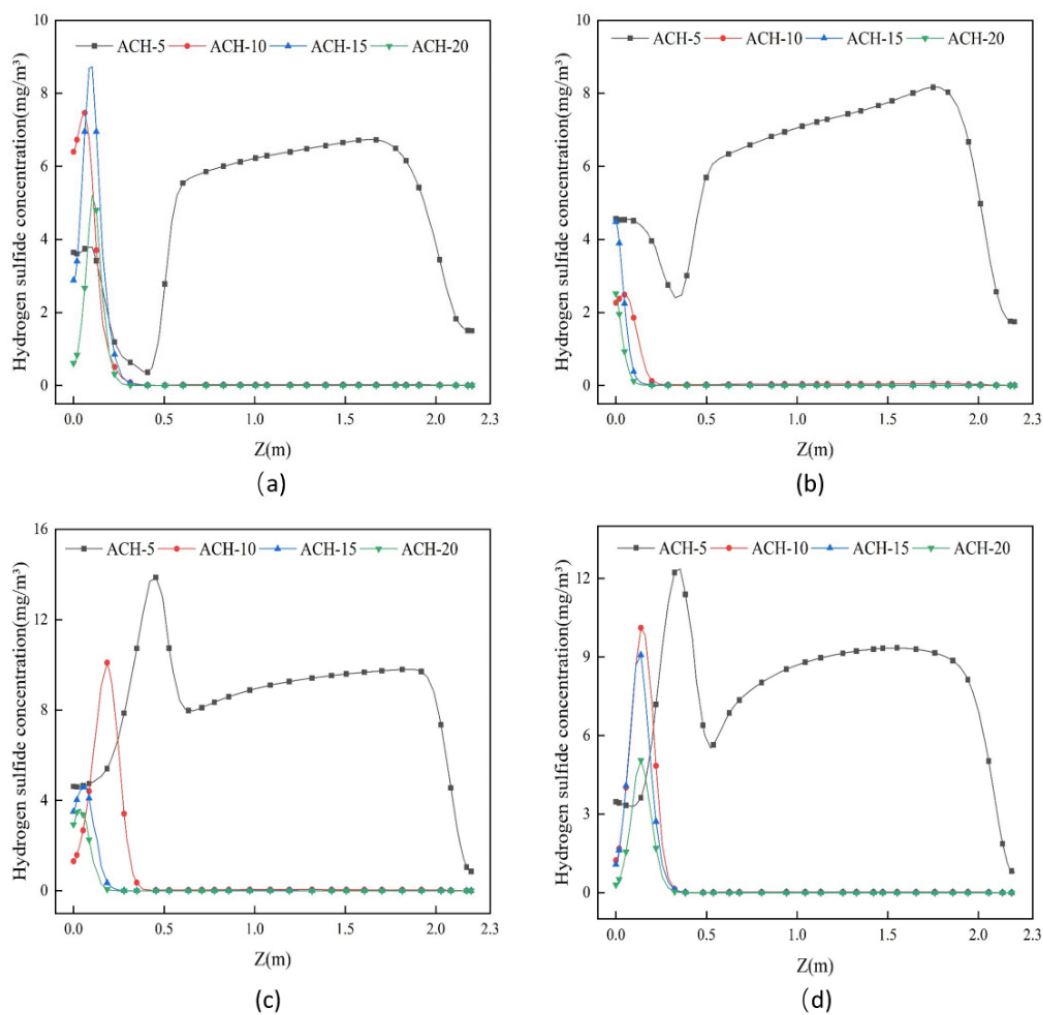**Figure S6.** Hydrogen sulfide concentration at the ABCD four-point vertical line in Case 2; ACH unit: