SIA Rimateria in riprofilazione e Discarica LI53 a seguito della rimodulazione
Studio di impatto odorigeno

Codice commessa: WS_19_0191_RIMATERIA_MAC	Cliente: RIMateria s.p.a.
Oggetto: Studio impatto olfattometrico	
Livello di riservatezza: *Company Confidential*	

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1 Premessa

Il presente studio è stato sviluppato per rivalutare l'impatto olfattometrico a fronte della nuova ridistribuzione percentuale dei rifiuti nella Discarica LI53. Nel progetto originariamente sottoposto all'approvazione degli Enti la coltivazione della discarica come sottocategoria 7.1.c interessava i lotti 2-4-6-8-9-10, nella nuova configurazione sarà limitata ai Lotti 4, 6 ed 8, riducendo sensibilmente le aree destinate al conferimento di rifiuto con contenuto organico e conseguentemente le potenziali emissioni odorigene. In Figura 1.1 si riporta la planimetria della LI53 dove in rosa sono evidenziate le aree dedicate alla coltivazione della 7.1.c in seguito a rimodulazione. L'impatto olfattometrico è stato quindi ricalcolato considerando la riduzione delle superfici emissive della Discarica LI53.

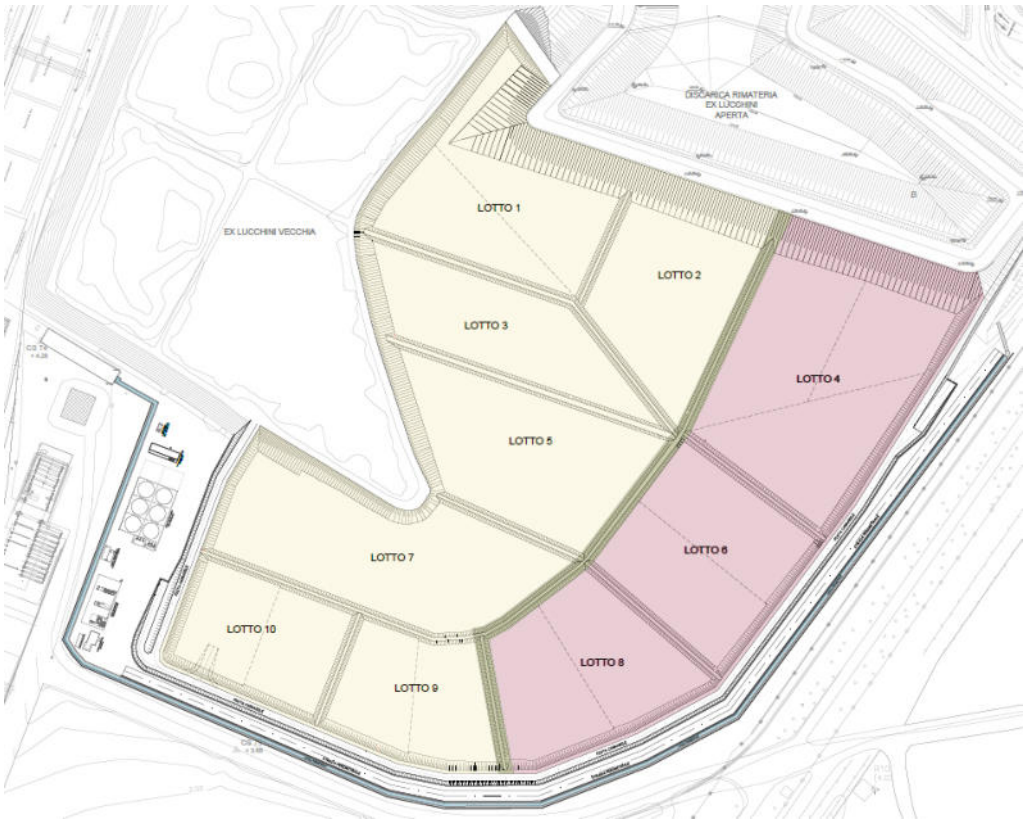

Figura 1.1 Rimodulazione della Discarica LI53: in rosa sono evidenziate le aree interessate dalla 7.1.c

Si fa presente inoltre che è stata inoltre riprecisata l'area emissiva della sopraelevazione sulla Ex-Lucchini secondo valutazione più realistica, nella documentazione precedentemente consegnata l'area emissiva era relativa a tutta la discarica (colmo+scarpate) ex-Lucchini. A tale proposito si ricorda che la coltivazione della sopraelevazione avverrà solamente su una porzione dell'area di colmo, pertanto risulta più corretto utilizzare solo questa superficie come area potenzialmente emissiva ai fini dell'impatto odorigeno.

Di seguito, per chiarezza, si riporta un estratto cartografico con evidenziale le varie superfici delle discariche (Figura 1.2).

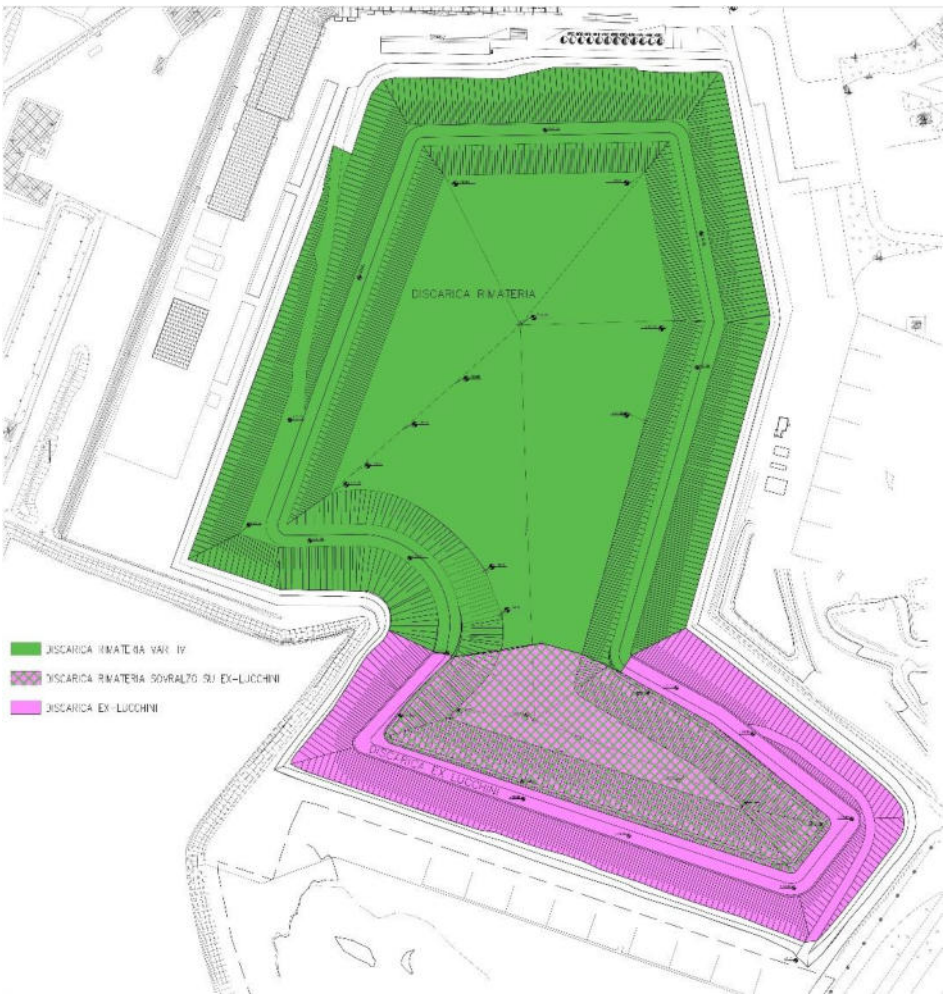

Figura 1.2 Superfici emissive della discarica Rimateria in Variante 2 e Riprofilazione

Per la parte relativa alla meteorologia si deve fare riferimento al documento: "1_SIA_ALL1_Rimateria Stima degli impatti in atmosfera" consegnato in data 27/02/2019 con protocollo della Regione Toscana n.0096616 del 28/08/2019.

2 Stima dell'impatto olfattometrico

2.1 Scelta del codice di calcolo

CALPUFF[1] è un modello che calcola la dispersione atmosferica per inquinanti inserito nella "Guideline on Air Quality Model" tra i modelli ufficiali di qualità dell'aria riconosciuti dall'U.S. EPA.

CALPUFF è un modello di tipo gaussiano – lagrangiano a *puff*. Permette di simulare gli effetti delle variazioni spazio-temporali dei campi meteorologici, non omogenei e non stazionari, sul trasporto degli inquinanti, sulla loro dispersione, sulle loro trasformazioni chimiche, e sulla loro rimozione. Nel codice è presente una vasta gamma di algoritmi che tengono conto sia degli effetti vicino alla sorgente (*transitional plume rise[1], building downwash, partial plume penetration*) che di quelli a lungo raggio come le trasformazioni chimiche, il comportamento su superfici marine e l'interazione tra queste e le zone costiere.

Le principali caratteristiche del codice di calcolo sono:

- capacità di simulazione di rilasci continui o accidentali e di tipo *short term o long term*;
- flessibilità relativamente all'estensione del dominio di simulazione (da qualche centinaia di metri a centinaia di chilometri dalla sorgente);
- capacità di trattare condizioni di orografia complessa;
- possibilità di trattare situazioni meteorologiche variabili e complesse (calme di vento, fumigazione, parziale penetrazione del pennacchio nello strato di inversione, parametri dispersivi non omogenei);
- capacità di simulare gli effetti che si verificano vicino alle sorgenti di emissione, quali effetto di risalita del pennacchio a causa del contenuto termico e dinamico e gli effetti locali di turbolenza dovuti alla presenza di edifici (building downwash);
- possibilità di applicazione a sorgenti puntuali, lineari, areali o di volume (anche con caratteristiche variabili nel tempo);
- capacità di considerare il trasporto su superfici d'acqua e gli effetti di costa;
- possibilità di simulare fenomeni di deposizione (secca o umida);
- possibilità di applicazione a inquinanti reagenti e simulazione di trasformazioni chimiche (in condizioni semplificate).

2.2 Dominio di calcolo

Il dominio di calcolo di Calpuff corrisponde alla griglia di calcolo di Calmet ovvero una griglia di 8x8 km composta da 100 celle lungo l'asse X e 100 celle lungo l'asse Y, con risoluzione di 100 metri e 5 layers verticali, rispettivamente a 20, 50, 100, 200, 500metri. La localizzazione della griglia viene

[1]Sviluppato nel 1990 da J.S.Scire, Robert J.Yamartino della "Sigma Research Corporation".

definita dalle coordinate dell'angolo a sud ovest del sistema di riferimento (cella [1,1]) e la direzione degli assi X e Y è da ovest verso est e da sud verso nord (WGS-84 32N 622.273 xE, 4753.048 yN).

2.3 **Recettori**

Il codice Calpuff permette di selezionare punti di particolare interesse, non necessariamente coincidenti con la griglia areale, per i quali è possibile estrarre i valori di concentrazione degli inquinanti calcolati. Nella presente modellazione sono stati inseriti i 24 recettori nel territorio limitrofo all'impianto (Figura 2.1) concordati con l'Ente, dei quali, in Tabella 2.1, sono riportate le coordinate e la frequenza sottovento rispetto all'impianto per l'anno 2017.

I valori di concentrazione saranno estratti anche come "recettori grigliati" su un dominio di 8x8 km e con risoluzione di 100 metri.

Figura 2.1 Ubicazione dei recettori discreti.

Tabella 2.1 Rettori discreti: coordinate UTM WSG 84 Fuso 32N e frequenza sottovento calcolata secondo il regime anemologico dell'anno 2017.

ID	Coord X	Coord Y	Dir.Wind	% Sottovento	Uso suolo
R1	625881	4758441	SE	4.2	Area abitativa
R2	629505	4760275	SW	1.8	Scuola dell'infanzia
R3	624476	4759954	SE	4.2	Area Abitativa
R4	626506	4758008	ESE, E, ENE	15.6	Area abitativa
R5	625270	4757623	E	4.9	Area abitativa
R6	625404	4755270	NNE	7.2	Area abitativa
R7	623288	4755253	ENE	7.2	Ospedale Piombino
R8	622569	4755324	ENE	7.2	Scuola elementare
R9	624618	4753865	NNE	7.2	Scuola elementare
R10	626490	4758302	SE, ESE, E	12.7	Area abitativa
R11	626732	4756595	N	6.1	Area industriale
R12	626042	4756848	NE	6.6	Area ricreativa
R13	625710	4756141	NE	6.6	Area abitativa
R14	630273	4757648	W	4.4	Area industriale
R15	627013	4758718	SSW, S, SSE	21.4	Area abitativa
R16	627711	4757634	W, WNW, NW	26.6	Area industriale
R17	627856	4757883	WSW, W, WNW	16.6	Area industriale
R18	625710	4757216	ENE	7.2	Area industriale
R19	626325	4757737	ESE, E, ENE, NE	22.2	Area abitativa
R20	626248	4757334	E, ENE, NE	18.7	Area abitativa
R21	626347	4757478	E, ENE, NE	18.7	Area abitativa
R22	626271	4757513	E, ENE, NE	18.7	Area abitativa
R23	626918	4758552	S, SSE	19.4	Area Abitativa
R24	626694	4758573	S, SSE, SE	23.6	Area abitativa

2.5 Scenari di progetto

La valutazione dell'impatto olfattometrico, come specificato in premessa, è stata effettuata considerando la variante alla Discarica LI53.

Per la valutazione del potenziale impatto olfattometrico sono state eseguite più simulazioni:

- **Scenario I: riprofilazione della Discarica Ex Lucchini.**
- **Scenario II: coltivazione della Discarica LI53 nella nuova configurazione.**

Lo **Scenario I** si riferisce alla coltivazione dell'area di colmo della Ex-Lucchini, pertanto si considera la discarica Rimateria in chiusura definitiva, mentre le superfici della Ex-Lucchini non interessate dalla presenza del fronte in coltivazione in copertura gestionale e la discarica LI53 non ancora in coltivazione.