h^{-1}. (**a**): Point A (**b**): Point B; (**c**): Point C, (**d**): Point D.
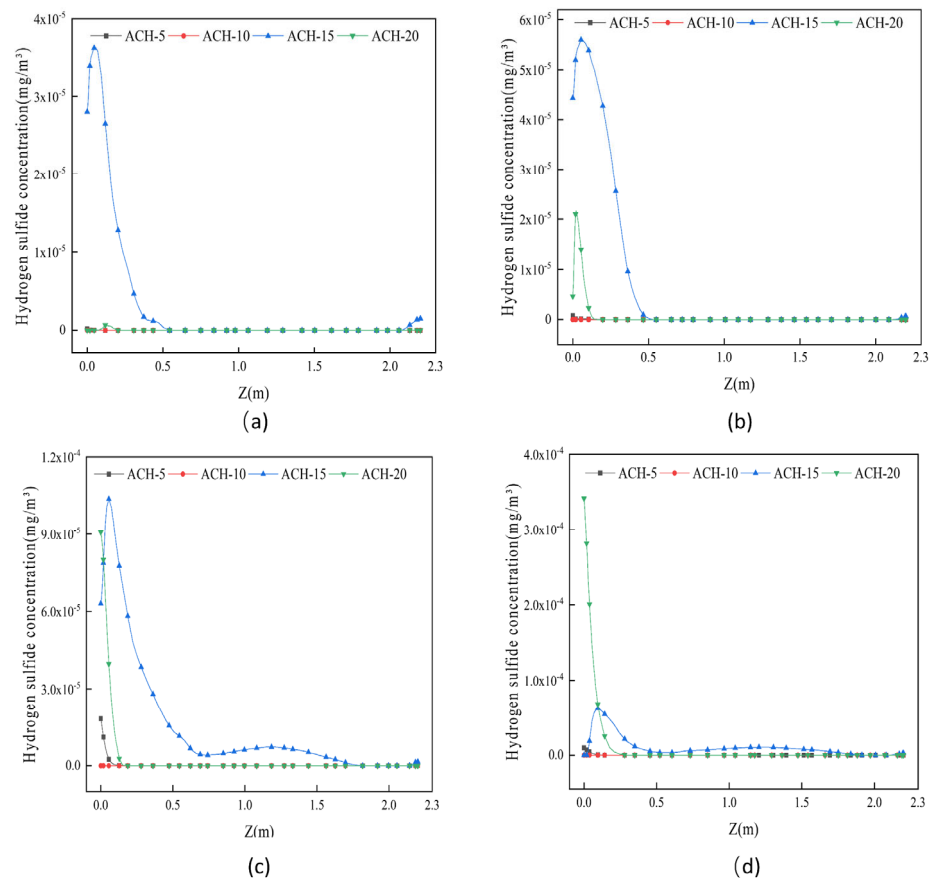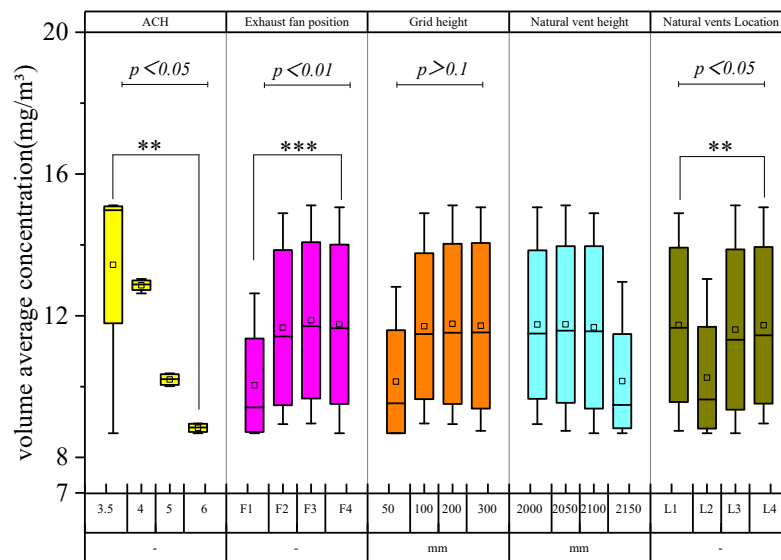