Lo **Scenario II**, secondo il piano di coltivazione presentato nella Relazione illustrativa di variante (R005 _19 Relazione illustrativa variante), considera la discarica Rimateria ed la discarica Ex-Lucchini in chiusura definitiva, il Lotto 4 ed il Lotto 6 della discarica LI53 in chiusura provvisoria con telo ed il Lotto 8, quello più vicino ai recettori sensibili, in coltivazione.

Tali scenari utilizzano come fattori emissivi i risultati del monitoraggio olfattometrico eseguito in data 12/02/2019 sulla discarica Rimateria attualmente attiva, in accordo la precedente modellazione depositata in data 27/02/2019 (1_SIA_ALL1_Rimateria Stima degli impatti in atmosfera rev.02).

Tabella 2.2 Sintesi degli scenari di progetto

Sorgente	*Scenario 1*	*Scenario 2*
Discarica Rimateria	**COPERTURA DEFINITIVA**	**COPERTURA DEFINITIVA**
Discarica Ex Lucchini in riprofilatura	**COPERTURA GESTIONALE**	**COPERTURA DEFINITIVA**
Fronte in coltivazione Ex Lucchini	**FRONTE ATTIVO**	-
Discarica LI 53 Lotto 4 e Lotto 6	-	**COPERTURA PROVVISORIA**
Discarica LI53 Lotto 8	-	**COPERTURA PROVVISORIA**
Fronte in coltivazione LI53	-	**FRONTE ATTIVO**

2.6 Termine di sorgente

2.6.1 Geometria della sorgente

Per le simulazioni sono state considerate:

- per lo **Scenario I** tre sorgenti areali: la discarica Rimateria, la sopraelevazione sulla discarica Ex Lucchini (per brevità denominata in seguito "Discarica ex Lucchini") ed il fronte in coltivazione sulla sopraelevazione (Figura 2.2);
- per lo **Scenario II** cinque sorgenti areali: la discarica Rimateria, la discarica Ex Lucchini, i Lotti 4 e 6 della discarica LI53, il Lotto 8 della discarica LI53 ed il fronte in coltivazione posizionato in corrispondenza del Lotto 8(Figura 2.5).

Figura 2.2 Scenario I: sorgenti areali considerate all'interno dello studio di impatto olfattometrico

Figura 2.3 Scenario II: sorgenti areali considerate all'interno dello studio di impatto olfattometrico

In

Tabella 2.3 - Tabella 2.8 sono riportate le coordinate delle sorgenti ed il codice identificativo.

Tabella 2.3 Valutazione dell'impatto odorigeno: coordinate della sorgente Discarica Rimateria in Variante 4.

Discarica Rimateria in Variante 4		
	Coordinata x WGS-84 UTM	**Coordinata y WGS-84 UTM**
Vertice 1	626.869	4757.909
Vertice 2	626.972	4758.279
Vertice 3	627.240	4758.262
Vertice 4	627.225	4757.919

Tabella 2.4 Valutazione dell'impatto odorigeno: coordinate della sorgente Discarica Ex-Lucchini.

Discarica Ex Lucchini		
	Coordinata x WGS-84 UTM	**Coordinata y WGS-84 UTM**
Vertice 1	627.080	4757.875
Vertice 2	627.297	4757.773

Discarica Ex Lucchini		
	Coordinata x WGS-84 UTM	Coordinata y WGS-84 UTM
Vertice 3	627.273	4757.680
Vertice 4	627.022	4757.788

Tabella 2.5 Valutazione dell'impatto odorigeno: coordinate del fronte in coltivazione della sorgente Discarica Ex Lucchini.

Fronte in coltivazione Ex Lucchimi		
	Coordinata x WGS-84 UTM	Coordinata y WGS-84 UTM
Vertice 1	627.205	4757.710
Vertice 2	627.206	4757.761
Vertice 3	627.259	4757.760
Vertice 4	627.261	4757.707

Tabella 2.6 Valutazione dell'impatto odorigeno: coordinate della sorgente Discarica LI53 Lotto 4 e Lotto 6.

Discarica LI53 – Lotto 4 e Lotto 6		
	Coordinata x WGS-84 UTM	Coordinata y WGS-84 UTM
Vertice 1	627.120	4757.642
Vertice 2	627.270	4757.598
Vertice 3	627.101	4757.371
Vertice 4	626.994	4757.436

Tabella 2.7 Valutazione dell'impatto odorigeno: coordinate della sorgente Discarica LI53 Lotto 8.

Discarica LI53 – Lotto 8		
	Coordinata x WGS-84 UTM	Coordinata y WGS-84 UTM
Vertice 1	627.101	4757.371
Vertice 2	626.994	4757.436
Vertice 3	626.992	4757.317
Vertice 4	627.088	4757.354

Tabella 2.8 Valutazione dell'impatto odorigeno: coordinate della sorgente Discarica LI53 fronte in coltivazione.

Fronte in coltivazione	ID Sorgente: D3	
	Coordinata x WGS-84 UTM	Coordinata y WGS-84 UTM
Vertice 1	626.992	4757.403
Vertice 2	627.046	4757.403
Vertice 3	627.046	4757.356
Vertice 4	626.992	4757.356

2.6.2 Fattori di emissione

Per effettuare la scelta dei fattori di emissione è stata invece condotta una campagna di misura presso l'impianto di discarica attualmente attivo ex Asiu realizzata da Progress srl in data 12/02/2019, i cui risultati sono riportati di seguito e nel documento "1_SIA_ALL1_Rimateria Stima degli impatti in atmosfera", consegnato in data 27/02/2019 con protocollo della Regione Toscana n.0096616 del 28/08/2019 al Paragrafo 4.5.2.

La definizione degli input emissivi concorda con quanto consigliato all'interno del documento SNPA del maggio 2018 "Metodologie per la valutazione delle emissioni odorigene", elaborato a cura del Gruppo di Lavoro 13 nell'ambito dei lavori del Programma Triennale 2014-2016, approvato con Delibera n.38/2018, si suggerisce di effettuare le simulazioni di impatto olfattometrico utilizzando, ove disponibili, dati sperimentali, ottenuti secondo monitoraggio con wind tunnel (Capitolo 3, pagina 32 del suddetto documento).

Il monitoraggio ha visto il prelievo di un totale di 19 campioni da tre tipologie di coperture sul corpo discarica (Figura 2.4). In particolare:

- Corpo discarica con copertura provvisoria con telo HDPE (5 campioni con prefisso CP)
- Corpo di discarica con copertura gestionale con terre (9 campioni con prefisso CG)
- Fronte in coltivazione (5 campioni con prefisso FC)

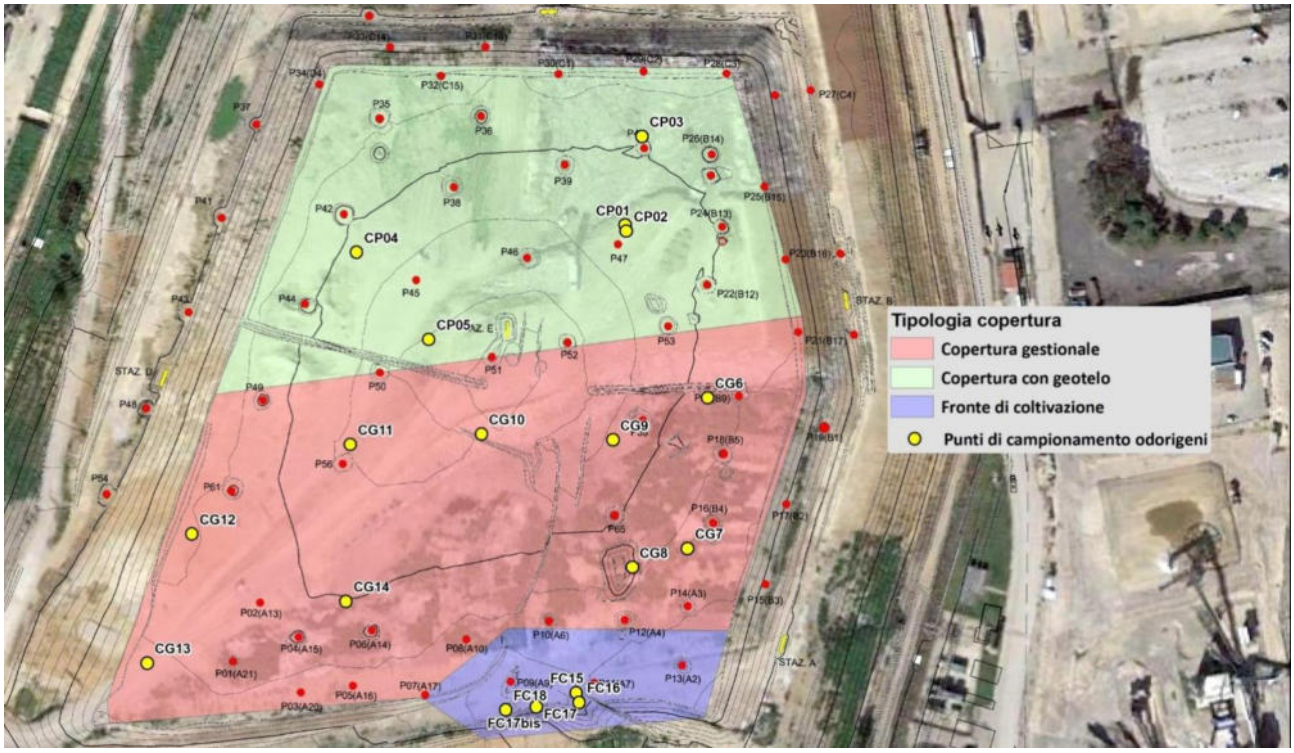

Figura 2.4 Discarica Rimateria: Collocazione dei punti di campionamento degli odorigeni e tipologia di coperture presenti nell'impianto

Di seguito in Tabella 2.9 si riportano i risultati analitici delle misure olfattometriche ed il calcolo del SOER.

Tabella 2.9 Risultati analitici delle misure olfattometriche effettuate sull'impianto Rimateria in data 12/02/2019.

ID campione	Tipologia di copertura	Coord X UTM WGS84 32N	Coord Y UTM WGS84 32N	Conc. di odore [U.Oe/m³]	Incertezza estesa di misura [U.Oe/m³]	SOER [U.Oe/m²/s]
CP01	Provvisoria con telo	627147.2	4758129.5	23	±16	0.13
CP03	Provvisoria con telo	627153.3	4758161.5	16	±11	0.09
CP04	Provvisoria con telo	627050.2	4758119.7	18	±12	0.10
CP05	Provvisoria con telo	627076.3	4758088.2	39	±27	0.22
CP02	Provvisoria con telo	627147.6	4758127.3	29	±20	0.16
CG6	Gestionale	627177.0	4758067.2	75	±51	0.42
CG7	Gestionale	627169.8	4758012.8	29	±20	0.16
CG8	Gestionale	627149.8	4758006.0	52	±35	0.29
CG9	Gestionale	627142.8	4758052.0	33	±22	0.18
CG10	Gestionale	627095.3	4758054.1	190	±130	1.06
CG11	Gestionale	627048.0	4758050.3	120	±82	0.67
CG12	Gestionale	626990.8	4758018.0	160	±110	0.89
CG13	Gestionale	626974.6	4757971.5	220	±220	1.22
CG14	Gestionale	627046.4	4757993.7	160	±160	0.89

FC15	Fronte coltivazione	627129.5	4757960.7	200	±140	1.11
FC16	Fronte coltivazione	627130.7	4757957.3	180	±120	1.00
FC17	Fronte coltivazione	627115.2	4757955.7	930	±630	5.17
FC17-Bis	Fronte coltivazione	627115.2	4757955.7	1100	±750	6.11
FC18	Fronte coltivazione	627104.1	4757954.6	1400	±950	7.78

I risultati del monitoraggio olfattometrico (Tabella 2.9) mostrano che le aree provviste di copertura provvisoria con telo hanno un emissione estremamente bassa, con un valore massimo di 39 $U.O_e/m^3$. Inoltre si osserva che le concentrazioni misurate sulla copertura gestionale variano da 29 a 220 $U.O_e/m^3$. In Figura 2.4 è possibile osservare che le misure con concentrazione più elevata sono collocate nella parte sinistra della discarica, dove non è ancora stata completata la perforazione dei pozzi, pertanto la captazione del biogas non è ancora ottimale, differentemente da quanto accade nell'area a destra, dove le misure risultano inferiori e la densità di pozzi maggiore. Questo monitoraggio conferma quanto già noto, ovvero che una buona gestione del biogas riduce l'emissione di odore.

A partire dalle misure effettuate sono state definite quattro ipotesi emissive (

Tabella 2.10):

- **Scenario I e Scenario II massimo di progetto**: utilizzando come fattori emissivi i valori massimi registrati sulle tre tipologie di coperture.
- **Scenario I e Scenario II medio di progetto**: utilizzando come fattori emissivi i valori medi per la copertura con telo e per la copertura gestionale, mentre per il fronte coltivazione sono stati esclusi i campioni FC15 e FC16, considerando quindi i valori di concentrazione di odore più elevati.

Si precisa che per il calcolo dei fattori di emissione relativi alla copertura definitiva, non avendo dati sperimentali disponibili, sono stati utilizzati i valori misurati sulla copertura provvisoria, sovrastimando l'emissione.

Tabella 2.10 Dati di input definiti negli scenari di progetto a partire dalle misure in sito: tipologia di copertura nella simulazione e calcolo del valore del rispettivo SOER.