Each box of results illustrate the findings of orthogonal experiments under each condition.
*,**and ***represent the significant difference via the F test levels of 0.1,0.05 and 0.01,respectively.

Figure S7. Statistical significance analysis of the orthogonal experiment results regarding the VAC of ammonia.
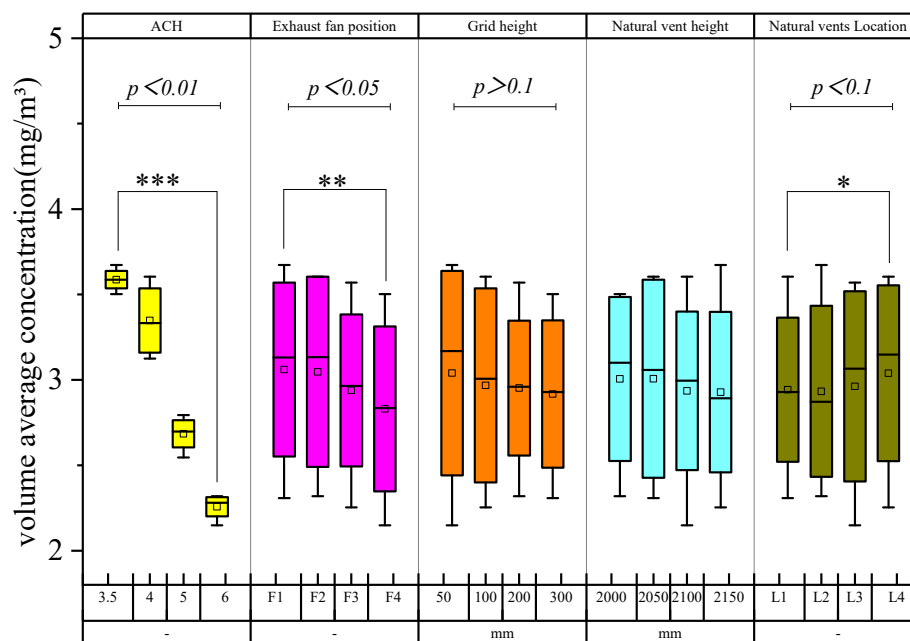
Each box of results illustrate the findings of orthogonal experiments under each condition.
*,**and ***represent the significant difference via the F test levels of 0.1,0.05 and 0.01,respectively.

Figure S8. Statistical significance analysis of the orthogonal experiment results regarding the VAC of hydrogen sulfide.

Each box of results illustrate the findings of orthogonal experiments under each condition.
*,**and ***represent the significant difference via the F test levels of 0.1,0.05 and 0.01,respectively.
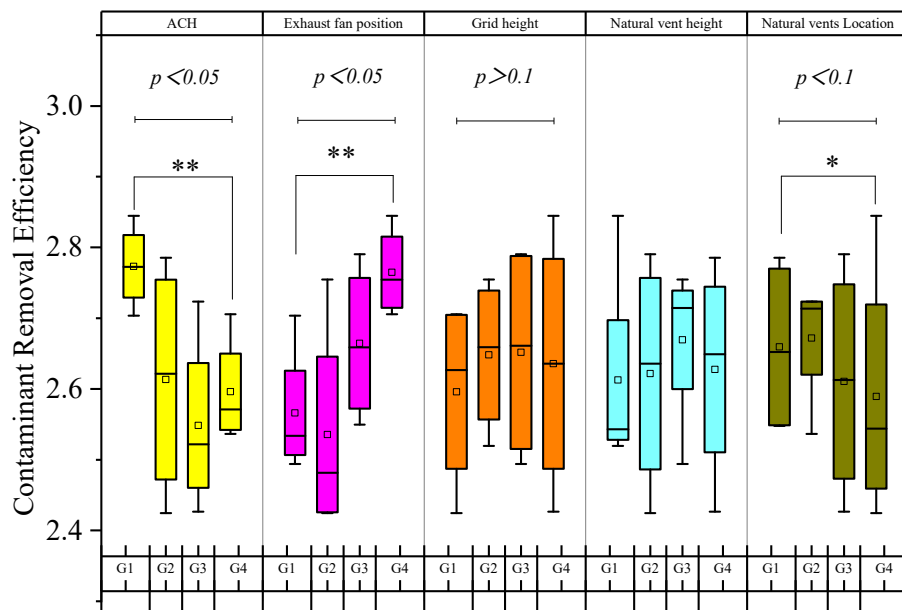
Figure S9. Statistical significance analysis of the orthogonal experiment results regarding the CRE of hydrogen sulfide.