			Valori massimi di progetto		Valori medio di progetto	
	Discarica	**Tipologia copertura simulazione**	**Concentrazione di odore [U.Oe/m³]**	**SOER [U.Oe/m²/s]**	**Concentrazione di odore [U.Oe/m³]**	**SOER [U.Oe/m²/s]**
Scenario I	Rimateria	Copertura definitiva	39	**0.22**	25	**0.14**
	Ex Lucchini	Copertura gestionale	220	**1.22**	115.4	**0.64**
	Coltivazione	Fronte rifiuti	1400	**7.78**	1143.3	**6.35**
Scenario II	Rimateria	Copertura definitiva	39	**0.22**	25	**0.14**
	Ex Lucchini	Copertura definitiva	39	**0.22**	25	**0.14**
	LI53 Lotto 4 e Lotto 6	Copertura provvisoria	39	**0.22**	25	**0.14**

	LI53 Lotto 8	Copertura gestionale	220	**1.22**	115.4	**0.64**
	Coltivazione	Fronte rifiuti	1400	**7.78**	1143.3	**6.35**

È stato inoltre valutato il fattore di riduzione da applicare all'emissione dal fronte rifiuti nelle ore notturne durante le quali avviene la copertura giornaliera. Tale fattore, impostato ad un valore di 0.4, è stato calcolato a partire dal rapporto tra i valori di flusso di odore misurati sui rifiuti parzialmente coperti e il rifiuto fresco stoccato in giornata presenti nel manuale APAT (2003). Il dato è stato calcolato per le discariche presenti all'interno del documento ed è stato quindi selezionato quello più cautelativo.

In si riportano per ciascuna sorgente i relativi valori di superficie ed il fattore di emissione (SOER) associato.

2.7 Configurazione del codice di calcolo

Input	
Periodo	Anno 2017
File Input	File output di Calmet denominato MET17.DAT
Specie implementate	Per ciascuna delle specie elencate è stata disattivata la deposizione umida, secca e le reazioni chimiche. **Composto** — **Specie** — **File Input** Scenario I (Fattori Massimi) — ODR1 — SC1MX.INP Scenario I (Fattori Medi) — ODR2 — SC1MD.IN Scenario II (Fattori Massimi e medi) — ODR1, ODR2 — SC2.IN
Dominio	➢ Angolo a sud ovest del sistema di riferimento (cella [1,1]) (WGS-84 32N) Km 622.273 xE, KM 4753.048 yN. ➢ Nx: 80; Ny: 80; Passo della griglia: 100 metri. ➢ N. Livelli di quota: 7 a 20, 50, 100, 200, 500, 1000, 1500 metri
Sorgente	Sono state implementate 3 sorgenti areali denominate D1, D2, D3. Per ciascuna sorgente sono stati selezionati i seguenti parametri: - Base elevation: 25.0 mt - Height effective: 0.0 mt - Sigma iniziale (z): 0.0
Recettori discreti	Sono stati selezionati 24 recettori sensibili, esterni all'impianto, in corrispondenza dei centri abitati. Le coordinate dei recettori sono riportate in Tabella 2.1.
Simulazioni	
Dispersione	Sono state effettuate simulazioni per la valutazione della dispersione degli inquinanti emessi su scala oraria per l'anno 2017. Non è stata considerata l'eventuale deposizione umida.
Output	
	Sono stati elaborati i dati sia come "recettori discreti" che "recettori grigliati" per ottenere le mappe di isoconcentrazione orarie, corrispondenti al 98° percentile moltiplicato per il fattore 2.3 come da Linee Guida Regione Lombardia.

2.8 **Risultati delle simulazioni**

Di seguito si riporta:

- la mappa di isoconcentrazione del 98° percentile delle concentrazioni massime orarie di picco di odore sull'intero periodo relativa allo Scenario I Massimo di progetto (Figura 2.5);
- la mappa di isoconcentrazione del 98° percentile delle concentrazioni massime orarie di picco di odore sull'intero periodo relativa allo Scenario I Medio di progetto (Figura 2.6);
- la mappa di isoconcentrazione del 98° percentile delle concentrazioni massime orarie di picco di odore sull'intero periodo relativa allo Scenario II Massimo di progetto (Figura 2.7);
- la mappa di isoconcentrazione del 98° percentile delle concentrazioni massime orarie di picco di odore sull'intero periodo relativa allo Scenario II Massimo di progetto (Figura 2.8);

I risultati delle simulazioni riferite ai singoli recettori discreti, sono mostrati in Tabella 2.11 relativamente allo Scenario I e Scenario II.

ID	Coord X	Coord Y	Distanza dall'impianto	Scenario 1				Scenario 2			
				Scenario Massimo (U.Oe/m³)		Scenario Medio (U.Oe/m³)		Scenario Massimo (U.Oe/m³)		Scenario Medio (U.Oe/m³)	
	UTM WGS84 32N	UTM WGS84 32N	(m)	98° Perc.	98° Perc. picco	98°Perc.	98° Perc. Picco	98° Perc.	98° Perc. picco	98°Perc.	98° Perc. Picco
R1	625881	4758441	1100	0.33	0.75	0.20	0.46	0.27	0.62	0.18	0.41
R2	629505	4760275	3000	0.09	0.22	0.06	0.13	0.07	0.16	0.05	0.11
R3	624476	4759955	3000	0.12	0.27	0.07	0.17	0.10	0.23	0.07	0.16
R4	626506	4758008	400	0.99	2.29	0.62	1.43	0.76	1.74	0.49	1.12
R5	625270	4757624	1600	0.48	1.10	0.30	0.68	0.36	0.84	0.23	0.54
R6	625404	4755271	2500	0.13	0.29	0.08	0.18	0.11	0.26	0.07	0.17
R7	623288	4755253	4000	0.10	0.24	0.06	0.15	0.09	0.21	0.06	0.14
R8	622569	4755325	4800	0.09	0.21	0.06	0.13	0.08	0.19	0.05	0.12
R9	624618	4753866	4100	0.06	0.15	0.04	0.09	0.06	0.13	0.04	0.09
R10	626490	4758302	500	0.73	1.67	0.46	1.05	0.60	1.38	0.39	0.89
R11	626732	4756596	780	0.52	1.19	0.32	0.73	0.62	1.42	0.41	0.93
R12	626042	4756849	1450	0.47	1.07	0.28	0.64	0.43	0.99	0.28	0.64
R13	625710	4756141	2250	0.26	0.60	0.16	0.36	0.24	0.55	0.16	0.36
R14	630273	4757648	3000	0.05	0.11	0.03	0.07	0.04	0.10	0.03	0.06
R15	627012	4758717	900	1.11	2.56	0.69	1.58	0.93	2.14	0.60	1.38
R16	627710	4757634	500	1.00	2.30	0.61	1.40	0.55	1.27	0.35	0.81
R17	627856	4757882	600	0.84	1.94	0.51	1.18	0.50	1.14	0.32	0.73
R18	625709	4757216	1600	0.68	1.57	0.41	0.95	0.47	1.09	0.31	0.70

				Scenario 1				Scenario 2			
ID	Coord X	Coord Y	Distanza dall'impianto	Scenario Massimo (U.Oe/m³)		Scenario Medio (U.Oe/m³)		Scenario Massimo (U.Oe/m³)		Scenario Medio (U.Oe/m³)	
	UTM WGS84 32N	UTM WGS84 32N	(m)	98° Perc.	98° Perc. picco	98°Perc.	98° Perc. Picco	98° Perc.	98° Perc. picco	98°Perc.	98° Perc. Picco
R19	626325	4757737	900	0.91	2.09	0.55	1.27	0.65	1.49	0.42	0.96
R20	626247	4757333	1000	0.92	2.11	0.54	1.25	0.67	1.53	0.44	1.01
R21	626346	4757479	900	1.09	2.51	0.66	1.51	0.73	1.69	0.48	1.11
R22	626271	4757514	1000	1.04	2.39	0.62	1.42	0.69	1.60	0.46	1.05
R23	626918	4758552	750	1.16	2.66	0.73	1.68	1.04	2.39	0.66	1.53
R24	626693	4758574	900	0.81	1.85	0.50	1.15	0.65	1.50	0.42	0.97

Tabella 2.11: Scenario I e Scenario II- Recettori discreti: coordinate, distanza dall'impianto, 98° percentile della concentrazione massima oraria calcolata e 98° della concentrazione oraria di picco oraria.

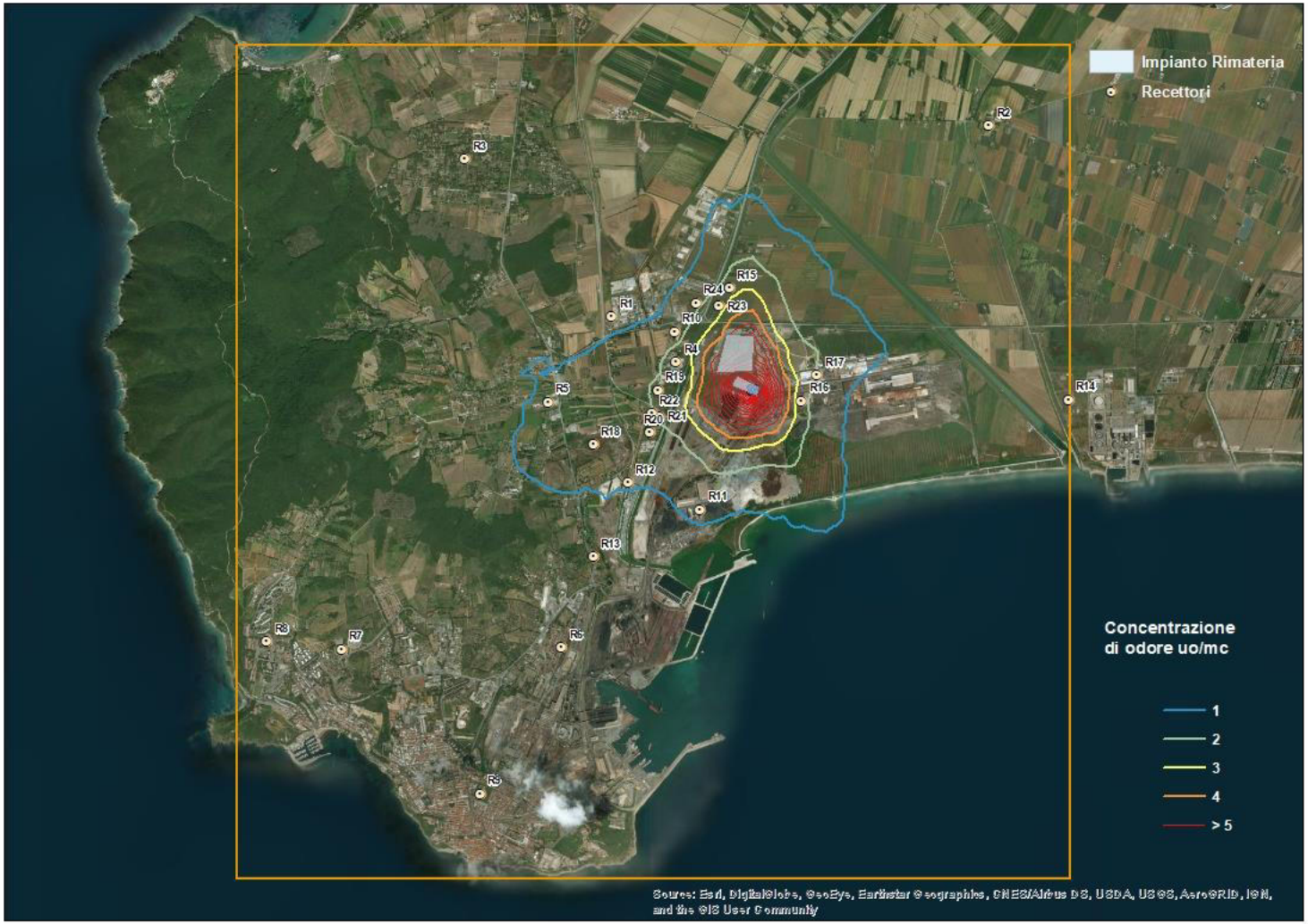

Figura 2.5 Scenario I Massimo di progetto: mappa del 98° percentile delle concentrazioni massime orarie di picco di odore sull'intero periodo.

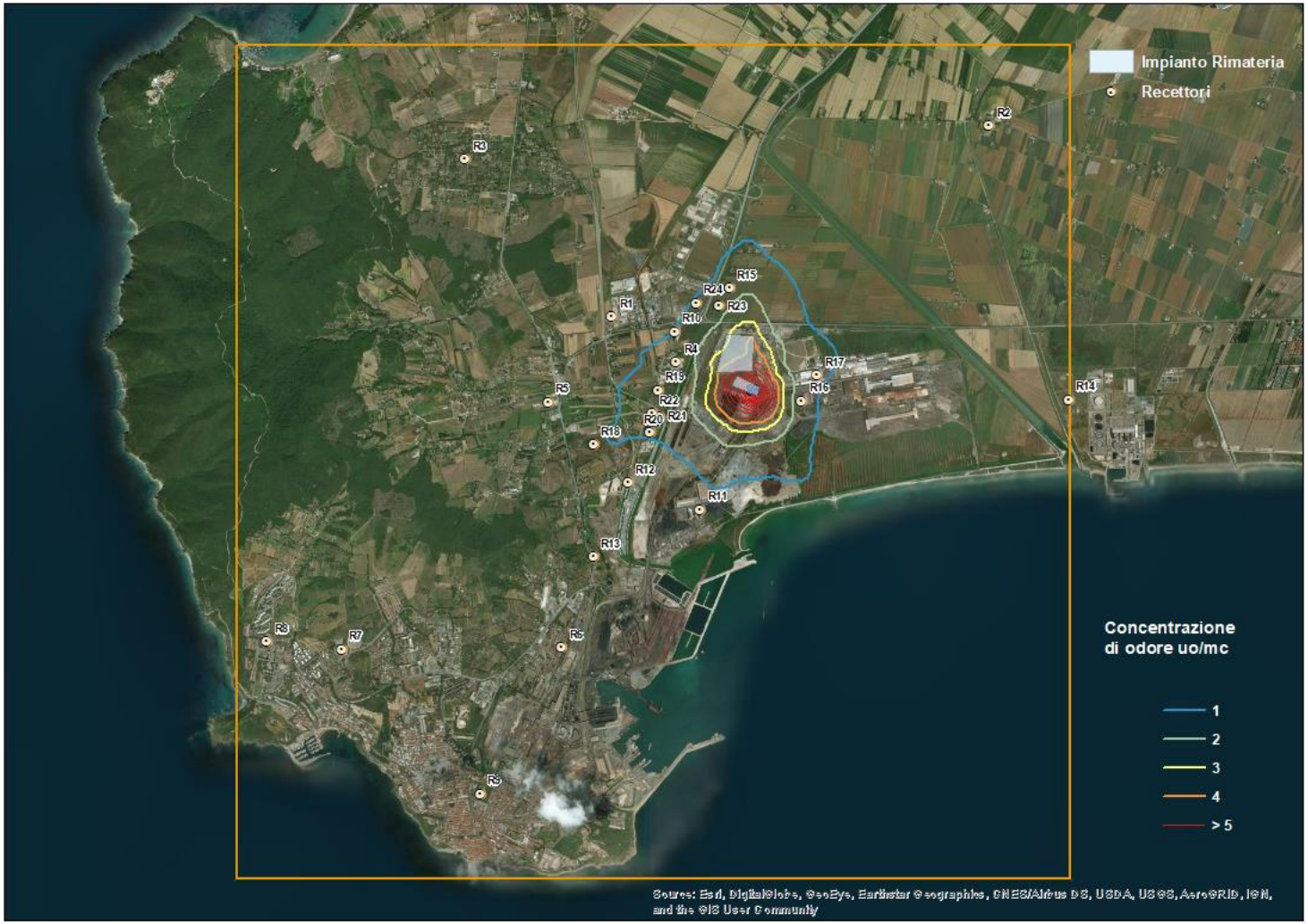

Figura 2.6 Scenario I Medio di progetto: mappa del 98° percentile delle concentrazioni massime orarie di picco di odore sull'intero periodo.