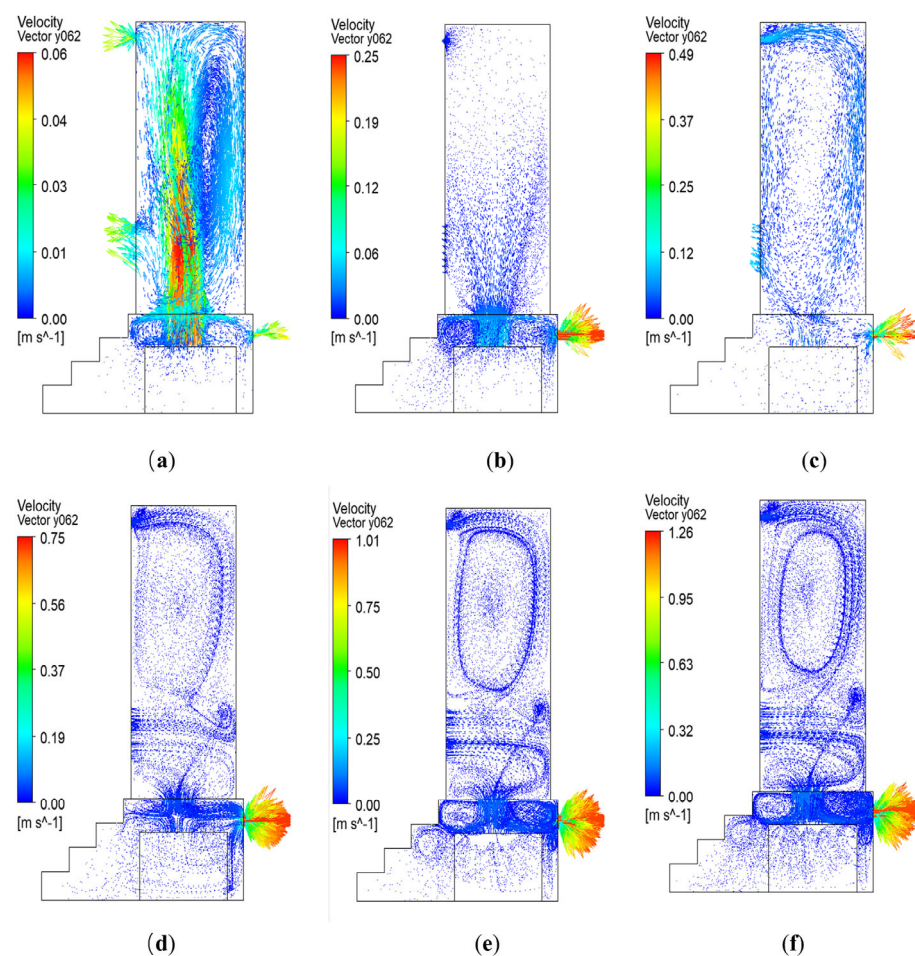**Figure S10.** Velocity vector contours for different ACH (unit: h⁻¹) values. (**a**): ACH=0; (**b**): ACH=2; (**c**): ACH=4; (**d**): ACH=6; (**e**): ACH=8; (**f**): ACH=10.
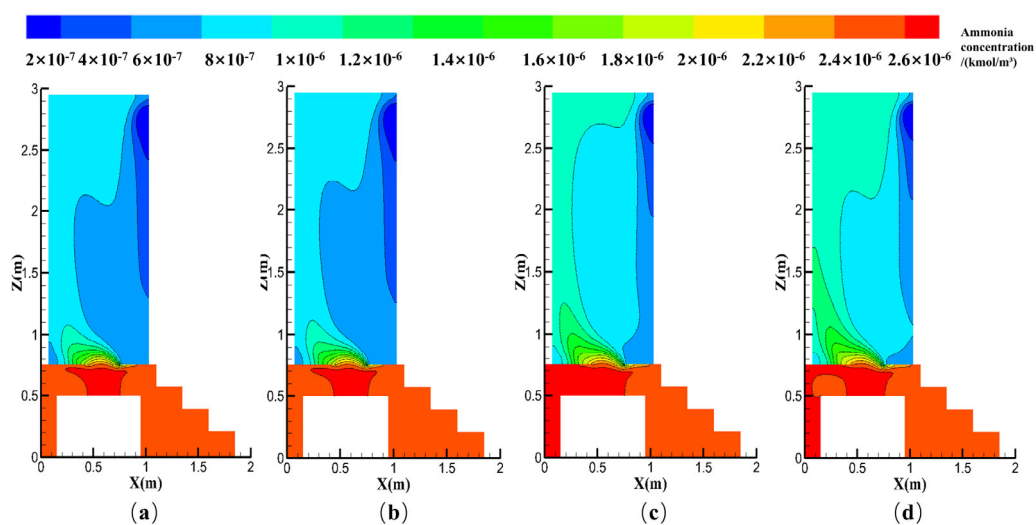

Figure S11. Ammonia concentration distributions for different positions of the exhaust fan (ACH=3.3 h⁻¹). (**a**): F1, (**b**): F2; (**c**): F3, (**d**): F4.

Figure S12. Ammonia diffusion dynamics for different positions of the exhaust fan (ACH=3.3 h⁻¹). (**a**): F1, (**b**): F2; (**c**): F3, (**d**): F4.

Figure S13. Ammonia concentration distributions for different positions of the exhaust fan (ACH=3.6 h⁻¹). (**a**): F1, (**b**): F2; (**c**): F3, (**d**): F4.
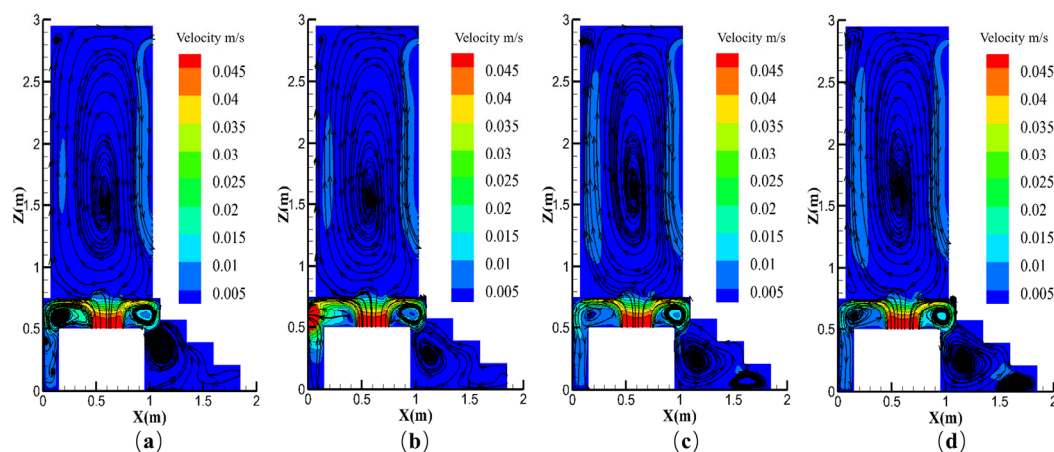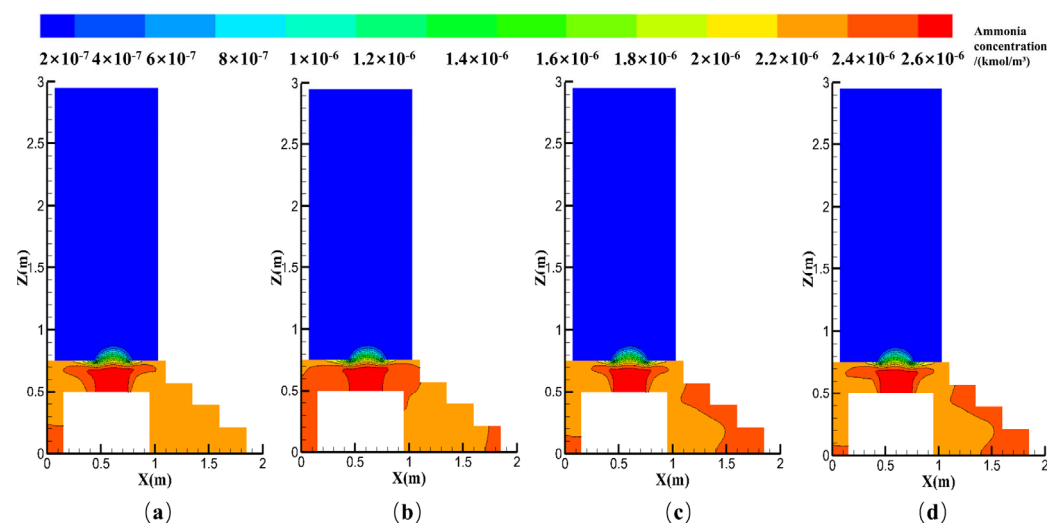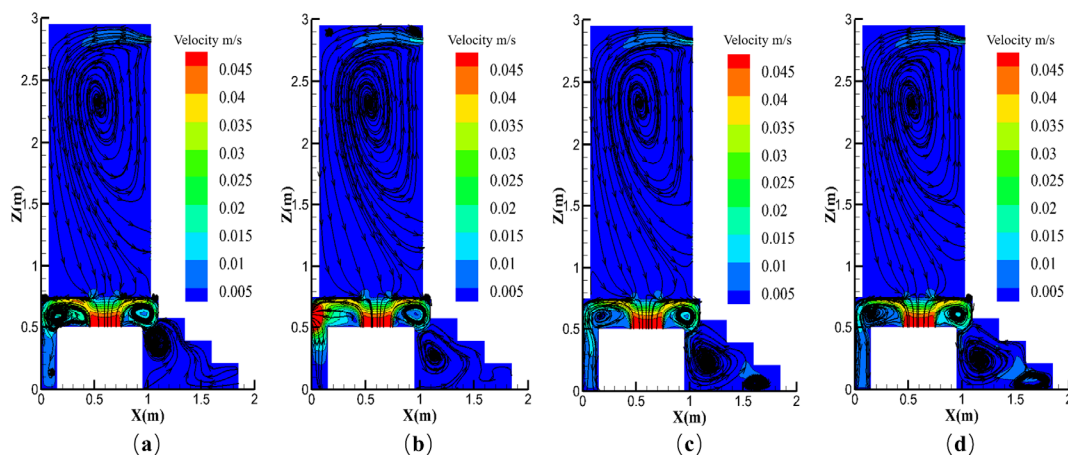