Figura 2.7 Scenario II Massimo di progetto: mappa del 98° percentile delle concentrazioni massime orarie di picco di odore sull'intero periodo

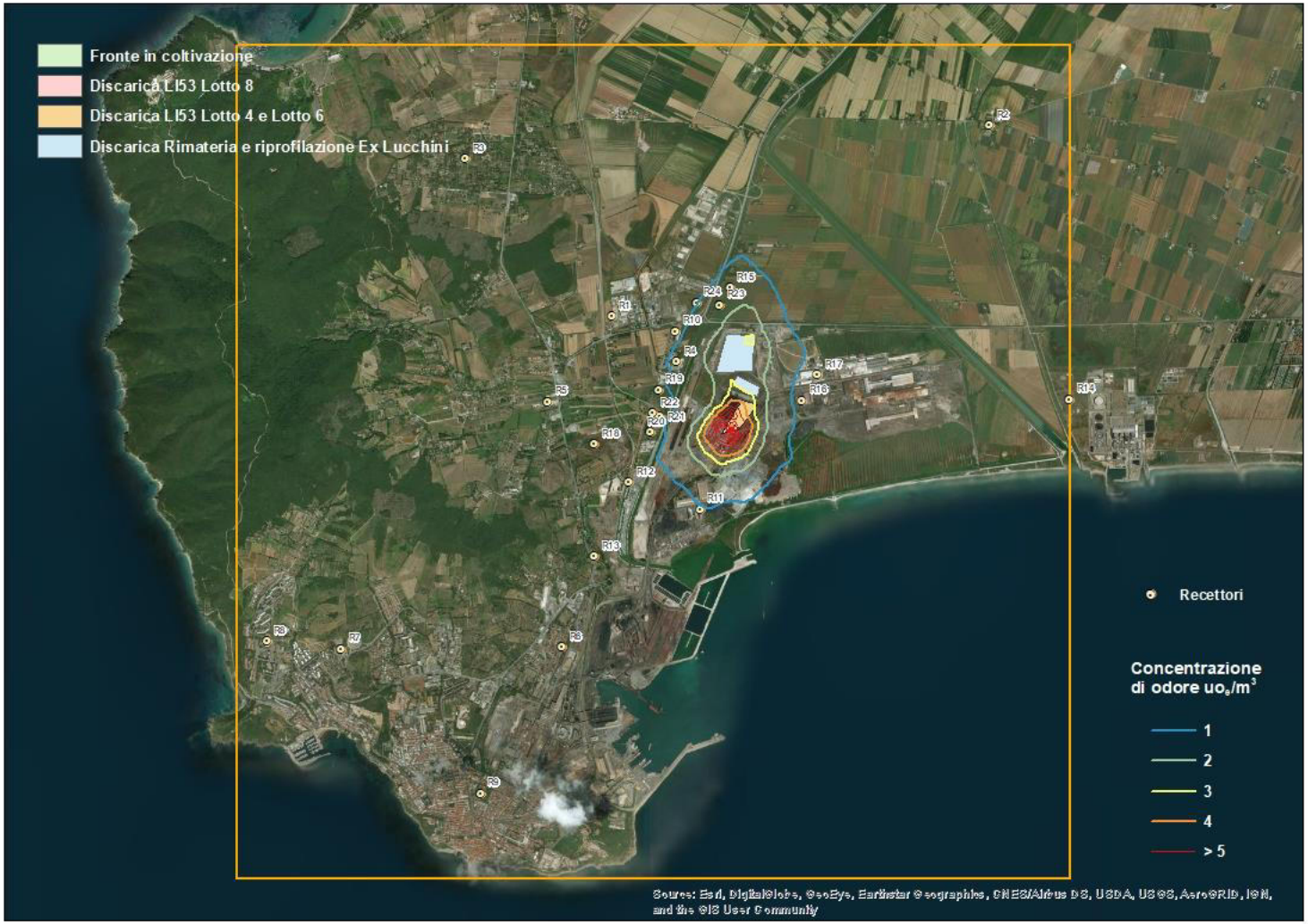

Figura 2.8 Scenario II Medio di progetto: mappa del 98° percentile delle concentrazioni massime orarie di picco di odore sull'intero periodo

2.9 **Analisi dei risultati relativi alla configurazione di progetto più gravosa**

In Tabella 2.12 è riportata un'analisi di frequenza relativa al numero di superamenti della soglia di accettabilità. Tale confronto è stato effettuato per lo **Scenario I**, che presenta valori ai recettori maggiori rispetto allo Scenario II, sebbene i risultati siano confrontabili.

Relativamente allo Scenario I si è scelto di effettuare l'analisi dei valori ottenuti implementando i fattori di emissione calcolati come media delle misure effettuate sulle differenti tipologie di coperture in quanto più rappresentativi dell'emissione globale dalla discarica.

La soglia di accettabilità è stata attribuita seguendo le Linee Guida della Provincia di Trento, come indicato dall'Ente (contributo tecnico istruttorio prot. AOOGRT.prot.2018/387935-A del 06/08/2018 Regione Toscana), in base alla lontananza dall'impianto. Come si osserva il recettore più impattato risulta R23, distanze circa 750 metri, ciò nonostante la frequenza delle ore che superano 1 UO_e/m^3 è estremamente bassa (1.21%). Si evince inoltre che i superamenti sono concentrati nelle ore notturne, in cui la percezione del disturbo è minore in quanto i recettori tendono a restare all'interno delle abitazioni. In aggiunta i superamenti risultano minori nel periodo estivo, quando la dispersione risulta favorita.

Tabella 2.12 Superamenti del criterio di accettabilità definito per ciascun recettore

Recettore	***R4***	***R10***	***R12***	***R15***	***R18***	***R19***	***R20***	***R21***	***R22***	***R23***	***R24***	
Distanza dall'impianto	*400*	*500*	*1450*	*900*	*1600*	*900*	*1000*	*900*	*1000*	*750*	*900*	
Criterio di accettabilità in UO/m³	*2*	*2*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	
0	0	0	0	14	3	2	7	6	6	14	6	**58**
1	0	0	0	6	2	2	8	10	11	10	6	**55**
2	0	0	0	11	4	1	12	14	14	10	6	**72**
3	1	0	0	3	1	3	13	19	13	10	10	**73**
4	0	0	0	10	4	0	3	5	5	11	5	**43**
5	0	0	0	2	1	0	1	1	1	2	4	**12**
6	0	0	0	3	0	0	0	1	0	3	2	**9**
7	0	0	0	1	0	0	0	2	2	3	1	**9**
8	0	0	0	0	0	0	0	0	0	0	0	**0**
9	0	0	0	0	0	0	0	0	0	0	0	**0**
10	0	0	0	0	0	0	0	0	0	0	0	**0**
11	0	0	0	0	0	0	0	0	0	0	0	**0**
12	0	0	0	0	0	0	0	0	0	0	0	**0**
13	0	0	0	0	0	0	0	0	0	0	0	**0**
14	0	0	0	0	0	0	0	0	0	0	0	**0**
15	0	0	0	0	0	0	0	0	0	0	1	**1**
16	0	0	0	3	0	0	0	0	0	1	0	**4**
17	0	0	0	4	1	0	0	0	0	5	1	**11**
18	0	0	0	6	1	0	0	0	0	6	2	**15**
19	0	0	0	3	1	0	1	1	1	1	3	**11**
20	0	0	0	6	0	1	2	3	2	3	4	**21**
21	0	0	0	9	0	0	1	4	4	8	6	**32**

Recettore	***R4***	***R10***	***R12***	***R15***	***R18***	***R19***	***R20***	***R21***	***R22***	***R23***	***R24***	
Distanza dall'impianto	*400*	*500*	*1450*	*900*	*1600*	*900*	*1000*	*900*	*1000*	*750*	*900*	
Criterio di accettabilità in UO/m³	*2*	*2*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	
22	0	0	0	7	3	1	5	5	5	9	9	**44**
23	1	0	0	11	2	1	6	6	5	9	4	**45**
N. Totale di superamenti orari	**2**	**0**	**0**	**99**	**23**	**11**	**59**	**77**	**69**	**105**	**70**	
% Superanti sull'interno anno	**0.02%**	**0.00%**	**0.00%**	**1.14%**	**0.27%**	**0.13%**	**0.68%**	**0.89%**	**0.80%**	**1.21%**	**0.81%**	

Si è scelto di valutare anche i superamenti della soglia di 2 UOe/m^3 in funzione della direzione e della classe di velocità del vento per comprendere eventuali episodi più gravosi, da cui si evince che il numero di superamenti maggiori si hanno per venti che provengono dal quadrante N – E mentre la direzione prevalente dei venti di Rimateria è da NO e S, pertanto l'impatto risulta limitato, come si evince dalla Tabella 2.13.

Tabella 2.13 Tabella 2.14 Superamenti del criterio di accettabilità definito per ciascun recettore

Direzione del venti in °N	*Classe di velocità del vento in m/s*					
	0-0.5	0.5-1	1-1.5	1.5-2	2-2.5	N. superamenti
0-22.5	11	0	0	1	0	12
22.5-45.0	14	19	0	0	0	33
45.0-67.5	11	38	13	0	0	62
67.5-90.0	13	52	15	8	0	88
90.0-112.5	11	46	19	0	1	77
112.5-135.0	3	63	61	9	0	136
135.0-157.5	15	23	19	6	1	64
157.5-180.0	2	4	5	2	0	13
180.0-202.5	0	0	1	0	0	1
202.5-225.0	0	0	0	0	0	0
225.0-247.5	2	0	0	0	0	2
247.5-270.0	0	0	0	0	0	0
270.0-292.5	2	0	0	0	0	2
292.5-315.0	0	2	0	0	0	2
315.0-337.5	0	5	0	0	0	5
337.5-360.0	0	18	0	0	0	18

Dall'analisi effettuata emerge che i superamenti della soglia di accettabilità risultano estremamente contenuti, infatti trattasi al massimo del 1.2% sul totale delle ore annue, per cui l'impatto risulta gestibile adottando procedure gestionali ed operative volte ad integrare quanto previsto dal PMC.

Si fa inoltre presente che lo scenario più gravoso riguarda la riprofilazione della Ex Lucchini e non la presenza della LI53 nella nuova configurazione.

3 Confronto con i risultati ottenuti nei precedenti studi

In Tabella 3.1 sono riportati i valori di concentrazione di odore ottenuti nel precedente elaborato[2] relativamente allo Scenario 2, che prevedeva le discariche Rimateria ed Ex-Lucchini provviste di coperture definitive e la discarica LI53, a meno del fronte in coltivazione attivo, munita di copertura temporanea su tutta la superficie esposta. I valori dello Scenario 2 sono stati confrontanti con quelli ottenuti in questo studio, relativi allo Scenario I, ovvero quello risultato più impattante, allo scopo di poter apprezzare la riduzione di impatto derivata dalla rimodulazione della discarica LI53. Tale riduzione, nei recettori più prossimi all'impianto supera il 50% ed è apprezzabile sia sullo scenario massimo di progetto che su quello medio.

Tabella 3.1 Confronto tra lo Scenario 2 dei precedenti studi e lo Scenario I Massimo e medio di questo studio. Valori in tabella espressi in U.Oe/m³.

	Scenario 2 Massimo	Scenario 2 Medio	Scenario I Massimo	Scenario I Medio	Riduzione sui valori massimi	Riduzione sui valori medi
R1	1.11	0.68	0.75	0.46	32%	32%
R2	0.31	0.19	0.22	0.13	31%	28%
R3	0.46	0.28	0.27	0.17	42%	40%
R4	2.70	1.63	2.29	1.43	15%	12%
R5	1.63	0.98	1.10	0.68	32%	30%
R6	0.63	0.37	0.29	0.18	54%	51%
R7	0.48	0.28	0.24	0.15	50%	47%
R8	0.42	0.24	0.21	0.13	50%	48%
R9	0.31	0.18	0.15	0.09	52%	50%
R10	2.19	1.34	1.67	1.05	24%	22%
R11	3.45	1.98	1.19	0.73	65%	63%
R12	2.69	1.53	1.07	0.64	60%	58%
R13	1.39	0.80	0.60	0.36	57%	55%
R14	0.20	0.12	0.11	0.07	44%	42%
R15	3.39	2.02	2.56	1.58	24%	22%
R16	3.12	1.85	2.30	1.40	26%	25%
R17	2.12	1.26	1.94	1.18	9%	7%
R18	2.70	1.55	1.57	0.95	42%	39%
R19	2.99	1.69	2.09	1.27	30%	25%
R20	4.55	2.58	2.11	1.25	54%	52%
R21	5.04	2.89	2.51	1.51	50%	48%
R22	4.63	2.62	2.39	1.42	48%	46%
R23	3.54	2.12	2.66	1.68	25%	21%

[2] "1_SIA_ALL1_Rimateria Stima degli impatti in atmosfera" consegnato in data 27/02/2019 con protocollo della Regione Toscana n.0096616 del 28/08/2019

	Scenario 2 Massimo	Scenario 2 Medio	Scenario I Massimo	Scenario I Medio	Riduzione sui valori massimi	Riduzione sui valori medi
R24	2.51	1.53	1.85	1.15	26%	25%

In Figura 3.1 è possibile osservare:

- a sinistra la mappa di concentrazione di picco di odore contenuta nella documentazione consegnata a Febbraio 2019, elaborata considerando la discarica Rimateria, Ex-Lucchini ed Li53;
- a destra la mappa di picco di odore ottenuta in questo studio.