Figure S14. Ammonia diffusion dynamics for different positions of the exhaust fan (ACH=3.6 h⁻¹). (**a**): F1, (**b**): F2; (**c**): F3, (**d**): F4.
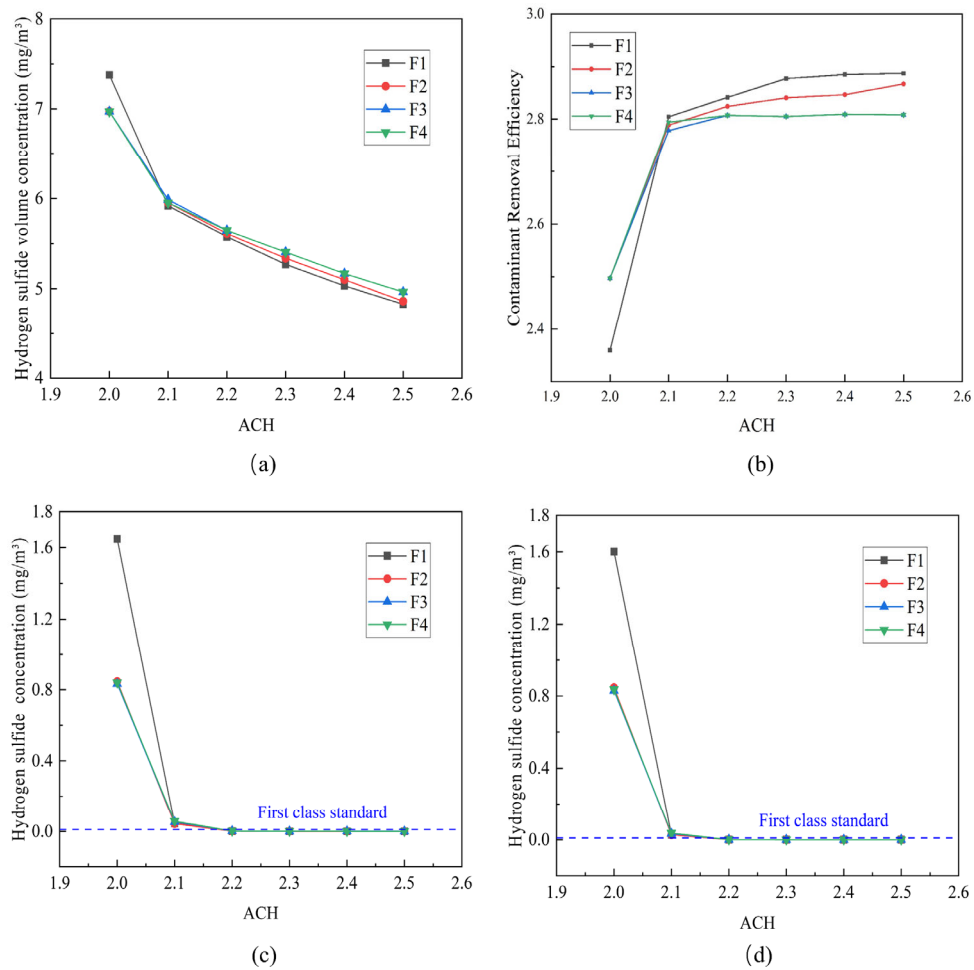
Figure S15. Average concentration and CRE of (**a**, **b**) hydrogen sulfide and (**c**, **d**) hydrogen sulfide in the breathing zone for different ACH values. VAC: volume average concentration; CRE: contaminant removal efficiency; ACH unit: h⁻¹. (**a**): VAC, (**b**): CRE; (**c**): Z=0.9m, (**d**): Z=1.5m.

(**a**)

(**b**)

(**c**)

(**d**)

Figure S16. (**a**, **c**) Average volume concentration and (**b**, **d**) CRE of ammonia in the breathing zone for different ACH (unit: h^{-1}) values. (**a**): VAC(ACH=3.1-3.6), (**b**): CRE(ACH=3.1-3.6); (**c**): VAC(ACH=4-10), (**d**): CRE(ACH=4-10).

(**a**)

(**b**)