Dal confronto delle due immagini si apprezza con immediatezza la riduzione dell'estensione dell'isolinea ad 1 $U.O_e/m^3$.

Figura 3.1 Mappa delle concentrazioni orarie di picco di odore al 98° percentile sull'intero periodo relative allo Scenario 2 (Rimateria, Ex-Lucchini e discarica LI53, contenuto all'interno dell'elaborato consegnato a Febbraio 2019) a sinistra, ed allo scenario medio di progetto, calcolato escludendo la presenza della LI53, sviluppato all'interno di questo studi

Nonostante lo Scenario I sia più gravoso, in termini di concentrazione di odore ai recettori, in Tabella 3.1 si riporta un confronto tra lo scenario 2 del precedente studio e lo Scenario II di questo studio, ovvero quello in cui è prevista la coltivazione della LI53 nella nuova rimodulazione.

Come si evince dalla tabella la riduzione dei volumi della sottocategoria 7.1.c porta globalmente ad una diminuzione di circa il 50% dell'impatto, in particolare sui recettori più sensibili R20, R21 ed R22 la riduzione è di oltre il 60%.

Tabella 3.2 Confronto tra lo Scenario 2 dei precedenti studi e lo Scenario II Massimo e medio di questo studio. Valori in tabella espressi in U.Oe/m³

	Scenario 2 Massimo	Scenario 2 Medio	Scenario II Massimo	Scenario II Medio	Riduzione sui valori massimi	Riduzione sui valori medi
R1	1.11	0.68	0.62	0.41	44%	40%
R2	0.31	0.19	0.16	0.11	48%	42%
R3	0.46	0.28	0.23	0.16	50%	43%
R4	2.7	1.63	1.74	1.12	36%	31%
R5	1.63	0.98	0.84	0.54	48%	45%
R6	0.63	0.37	0.26	0.17	59%	54%
R7	0.48	0.28	0.21	0.14	56%	50%
R8	0.42	0.24	0.19	0.12	55%	50%
R9	0.31	0.18	0.13	0.09	58%	50%
R10	2.19	1.34	1.38	0.89	37%	34%
R11	3.45	1.98	1.42	0.93	59%	53%
R12	2.69	1.53	0.99	0.64	63%	58%
R13	1.39	0.8	0.55	0.36	60%	55%
R14	0.2	0.12	0.1	0.06	50%	50%
R15	3.39	2.02	2.14	1.38	37%	32%
R16	3.12	1.85	1.27	0.81	59%	56%
R17	2.12	1.26	1.14	0.73	46%	42%
R18	2.7	1.55	1.09	0.7	60%	55%
R19	2.99	1.69	1.49	0.96	50%	43%
R20	4.55	2.58	1.53	1.01	66%	61%
R21	5.04	2.89	1.69	1.11	66%	62%
R22	4.63	2.62	1.6	1.05	65%	60%
R23	3.54	2.12	2.39	1.53	32%	28%
R24	2.51	1.53	1.5	0.97	40%	37%

L'analisi delle classi di frequenza dei superamenti evidenzia inoltre che il nuovo assetto impiantistico ha un minore impatto sul territorio limitrofe.

4 Osservazioni in merito ai risultati olfattometrici

Come già espresso all'interno della documentazione presentata in febbraio 2019 lo scenario di progetto più rappresentativo dell'impatto futuro del nuovo assetto impiantistico è quello in cui i fattori di emissione sono stati ottenuti utilizzando i valori medi misurati sull'attuale discarica Rimateria. A tale proposito si fa presente che lo scenario risulta comunque cautelativo in quanto:

- la gestione delle discariche future sarà migliorativa sia dal punto di vista della gestione delle coperture che dell'ottimizzazione della captazione del biogas.
- Rimateria conferirà rifiuti con un minor contenuto organico biodegradabile rispetto a quelli storicamente conferiti, questo garantirà un impatto olfattivo sicuramente minore rispetto alle attuali condizioni di esercizio.
- La fase attuale di gestione e coltivazione della discarica comprende lavorazioni straordinarie legate all'attività di realizzazione pozzi, stesura coperture etc. che possono creare potenziali effetti sulla generazione di odori.

Inoltre, relativamente alle ipotesi effettuate per la modellazione delle emissioni, si fa presente che:

- Il valore di input utilizzato per le aree in copertura definitiva è relativo al dato misurato sull'attuale copertura con telo in HDPE 1.5 diversamente da quanto previsto per la chiusura definitiva degli impianti futuri (secondo il pacchetto previsto dal D.Lgs 36/2003).
- L'area in copertura gestionale è stata sovrastimata, in quanto la messa in opera della copertura provvisoria da progetto dovrà avvenire con l'avanzamento della coltivazione, alla chiusura dei singoli lotti.

Per le ragioni di cui sopra si può supporre che in futuro i fattori emissivi risultino ridotti rispetti a quanto misurato nello stato attuale ed implementato in questo studio.

Si sottolinea che non esistono limiti in riferimento all'impatto olfattometrico, la difficoltà nel definire una soglia normativa è dovuta al fatto che l'odore è percepito in funzione della miscela di composti che caratterizza l'emissione e di molteplici condizioni esterne pertanto risulta difficile il monitoraggio in prossimità dei recettori, la norma stessa prevede che il campionamento sia effettuato alla sorgente e che l'impatto sul territorio sia valutato tramite modellistica. A seguito di ciò risulta fondamentale una robusta caratterizzazione delle emissioni.

Esistono tuttavia numerose Linee Guida e la redazione del documento SNPA n.38/2018 del maggio 2018 "Metodologie per la valutazione delle emissioni odorigene", elaborato a cura del Gruppo di Lavoro 13, cui Arpat ha partecipato, nell'ambito dei lavori del Programma Triennale 2014-2016, all'interno del quali sono indicati gli elementi ad oggi disponibili per la valutazione della problematica odorigena.

All'interno del documento si fa riferimento all'importanza della valutazione della presenza o meno di recettori all'interno dell'isolinea ad 1 UO_e/m^3 al fine di mettere in atto procedure di controllo e monitoraggio più restrittive all'interno del PMC, come schematizzato nel flow chart sottostante (Figura 4.1), estratto dal documento SNPA (Figura 6, Pagina 35, Capitolo 3 del documento n.38/2018).

A seguito di ciò, e considerato che il numero di superamenti della soglia di 1 UO_e/m^3 risulta contenuto e sono concentrati nelle ore notturne, in cui i recettori sensibili sono meno esposti e nei mesi e nei mesi invernali, si propone di inserire ulteriori procedure di contenimento dell'impatto all'interno del PMC una sezione dedicata alla caratterizzazione e contenimento delle emissioni odorigene, in particolare si propone di:

- attivare una programmazione dei conferimenti, ed una conseguente procedura operativa interna, in modo da conferire e mettere a dimora nelle due ore che precedono l'attivazione della chiusura del fronte, solo rifiuti da impatto odorigeno, anche solo potenziale, minimo.
- Anticipare la copertura del fronte entro le ore 18:00 nei mesi di giugno, luglio ed agosto, dove sebbene i superamenti olfattometrici risultano minori, la percezione dell'odore da parte della popolazione potrebbe essere maggiore, in modo da evitare accumuli di emissioni dovute ai fenomeni di inversione termica.
- Attivare un abbattimento odori mediante nebulizzazione di molecole attive neutralizzanti in base alle previsioni meteo, quando sono previsti venti da N – E, ovvero favorevoli ad un maggior impatto olfattivo.
- Effettuare l'aspirazione del biogas superficiale da inviare alla torcia, mediante anche la posa in opera di dreni di captazione sottocopertura, nel caso in cui la copertura temporanea si protragga per più di 1,5 anni.
- Installare una stazione di monitoraggio in continuo di H_2S e CH_4 nell'area esterna all'impianto in aggiunta al monitoraggio già previsto, interessati dalla frequenza più alta di superamenti di 1 UO_e/m^3. Ciò in aggiunta al monitoraggio in continuo previsto all'interno dell'impianto di Rimateria.
- Aumentare la frequenza dei monitoraggio delle emissioni odorigene e delle emissioni diffuse di biogas per poter verificare l'efficacia delle attività messe in atto oppure attivare procedure ad hoc per aree che evidenzino emissioni rilevanti.

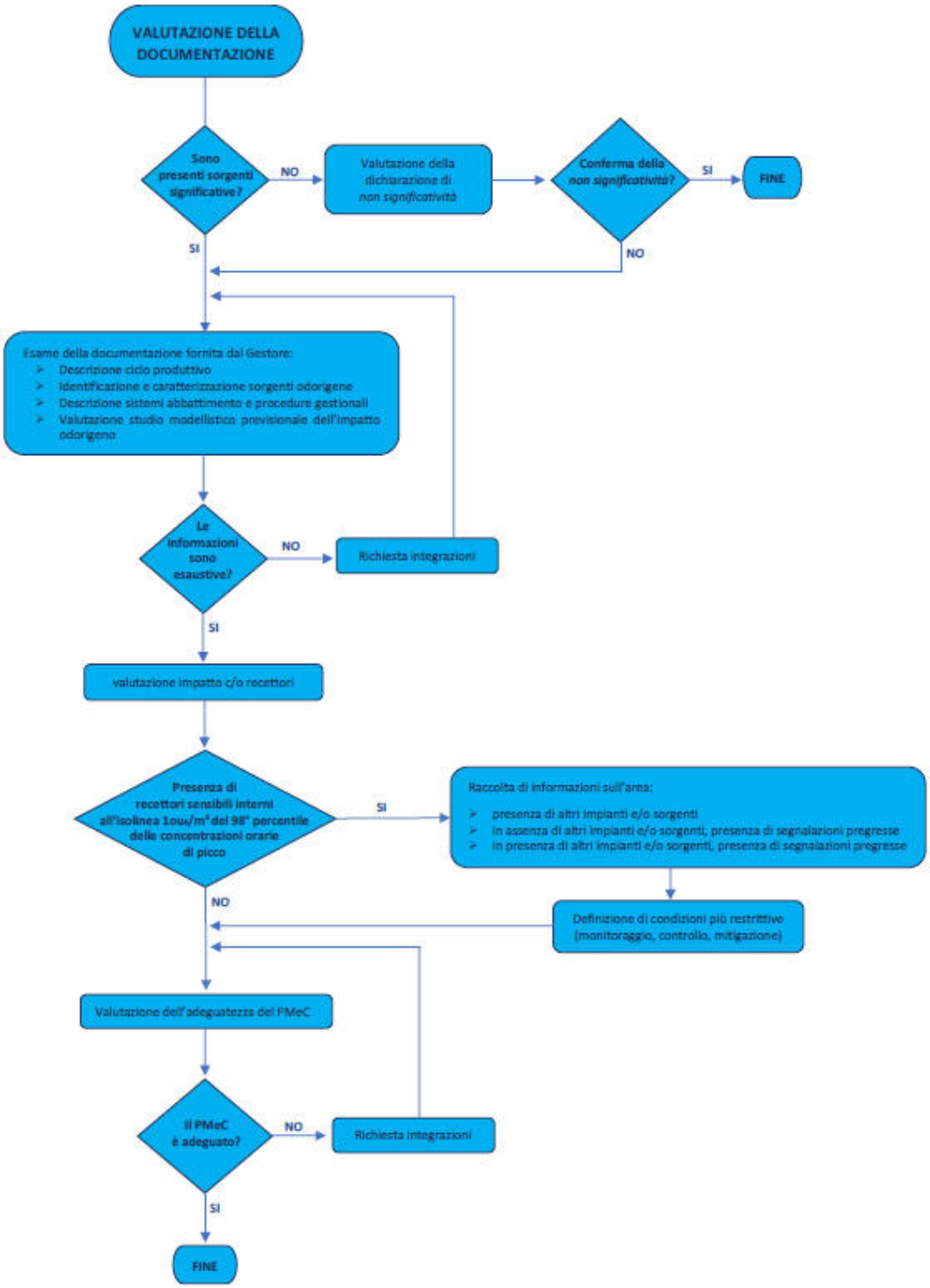

Figura 4.1 Schema esemplificativo relativo al percorso di valutazione nell'ambito delle procedure autorizzative– Documento SNPA n.38/2018

5 Conclusioni

Il presente studio è stato effettuato per valutare il potenziale impatto odorigeno derivato dall'ipotesi di progetto di rimodulazione delle volumetrie della Discarica LI53.

Dallo studio emerge che la riduzione delle volumetrie dedicate al conferimento di rifiuti con contenuto organico ha portato ad una diminuzione delle aree potenzialmente sorgenti di emissioni odorigene e che lo scenario maggiormente impattante non risulta essere associato alla coltivazione della LI53.

Le variazioni di cui sopra, congiuntamente ad una riprecisazione dell'area emissiva della Ex-Lucchini, hanno portato ad una riduzione dell'impatto olfattometrico in media del 39% per valori massimi e del 37% per valori medi, con punte di oltre il 50% per entrambi. Si ricorda che nello scenario medio del presente studio i valori ai recettori sono tutti inferiori a 2 UO_e/m^3.

L'analisi delle classi di frequenza dei superamenti ha evidenziato inoltre che nel nuovo assetto impiantistico il numero dei superamenti è minore, il potenziale impatto risulta pertanto gestibile attraverso un protocollo di monitoraggio specifico per le emissioni odorigene che includa soluzioni operative migliorative, un monitoraggio più frequente e più dettagliato della discarica, in modo da poter individuare tempestivamente eventuali situazioni critiche, ed un controllo in prossimità dei recettori più sensibili attraverso l'implementazione di un sistema di monitoraggio in continuo.

INDICE DELLE FIGURE

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Allegato 1 File Input di Calpuff

```
CALPUFF.INP     2.0             File version record

RIMATERIA Ex Asiu definitiva, Ex Lucchini Coltivazione Superficie 24500  H=25
Scenario 1 Medio(ODR2)

---------------- Run title (3 lines) ------------------------------------------

                    CALPUFF MODEL CONTROL FILE
                    --------------------------

--------------------------------------------------------------------------------

INPUT GROUP: 0 -- Input and Output File Names

--------------
Default Name  Type          File Name
------------  ----          ---------
CALMET.DAT    input    ! METDAT =C:\Calpuff\RIM08\MET17.DAT  !
    or
ISCMET.DAT    input    * ISCDAT =            *
    or
PLMMET.DAT    input    * PLMDAT =            *
    or
PROFILE.DAT   input    * PRFDAT =            *
SURFACE.DAT   input    * SFCDAT =            *
RESTARTB.DAT  input    * RSTARTB=            *
--------------------------------------------------------------------------------
-
CALPUFF.LST   output   ! PUFLST =ODR219.LST  !
CONC.DAT      output   ! CONDAT =ODR219.DAT  !
DFLX.DAT      output   * DFDAT  =            *
WFLX.DAT      output   * WFDAT  =            *

VISB.DAT      output   * VISDAT =            *
TK2D.DAT      output   * T2DDAT =            *
RHO2D.DAT     output   * RHODAT =            *
RESTARTE.DAT  output   * RSTARTE=            *
--------------------------------------------------------------------------------
-
Emission Files
--------------
PTEMARB.DAT   input    * PTDAT  =            *
VOLEMARB.DAT  input    * VOLDAT =            *
BAEMARB.DAT   input    * ARDAT  =            *
LNEMARB.DAT   input    * LNDAT  =            *
--------------------------------------------------------------------------------
-
Other Files
-----------
OZONE.DAT     input    * OZDAT  =            *
VD.DAT        input    * VDDAT  =            *
CHEM.DAT      input    * CHEMDAT=            *
AUX           input    ! AUXEXT =AUX     !
(Extension added to METDAT filename(s) for files
```

```
 with auxiliary 2D and 3D data)
H2O2.DAT      input    * H2O2DAT=             *
NH3Z.DAT      input    * NH3ZDAT=             *
HILL.DAT      input    * HILDAT=             *
HILLRCT.DAT   input    * RCTDAT=             *
COASTLN.DAT   input    * CSTDAT=             *
FLUXBDY.DAT   input    * BDYDAT=             *
BCON.DAT      input    * BCNDAT=             *
DEBUG.DAT     output   * DEBUG =             *
MASSFLX.DAT   output   * FLXDAT=             *
MASSBAL.DAT   output   * BALDAT=             *
FOG.DAT       output   * FOGDAT=             *
RISE.DAT      output   * RISDAT=             *
------------------------------------------------------------------------------
-
All file names will be converted to lower case if LCFILES = T
Otherwise, if LCFILES = F, file names will be converted to UPPER CASE
         T = lower case      ! LCFILES = F !
         F = UPPER CASE
NOTE: (1) file/path names can be up to 132 characters in length


Provision for multiple input files
----------------------------------

     Number of Modeling Domains (NMETDOM)
                                   Default: 1       ! NMETDOM =  1  !

     Number of CALMET.DAT files for run (NMETDAT)
                                   Default: 1       ! NMETDAT =   1   !

     Number of PTEMARB.DAT files for run (NPTDAT)
                                   Default: 0       ! NPTDAT =   0   !

     Number of BAEMARB.DAT files for run (NARDAT)
                                   Default: 0       ! NARDAT =   0   !

     Number of VOLEMARB.DAT files for run (NVOLDAT)
                                   Default: 0       ! NVOLDAT =   0   !

!END!

-------------
Subgroup (0a)
-------------

  Provide a name for each CALMET domain if NMETDOM > 1
  Enter NMETDOM lines.
                                  a,b
Default Name             Domain Name
------------             ------------
 none                  * DOMAIN1=     *   *END*
 none                  * DOMAIN2=     *   *END*
 none                  * DOMAIN3=     *   *END*
```

```
  The following CALMET.DAT filenames are processed in sequence
  if NMETDAT > 1

  Enter NMETDAT lines, 1 line for each file name.

                                    a,c,d
Default Name  Type          File Name
------------  ----          ---------
 none         input    * METDAT1=     *   *END*
 none         input    * METDAT2=     *   *END*
 none         input    * METDAT3=     *   *END*

-------------
    a
     The name for each CALMET domain and each CALMET.DAT file is treated
     as a separate input subgroup and therefore must end with an input
     group terminator.
    b
     Use DOMAIN1= to assign the name for the outermost CALMET domain.
     Use DOMAIN2= to assign the name for the next inner CALMET domain.
     Use DOMAIN3= to assign the name for the next inner CALMET domain, etc.
      ------------------------------------------------------------------
      |   When inner domains with equal resolution (grid-cell size)    |
      |   overlap, the data from the FIRST such domain in the list will |
      |   be used if all other criteria for choosing the controlling    |
      |   grid domain are inconclusive.                                 |
      ------------------------------------------------------------------
    c
     Use METDAT1= to assign the file names for the outermost CALMET domain.
     Use METDAT2= to assign the file names for the next inner CALMET domain.
     Use METDAT3= to assign the file names for the next inner CALMET domain,
etc.
    d
     The filenames for each domain must be provided in sequential order

-------------
Subgroup (0b)
-------------

  The following PTEMARB.DAT filenames are processed if NPTDAT>0
  (Each file contains a subset of the sources, for the entire simulation)

Default Name  Type          File Name
------------  ----          ---------
 none         input       * PTDAT=     *   *END*


-------------
Subgroup (0c)
-------------

  The following BAEMARB.DAT filenames are processed if NARDAT>0
```

```
  (Each file contains a subset of the sources, for the entire simulation)

Default Name  Type          File Name
------------  ----          ---------
 none         input       * ARDAT=     *   *END*


-------------
Subgroup (0d)
-------------

  The following VOLEMARB.DAT filenames are processed if NVOLDAT>0
  (Each file contains a subset of the sources, for the entire simulation)

Default Name  Type          File Name
------------  ----          ---------
 none         input       * VOLDAT=     *   *END*


------------------------------------------------------------------------------
-

INPUT GROUP: 1 -- General run control parameters
--------------

    Option to run all periods found
    in the met. file     (METRUN)   Default: 0       ! METRUN =   1  !

        METRUN = 0 - Run period explicitly defined below
        METRUN = 1 - Run all periods in met. file

     Starting date:    Year   (IBYR)  --    No default   ! IBYR  =  2017  !
                       Month  (IBMO)  --    No default   ! IBMO  =  0  !
                       Day    (IBDY)  --    No default   ! IBDY  =  0  !
     Starting time:    Hour   (IBHR)  --    No default   ! IBHR  =  0  !
                       Minute (IBMIN) --    No default   ! IBMIN =  0  !
                       Second (IBSEC) --    No default   ! IBSEC =  0  !

     Ending date:      Year   (IEYR)  --    No default   ! IEYR  =  0  !
                       Month  (IEMO)  --    No default   ! IEMO  =  0  !
                       Day    (IEDY)  --    No default   ! IEDY  =  0  !
     Ending time:      Hour   (IEHR)  --    No default   ! IEHR  =  0  !
                       Minute (IEMIN) --    No default   ! IEMIN =  0  !
                       Second (IESEC) --    No default   ! IESEC =  0  !

     (These are only used if METRUN = 0)

     Base time zone:          (ABTZ)  --    No default   ! ABTZ= UTC+0000 !
      (character*8)
     The modeling domain may span multiple time zones.  ABTZ defines the
     base time zone used for the entire simulation.  This must match the
     base time zone of the meteorological data.
     Examples:
         Los Angeles, USA          = UTC-0800
```

```
    New York, USA             = UTC-0500
    Santiago, Chile           = UTC-0400
    Greenwich Mean Time (GMT) = UTC+0000
    Rome, Italy               = UTC+0100
    Cape Town, S.Africa       = UTC+0200
    Sydney, Australia         = UTC+1000

Length of modeling time-step (seconds)
Equal to update period in the primary
meteorological data files, or an
integer fraction of it (1/2, 1/3 ...)
Must be no larger than 1 hour
(NSECDT)                      Default:3600     ! NSECDT =  3600  !
                              Units: seconds

Number of chemical species (NSPEC)
                              Default: 5       ! NSPEC = 1   !

Number of chemical species
to be emitted  (NSE)          Default: 3       ! NSE =  1   !

Flag to stop run after
SETUP phase (ITEST)           Default: 2       ! ITEST =  2   !
(Used to allow checking
of the model inputs, files, etc.)
      ITEST = 1 - STOPS program after SETUP phase
      ITEST = 2 - Continues with execution of program
                  after SETUP

Restart Configuration:

   Control flag (MRESTART)    Default: 0       ! MRESTART =  0   !

      0 = Do not read or write a restart file
      1 = Read a restart file at the beginning of
          the run
      2 = Write a restart file during run
      3 = Read a restart file at beginning of run
          and write a restart file during run

   Number of periods in Restart
   output cycle (NRESPD)      Default: 0       ! NRESPD =  0   !

      0 = File written only at last period
     >0 = File updated every NRESPD periods

Meteorological Data Format (METFM)
                              Default: 1       ! METFM =  1   !

      METFM = 1 - CALMET binary file (CALMET.MET)
      METFM = 2 - ISC ASCII file (ISCMET.MET)
      METFM = 3 - AUSPLUME ASCII file (PLMMET.MET)
      METFM = 4 - CTDM plus tower file (PROFILE.DAT) and
                  surface parameters file (SURFACE.DAT)
```

```
            METFM = 5 - AERMET tower file (PROFILE.DAT) and
                        surface parameters file (SURFACE.DAT)

     Meteorological Profile Data Format (MPRFFM)
            (used only for METFM = 1, 2, 3)
                                    Default: 1       ! MPRFFM =  1   !

            MPRFFM = 1 - CTDM plus tower file (PROFILE.DAT)
            MPRFFM = 2 - AERMET tower file (PROFILE.DAT)

     PG sigma-y is adjusted by the factor (AVET/PGTIME)**0.2
     Averaging Time (minutes) (AVET)
                                    Default: 60.0    ! AVET = 60. !
     PG Averaging Time (minutes) (PGTIME)
                                    Default: 60.0    ! PGTIME = 60. !


     Output units for binary concentration and flux files
     written in Dataset v2.2 or later formats
     (IOUTU)                        Default: 1       ! IOUTU =  2   !
         1 = mass      -  g/m3 (conc) or g/m2/s (dep)
         2 = odour     -  odour_units (conc)
         3 = radiation -  Bq/m3 (conc) or Bq/m2/s (dep)


     Output Dataset format for binary concentration
     and flux files (e.g., CONC.DAT)
     (IOVERS)                       Default: 2       ! IOVERS =  2   !
         1 = Dataset Version 2.1
         2 = Dataset Version 2.2


!END!


------------------------------------------------------------------------------

INPUT GROUP: 2 -- Technical options
--------------


     Vertical distribution used in the
     near field (MGAUSS)                Default: 1     ! MGAUSS =  1   !
        0 = uniform
        1 = Gaussian

     Terrain adjustment method
     (MCTADJ)                           Default: 3     ! MCTADJ =  3   !
        0 = no adjustment
        1 = ISC-type of terrain adjustment
        2 = simple, CALPUFF-type of terrain
            adjustment
        3 = partial plume path adjustment
```

```
Subgrid-scale complex terrain
flag (MCTSG)                          Default: 0     ! MCTSG =  0   !
   0 = not modeled
   1 = modeled

Near-field puffs modeled as
elongated slugs? (MSLUG)              Default: 0     ! MSLUG =  0   !
   0 = no
   1 = yes (slug model used)

Transitional plume rise modeled?
(MTRANS)                              Default: 1     ! MTRANS =  1   !
   0 = no  (i.e., final rise only)
   1 = yes (i.e., transitional rise computed)

Stack tip downwash? (MTIP)            Default: 1     ! MTIP =  1  !
   0 = no  (i.e., no stack tip downwash)
   1 = yes (i.e., use stack tip downwash)

Method used to compute plume rise for
point sources not subject to building
downwash? (MRISE)                     Default: 1     ! MRISE =  1  !
   1 = Briggs plume rise
   2 = Numerical plume rise

Method used to simulate building
downwash? (MBDW)                      Default: 1     ! MBDW =   1  !
   1 = ISC method
   2 = PRIME method

Vertical wind shear modeled above
stack top (modified Briggs plume rise)?
(MSHEAR)                              Default: 0     ! MSHEAR =  1  !
   0 = no  (i.e., vertical wind shear not modeled)
   1 = yes (i.e., vertical wind shear modeled)

Puff splitting allowed? (MSPLIT)      Default: 0     ! MSPLIT =  0  !
   0 = no (i.e., puffs not split)
   1 = yes (i.e., puffs are split)

Chemical mechanism flag (MCHEM)       Default: 1     ! MCHEM =  0   !
   0 = chemical transformation not
       modeled
   1 = transformation rates computed
       internally (MESOPUFF II scheme)
   2 = user-specified transformation
       rates used
   3 = transformation rates computed
       internally (RIVAD/ARM3 scheme)