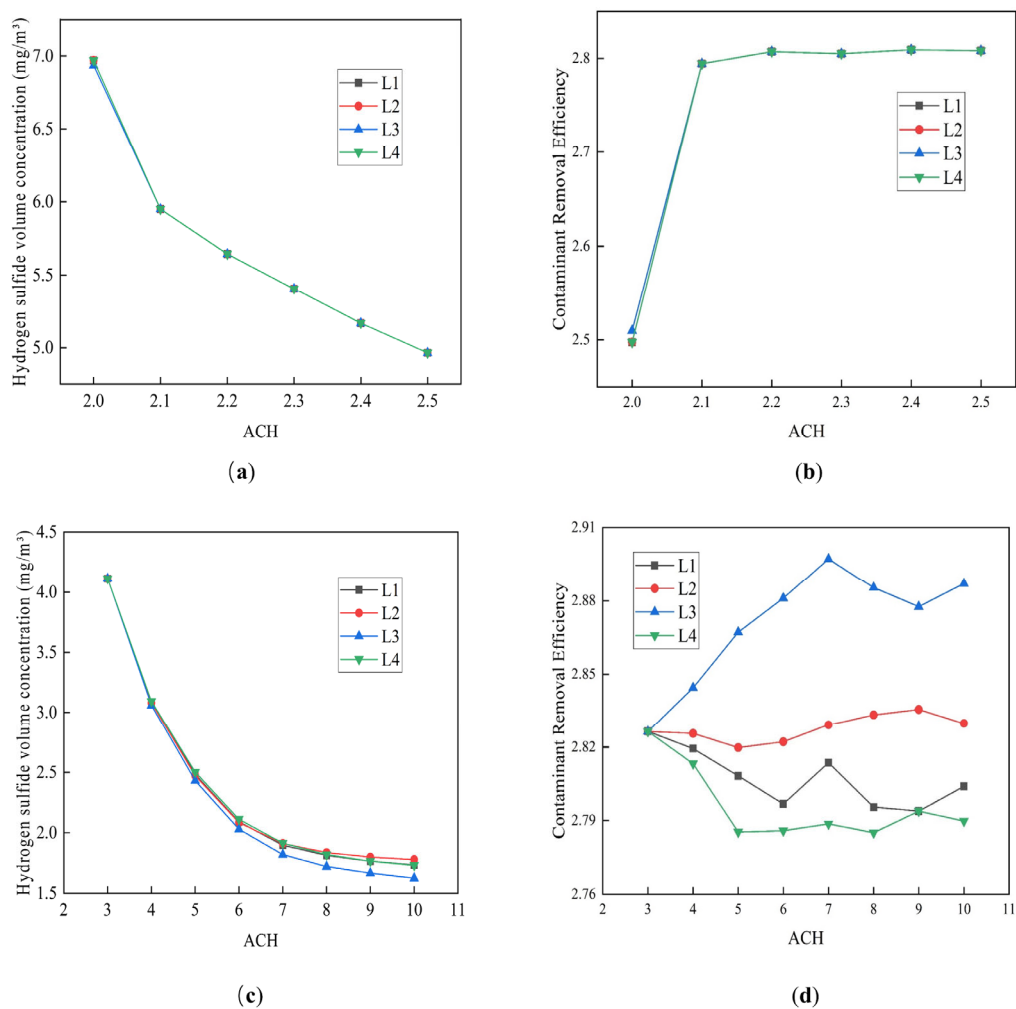
(**c**)

(**d**)

Figure S17. (**a**, **c**) Average volume concentration and (**b**, **d**) CRE of hydrogen sulfide in the breathing zone for different ACH (unit: h⁻¹) values. (**a**): VAC(ACH=2-2.5), (**b**): CRE(ACH=2-2.5), (**c**): VAC(ACH=3-10), (**d**): CRE(ACH=3-10).

Table S1. Summary of the experiments proposed according to the orthogonal design approach.

Case	ACH	EFP	G-h	NVL	NV-h
Case 1	3.5	F_1	50	L2	2150
Case 2	3.5	F_2	100	L1	2100
Case 3	3.5	F_3	200	L3	2050
Case 4	3.5	F_4	300	L4	2000
Case 5	4	F_1	100	L3	2000
Case 6	4	F_2	50	L4	2050
Case 7	4	F_3	300	L2	2100
Case 8	4	F_4	200	L1	2150
Case 9	5	F_1	200	L4	2100
Case10	5	F_2	300	L3	2150
Case11	5	F_3	50	L1	2000
Case12	5	F_4	100	L2	2050
Case13	6	F_1	300	L1	2050
Case14	6	F_2	200	L2	2000
Case15	6	F_3	100	L4	2150
Case16	6	F_4	50	L3	2100

Unit: h⁻¹