   4 = secondary organic aerosol formation
       computed (MESOPUFF II scheme for OH)
   5 = user-specified half-life with or
       without transfer to child species
   6 = transformation rates computed
```

```
        internally (Updated RIVAD scheme with
        ISORROPIA equilibrium)
    7 = transformation rates computed
        internally (Updated RIVAD scheme with
        ISORROPIA equilibrium and CalTech SOA)

Aqueous phase transformation flag (MAQCHEM)
(Used only if MCHEM = 6, or 7)        Default: 0     ! MAQCHEM =  0   !
    0 = aqueous phase transformation
        not modeled
    1 = transformation rates and wet
        scavenging coefficients adjusted
        for in-cloud aqueous phase reactions
        (adapted from RADM cloud model
         implementation in CMAQ/SCICHEM)

Liquid Water Content flag (MLWC)
(Used only if MAQCHEM = 1)            Default: 1     ! MLWC =  1   !
    0 = water content estimated from cloud cover
        and presence of precipitation
    1 = gridded cloud water data read from CALMET
        water content output files (filenames are
        the CALMET.DAT names PLUS the extension
        AUXEXT provided in Input Group 0)

Wet removal modeled ? (MWET)          Default: 1     ! MWET =  0   !
    0 = no
    1 = yes

Dry deposition modeled ? (MDRY)       Default: 1     ! MDRY =  0   !
    0 = no
    1 = yes
    (dry deposition method specified
     for each species in Input Group 3)


Gravitational settling (plume tilt)
modeled ? (MTILT)                     Default: 0     ! MTILT =  0   !
    0 = no
    1 = yes
    (puff center falls at the gravitational
     settling velocity for 1 particle species)

Restrictions:
     - MDRY  = 1
     - NSPEC = 1  (must be particle species as well)
     - sg    = 0  GEOMETRIC STANDARD DEVIATION in Group 8 is
                  set to zero for a single particle diameter

Method used to compute dispersion
coefficients (MDISP)                  Default: 3     ! MDISP =  3   !

    1 = dispersion coefficients computed from measured values
        of turbulence, sigma v, sigma w
```

```
   2 = dispersion coefficients from internally calculated
       sigma v, sigma w using micrometeorological variables
       (u*, w*, L, etc.)
   3 = PG dispersion coefficients for RURAL areas (computed using
       the ISCST multi-segment approximation) and MP coefficients in
       urban areas
   4 = same as 3 except PG coefficients computed using
       the MESOPUFF II eqns.
   5 = CTDM sigmas used for stable and neutral conditions.
       For unstable conditions, sigmas are computed as in
       MDISP = 3, described above.  MDISP = 5 assumes that
       measured values are read

Sigma-v/sigma-theta, sigma-w measurements used? (MTURBVW)
(Used only if MDISP = 1 or 5)         Default: 3     ! MTURBVW =  3  !
   1 = use sigma-v or sigma-theta measurements
       from PROFILE.DAT to compute sigma-y
       (valid for METFM = 1, 2, 3, 4, 5)
   2 = use sigma-w measurements
       from PROFILE.DAT to compute sigma-z
       (valid for METFM = 1, 2, 3, 4, 5)
   3 = use both sigma-(v/theta) and sigma-w
       from PROFILE.DAT to compute sigma-y and sigma-z
       (valid for METFM = 1, 2, 3, 4, 5)
   4 = use sigma-theta measurements
       from PLMMET.DAT to compute sigma-y
       (valid only if METFM = 3)

Back-up method used to compute dispersion
when measured turbulence data are
missing (MDISP2)                      Default: 3     ! MDISP2 =  3  !
(used only if MDISP = 1 or 5)
   2 = dispersion coefficients from internally calculated
       sigma v, sigma w using micrometeorological variables
       (u*, w*, L, etc.)
   3 = PG dispersion coefficients for RURAL areas (computed using
       the ISCST multi-segment approximation) and MP coefficients in
       urban areas
   4 = same as 3 except PG coefficients computed using
       the MESOPUFF II eqns.

[DIAGNOSTIC FEATURE]
Method used for Lagrangian timescale for Sigma-y
(used only if MDISP=1,2 or MDISP2=1,2)
(MTAULY)                              Default: 0     ! MTAULY =  0  !
   0 = Draxler default 617.284 (s)
   1 = Computed as Lag. Length / (.75 q) -- after SCIPUFF
  10 < Direct user input (s)             -- e.g., 306.9


[DIAGNOSTIC FEATURE]
Method used for Advective-Decay timescale for Turbulence
(used only if MDISP=2 or MDISP2=2)
(MTAUADV)                             Default: 0     ! MTAUADV =  0  !
```

```
   0 = No turbulence advection
   1 = Computed (OPTION NOT IMPLEMENTED)
  10 < Direct user input (s)   -- e.g., 800


Method used to compute turbulence sigma-v &
sigma-w using micrometeorological variables
(Used only if MDISP = 2 or MDISP2 = 2)
(MCTURB)                              Default: 1     ! MCTURB =  1  !
   1 = Standard CALPUFF subroutines
   2 = AERMOD subroutines

PG sigma-y,z adj. for roughness?      Default: 0     ! MROUGH =  0  !
(MROUGH)
   0 = no
   1 = yes

Partial plume penetration of          Default: 1     ! MPARTL =  1  !
elevated inversion modeled for
point sources?
(MPARTL)
   0 = no
   1 = yes

Partial plume penetration of          Default: 1     ! MPARTLBA =  1  !
elevated inversion modeled for
buoyant area sources?
(MPARTLBA)
   0 = no
   1 = yes

Strength of temperature inversion     Default: 0     ! MTINV =  0  !
provided in PROFILE.DAT extended records?
(MTINV)
   0 = no (computed from measured/default gradients)
   1 = yes

PDF used for dispersion under convective conditions?
                                      Default: 0     ! MPDF =  0  !
(MPDF)
   0 = no
   1 = yes

Sub-Grid TIBL module used for shore line?
                                      Default: 0     ! MSGTIBL = 0  !
(MSGTIBL)
   0 = no
   1 = yes

Boundary conditions (concentration) modeled?
                                      Default: 0     ! MBCON = 0  !
(MBCON)
   0 = no
   1 = yes, using formatted BCON.DAT file
```

```
   2 = yes, using unformatted CONC.DAT file

Note:  MBCON > 0 requires that the last species modeled
       be 'BCON'.  Mass is placed in species BCON when
       generating boundary condition puffs so that clean
       air entering the modeling domain can be simulated
       in the same way as polluted air.  Specify zero
       emission of species BCON for all regular sources.

Individual source contributions saved?
                                       Default: 0     ! MSOURCE = 0  !
(MSOURCE)
   0 = no
   1 = yes


Analyses of fogging and icing impacts due to emissions from
arrays of mechanically-forced cooling towers can be performed
using CALPUFF in conjunction with a cooling tower emissions
processor (CTEMISS) and its associated postprocessors.  Hourly
emissions of water vapor and temperature from each cooling tower
cell are computed for the current cell configuration and ambient
conditions by CTEMISS. CALPUFF models the dispersion of these
emissions and provides cloud information in a specialized format
for further analysis. Output to FOG.DAT is provided in either
'plume mode' or 'receptor mode' format.

Configure for FOG Model output?
                                       Default: 0     ! MFOG =  0   !
(MFOG)
   0 = no
   1 = yes  - report results in PLUME Mode format
   2 = yes  - report results in RECEPTOR Mode format


Test options specified to see if
they conform to regulatory
values? (MREG)                         Default: 1     ! MREG =  0   !

   0 = NO checks are made
   1 = Technical options must conform to USEPA
       Long Range Transport (LRT) guidance
                  METFM    1 or 2
                  AVET     60. (min)
                  PGTIME   60. (min)
                  MGAUSS   1
                  MCTADJ   3
                  MTRANS   1
                  MTIP     1
                  MRISE    1
                  MCHEM    1 or 3 (if modeling SOx, NOx)
                  MWET     1
                  MDRY     1
                  MDISP    2 or 3
```

```
                    MPDF     0 if MDISP=3
                             1 if MDISP=2
                    MROUGH   0
                    MPARTL   1
                    MPARTLBA 0
                    SYTDEP   550. (m)
                    MHFTSZ   0
                    SVMIN    0.5 (m/s)


!END!


------------------------------------------------------------------------------

INPUT GROUP: 3a, 3b -- Species list
-------------------

------------
Subgroup (3a)
------------

  The following species are modeled:

! CSPEC =    ODR2 !         !END!




                                                        Dry
OUTPUT GROUP
    SPECIES          MODELED          EMITTED       DEPOSITED
NUMBER
     NAME         (0=NO, 1=YES)    (0=NO, 1=YES)    (0=NO,
(0=NONE,
   (Limit: 12                                        1=COMPUTED-GAS
1=1st CGRUP,
    Characters                                       2=COMPUTED-PARTICLE
2=2nd CGRUP,
    in length)                                       3=USER-SPECIFIED)     3=
etc.)

!    ODR2  =         1,               1,           0,                 0   !


!END!

  Note:  The last species in (3a) must be 'BCON' when using the
         boundary condition option (MBCON > 0).  Species BCON should
         typically be modeled as inert (no chem transformation or
         removal).


-------------
```

```
Subgroup (3b)
-------------
  The following names are used for Species-Groups in which results
  for certain species are combined (added) prior to output.  The
  CGRUP name will be used as the species name in output files.
  Use this feature to model specific particle-size distributions
  by treating each size-range as a separate species.
  Order must be consistent with 3(a) above.



--------------------------------------------------------------------------------


INPUT GROUP: 4 -- Map Projection and Grid control parameters
--------------

     Projection for all (X,Y):
     -------------------------

     Map projection
     (PMAP)                    Default: UTM    ! PMAP = UTM  !

         UTM :  Universal Transverse Mercator
         TTM :  Tangential Transverse Mercator
         LCC :  Lambert Conformal Conic
          PS :  Polar Stereographic
          EM :  Equatorial Mercator
        LAZA :  Lambert Azimuthal Equal Area

     False Easting and Northing (km) at the projection origin
     (Used only if PMAP= TTM, LCC, or LAZA)
     (FEAST)                   Default=0.0     ! FEAST  = 0.000  !
     (FNORTH)                  Default=0.0     ! FNORTH = 0.000  !

     UTM zone (1 to 60)
     (Used only if PMAP=UTM)
     (IUTMZN)                  No Default      ! IUTMZN =  32   !

     Hemisphere for UTM projection?
     (Used only if PMAP=UTM)
     (UTMHEM)                  Default: N      ! UTMHEM = N  !
         N   :  Northern hemisphere projection
         S   :  Southern hemisphere projection

     Latitude and Longitude (decimal degrees) of projection origin
     (Used only if PMAP= TTM, LCC, PS, EM, or LAZA)
     (RLAT0)                   No Default      ! RLAT0 =  0N  !
     (RLON0)                   No Default      ! RLON0 =  0E  !

         TTM :  RLON0 identifies central (true N/S) meridian of projection
                RLAT0 selected for convenience
         LCC :  RLON0 identifies central (true N/S) meridian of projection
                RLAT0 selected for convenience
```

```
         PS  :  RLON0 identifies central (grid N/S) meridian of projection
                RLAT0 selected for convenience
         EM  :  RLON0 identifies central meridian of projection
                RLAT0 is REPLACED by 0.0N (Equator)
         LAZA:  RLON0 identifies longitude of tangent-point of mapping plane
                RLAT0 identifies latitude of tangent-point of mapping plane

     Matching parallel(s) of latitude (decimal degrees) for projection
     (Used only if PMAP= LCC or PS)
     (XLAT1)                    No Default      ! XLAT1 =  0N  !
     (XLAT2)                    No Default      ! XLAT2 =  0N  !

         LCC :  Projection cone slices through Earth's surface at XLAT1 and
XLAT2
         PS  :  Projection plane slices through Earth at XLAT1
                (XLAT2 is not used)

     ----------
     Note:  Latitudes and longitudes should be positive, and include a
            letter N,S,E, or W indicating north or south latitude, and
            east or west longitude.  For example,
            35.9  N Latitude  =  35.9N
            118.7 E Longitude = 118.7E


     Datum-region
     ------------

     The Datum-Region for the coordinates is identified by a character
     string.  Many mapping products currently available use the model of the
     Earth known as the World Geodetic System 1984 (WGS-84).  Other local
     models may be in use, and their selection in CALMET will make its output0
    official transformation parameters is provided by the National Imagery and
     Mapping Agency (NIMA).

     NIMA Datum - Regions(Examples)

-------------------------------------------------------------------------------
     WGS-84    WGS-84 Reference Ellipsoid and Geoid, Global coverage (WGS84)
     NAS-C     NORTH AMERICAN 1927 Clarke 1866 Spheroid, MEAN FOR CONUS (NAD27)
     NAR-C     NORTH AMERICAN 1983 GRS 80 Spheroid, MEAN FOR CONUS (NAD83)
     NWS-84    NWS 6370KM Radius, Sphere
     ESR-S     ESRI REFERENCE 6371KM Radius, Sphere

     Datum-region for output coordinates
     (DATUM)                    Default: WGS-84    ! DATUM = WGS-84  !


METEOROLOGICAL Grid:

     Rectangular grid defined for projection PMAP,
     with X the Easting and Y the Northing coordinate

            No. X grid cells (NX)      No default     ! NX =  80   !
```

```
          No. Y grid cells (NY)      No default     ! NY =  80   !
       No. vertical layers (NZ)      No default     ! NZ =  7  !

         Grid spacing (DGRIDKM)      No default     ! DGRIDKM = .10 !
                                     Units: km

              Cell face heights
                  (ZFACE(nz+1))      No defaults
                                     Units: m
  ! ZFACE = 0.,20.,50.,100.,200.,500.,1000.,1500 !

          Reference Coordinates
         of SOUTHWEST corner of
               grid cell(1, 1):

          X coordinate (XORIGKM)     No default     ! XORIGKM = 622.273 !
          Y coordinate (YORIGKM)     No default     ! YORIGKM = 4753.048 !
                                    Units: km
```

COMPUTATIONAL Grid:

The computational grid is identical to or a subset of the MET. grid. The lower left (LL) corner of the computational grid is at grid point (IBCOMP, JBCOMP) of the MET. grid. The upper right (UR) corner of the computational grid is at grid point (IECOMP, JECOMP) of the MET. grid. The grid spacing of the computational grid is the same as the MET. grid.

```
   X index of LL corner (IBCOMP)      No default     ! IBCOMP =  1   !
             (1 <= IBCOMP <= NX)

   Y index of LL corner (JBCOMP)      No default     ! JBCOMP =  1   !
             (1 <= JBCOMP <= NY)


   X index of UR corner (IECOMP)      No default     ! IECOMP =  80   !
             (1 <= IECOMP <= NX)

   Y index of UR corner (JECOMP)      No default     ! JECOMP =  80   !
             (1 <= JECOMP <= NY)
```

SAMPLING Grid (GRIDDED RECEPTORS):

The lower left (LL) corner of the sampling grid is at grid point (IBSAMP, JBSAMP) of the MET. grid. The upper right (UR) corner of the sampling grid is at grid point (IESAMP, JESAMP) of the MET. grid. The sampling grid must be identical to or a subset of the computational grid. It may be a nested grid inside the computational grid. The grid spacing of the sampling grid is DGRIDKM/MESHDN.

```
   Logical flag indicating if gridded
   receptors are used (LSAMP)         Default: T     ! LSAMP = T !
```

```
        (T=yes, F=no)

        X index of LL corner (IBSAMP)      No default     ! IBSAMP =  1   !
         (IBCOMP <= IBSAMP <= IECOMP)

        Y index of LL corner (JBSAMP)      No default     ! JBSAMP =  1   !
         (JBCOMP <= JBSAMP <= JECOMP)


        X index of UR corner (IESAMP)      No default     ! IESAMP =  80   !
         (IBCOMP <= IESAMP <= IECOMP)

        Y index of UR corner (JESAMP)      No default     ! JESAMP =  80   !
         (JBCOMP <= JESAMP <= JECOMP)


       Nesting factor of the sampling
        grid (MESHDN)                      Default: 1     ! MESHDN =  1  !
        (MESHDN is an integer >= 1)

!END!


--------------------------------------------------------------------------------


INPUT GROUP: 5 -- Output Options
--------------
                                          *                          *
     FILE                        DEFAULT VALUE             VALUE THIS RUN
     ----                        -------------             --------------

   Concentrations (ICON)               1                   !  ICON =  1   !
   Dry Fluxes (IDRY)                   1                   !  IDRY =  0   !
   Wet Fluxes (IWET)                   1                   !  IWET =  0   !
   2D Temperature (IT2D)               0                   !  IT2D =  0   !
   2D Density (IRHO)                   0                   !  IRHO =  0   !
   Relative Humidity (IVIS)            1                   !  IVIS =  0   !
    (relative humidity file is
     required for visibility
     analysis)
   Use data compression option in output file?
   (LCOMPRS)                           Default: T          ! LCOMPRS = T !

   *
    0 = Do not create file, 1 = create file


    QA PLOT FILE OUTPUT OPTION:

       Create a standard series of output files (e.g.
       locations of sources, receptors, grids ...)
       suitable for plotting?
       (IQAPLOT)                       Default: 1          !  IQAPLOT =  1   !
```

```
     0 = no
     1 = yes

DIAGNOSTIC PUFF-TRACKING OUTPUT OPTION:

   Puff locations and properties reported to
   PFTRAK.DAT file for postprocessing?
   (IPFTRAK)                    Default: 0        ! IPFTRAK =  0   !
     0 = no
     1 = yes, update puff output at end of each timestep
     2 = yes, update puff output at end of each sampling step

DIAGNOSTIC MASS FLUX OUTPUT OPTIONS:

   Mass flux across specified boundaries
   for selected species reported?
   (IMFLX)                      Default: 0        ! IMFLX =  0  !
     0 = no
     1 = yes (FLUXBDY.DAT and MASSFLX.DAT filenames
              are specified in Input Group 0)

   Mass balance for each species
   reported?
   (IMBAL)                      Default: 0        ! IMBAL =  0  !
     0 = no
     1 = yes (MASSBAL.DAT filename is
          specified in Input Group 0)


NUMERICAL RISE OUTPUT OPTION:

   Create a file with plume properties for each rise
   increment, for each model timestep?
   This applies to sources modeled with numerical rise
   and is limited to ONE source in the run.
   (INRISE)                     Default: 0        ! INRISE =  0  !
     0 = no
     1 = yes (RISE.DAT filename is
              specified in Input Group 0)


LINE PRINTER OUTPUT OPTIONS:

   Print concentrations (ICPRT)    Default: 0     ! ICPRT =  1   !
   Print dry fluxes (IDPRT)        Default: 0     ! IDPRT =  0   !
   Print wet fluxes (IWPRT)        Default: 0     ! IWPRT =  0   !
   (0 = Do not print, 1 = Print)

   Concentration print interval
   (ICFRQ) in timesteps            Default: 1     ! ICFRQ =  1   !
   Dry flux print interval
   (IDFRQ) in timesteps            Default: 1     ! IDFRQ =  1   !
   Wet flux print interval
   (IWFRQ) in timesteps            Default: 1     ! IWFRQ =  1   !
```

```
       Units for Line Printer Output
       (IPRTU)                          Default: 1         ! IPRTU =  5   !
                      for              for
                  Concentration    Deposition
           1 =       g/m**3          g/m**2/s
           2 =      mg/m**3         mg/m**2/s
           3 =      ug/m**3         ug/m**2/s
           4 =      ng/m**3         ng/m**2/s
           5 =     Odour Units

       Messages tracking progress of run
       written to the screen ?
       (IMESG)                          Default: 2         ! IMESG =  2   !
         0 = no
         1 = yes (advection step, puff ID)
         2 = yes (YYYYJJJHH, # old puffs, # emitted puffs)


     SPECIES (or GROUP for combined species) LIST FOR OUTPUT OPTIONS

                  ---- CONCENTRATIONS ----   ------ DRY FLUXES ------   ------
WET FLUXES ------   -- MASS FLUX --
   SPECIES
   /GROUP        PRINTED?  SAVED ON DISK?   PRINTED?  SAVED ON DISK?   PRINTED?
 SAVED ON DISK?   SAVED ON DISK?
   -------       ------------------------   ------------------------
-----------------------   ---------------
!     ODR2 =     1,           1,           0,           0,           0,
  0,           0   !


  Note:  Species BCON (for MBCON > 0) does not need to be saved on disk.


     OPTIONS FOR PRINTING "DEBUG" QUANTITIES (much output)

       Logical for debug output
       (LDEBUG)                                 Default: F     ! LDEBUG = F !

       First puff to track
       (IPFDEB)                                 Default: 1     ! IPFDEB =  1  !

       Number of puffs to track
       (NPFDEB)                                 Default: 1     ! NPFDEB =  1  !

       Met. period to start output
       (NN1)                                    Default: 1     ! NN1 =  1   !

       Met. period to end output
       (NN2)                                    Default: 10    ! NN2 =  10  !

!END!
```

```
------------------------------------------------------------------------------


INPUT GROUP: 6a, 6b, & 6c -- Subgrid scale complex terrain inputs
-------------------------

--------------
Subgroup (6a)
--------------
       Number of terrain features (NHILL)       Default: 0     ! NHILL =  0   !

       Number of special complex terrain
       receptors  (NCTREC)                      Default: 0     ! NCTREC =  0
!

       Terrain and CTSG Receptor data for
       CTSG hills input in CTDM format ?
       (MHILL)                                  No Default     ! MHILL =  2   !
       1 = Hill and Receptor data created
           by CTDM processors & read from
           HILL.DAT and HILLRCT.DAT files
       2 = Hill data created by OPTHILL &
           input below in Subgroup (6b);
           Receptor data in Subgroup (6c)

       Factor to convert horizontal dimensions  Default: 1.0   ! XHILL2M = 1.0
!
       to meters (MHILL=1)

       Factor to convert vertical dimensions    Default: 1.0   ! ZHILL2M = 1.0
!
       to meters (MHILL=1)

       X-origin of CTDM system relative to      No Default     ! XCTDMKM = 0 !
       CALPUFF coordinate system, in Kilometers (MHILL=1)

       Y-origin of CTDM system relative to      No Default     ! YCTDMKM = 0 !
       CALPUFF coordinate system, in Kilometers (MHILL=1)

! END !

--------------
Subgroup (6b)
--------------

                     1 **
     HILL information


HILL           XC        YC       THETAH  ZGRID  RELIEF    EXPO 1    EXPO 2
SCALE 1    SCALE 2    AMAX1     AMAX2
 NO.           (km)      (km)      (deg.)   (m)     (m)      (m)       (m)
(m)        (m)       (m)       (m)
```

```
----          ----      ----      ------  -----  ------    ------    ------
-------    -------    -----     -----

---------------
Subgroup (6c)
---------------

    COMPLEX TERRAIN RECEPTOR INFORMATION

                      XRCT         YRCT        ZRCT          XHH
                      (km)         (km)         (m)
                     ------       -----      ------         ----


------------------
1
     Description of Complex Terrain Variables:
          XC, YC  = Coordinates of center of hill
          THETAH  = Orientation of major axis of hill (clockwise from
                    North)
          ZGRID   = Height of the  0  of the grid above mean sea
                    level
          RELIEF  = Height of the crest of the hill above the grid elevation
          EXPO 1  = Hill-shape exponent for the major axis
          EXPO 2  = Hill-shape exponent for the major axis
          SCALE 1 = Horizontal length scale along the major axis
          SCALE 2 = Horizontal length scale along the minor axis
          AMAX    = Maximum allowed axis length for the major axis
          BMAX    = Maximum allowed axis length for the major axis

          XRCT, YRCT = Coordinates of the complex terrain receptors
          ZRCT    = Height of the ground (MSL) at the complex terrain
                    Receptor
          XHH     = Hill number associated with each complex terrain receptor
                    (NOTE: MUST BE ENTERED AS A REAL NUMBER)

   **
     NOTE: DATA for each hill and CTSG receptor are treated as a separate
           input subgroup and therefore must end with an input group
terminator.

-------------------------------------------------------------------------------


INPUT GROUP: 7 -- Chemical parameters for dry deposition of gases
--------------

      SPECIES     DIFFUSIVITY      ALPHA STAR      REACTIVITY    MESOPHYLL
RESISTANCE     HENRY'S LAW COEFFICIENT
       NAME         (cm**2/s)                                        (s/cm)
              (dimensionless)
      -------     -----------      ----------      ----------
--------------------     ------------------------
```

```
!END!

--------------------------------------------------------------------------------


INPUT GROUP: 8 -- Size parameters for dry deposition of particles
--------------

     For SINGLE SPECIES, the mean and standard deviation are used to
     compute a deposition velocity for NINT (see group 9) size-ranges,
     and these are then averaged to obtain a mean deposition velocity.

     For GROUPED SPECIES, the size distribution should be explicitly
     specified (by the 'species' in the group), and the standard deviation
     for each should be entered as 0.  The model will then use the
     deposition velocity for the stated mean diameter.

      SPECIES      GEOMETRIC MASS MEAN        GEOMETRIC STANDARD
       NAME             DIAMETER                 DEVIATION
                        (microns)                (microns)
      -------      -------------------        ------------------

!END!

--------------------------------------------------------------------------------


INPUT GROUP: 9 -- Miscellaneous dry deposition parameters
--------------

     Reference cuticle resistance (s/cm)
     (RCUTR)                          Default: 30    !  RCUTR = 30.0 !
     Reference ground resistance  (s/cm)
     (RGR)                            Default: 10    !    RGR = 10.0 !
     Reference pollutant reactivity
     (REACTR)                         Default: 8     ! REACTR = 8.0 !

     Number of particle-size intervals used to
     evaluate effective particle deposition velocity
     (NINT)                           Default: 9     !   NINT =  9  !

     Vegetation state in unirrigated areas
     (IVEG)                           Default: 1     !   IVEG =  1   !
        IVEG=1 for active and unstressed vegetation
        IVEG=2 for active and stressed vegetation
        IVEG=3 for inactive vegetation

!END!

--------------------------------------------------------------------------------
```

INPUT GROUP: 10 -- Wet Deposition Parameters

Scavenging Coefficient -- Units: (sec)**(-1)

Pollutant	Liquid Precip.	Frozen Precip.

!END!

INPUT GROUP: 11a, 11b -- Chemistry Parameters

Subgroup (11a)

Several parameters are needed for one or more of the chemical transformation
mechanisms. Those used for each mechanism are:

Mechanism (MCHEM)	MOZ	BCKO3	MNH3	MAVGNH3	BCKNIT1	RNNIT2	RNNIT3	MH2O2	BCKH2O2	BCKPMF	OFRAC	VCNX	NDECAY
0 None	.	.	.	.	.	.	.	.	.	.	.	.	.
1 MESOPUFF II	X	X	.	.	X	X	X	X	.	.	.	.	.
2 User Rates	.	.	.	.	.	.	.	.	.	.	.	.	.
3 RIVAD	X	X	.	.	X	.	.	.	.	.	.	.	.
4 SOA	X	X	.	.	.	.	.	.	.	X	X	X	.
5 Radioactive Decay	.	.	.	.	.	.	.	.	.	.	.	.	X
6 RIVAD/ISORRPIA	X	X	X	X	X	X	.	.	X	X	.	.	.
7 RIVAD/ISORRPIA/SOA	X	X	X	X	X	X	.	.	X	X	X	X	.

Ozone data input option (MOZ) Default: 1 ! MOZ = 0 !
(Used only if MCHEM = 1, 3, 4, 6, or 7)
0 = use a monthly background ozone value
1 = read hourly ozone concentrations from
the OZONE.DAT data file

Monthly ozone concentrations in ppb (BCKO3)
(Used only if MCHEM = 1,3,4,6, or 7 and either
MOZ = 0, or

```
        MOZ = 1 and all hourly O3 data missing)
                                        Default: 12*80.
     !  BCKO3 = 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00,
80.00, 80.00, 80.00 !

     Ammonia data option (MNH3)        Default: 0            ! MNH3 =  0   !
     (Used only if MCHEM = 6 or 7)
        0 = use monthly background ammonia values (BCKNH3) - no vertical
variation
        1 = read monthly background ammonia values for each layer from
            the NH3Z.DAT data file

     Ammonia vertical averaging option (MAVGNH3)
     (Used only if MCHEM = 6 or 7, and MNH3 = 1)
        0 = use NH3 at puff center height (no averaging is done)
        1 = average NH3 values over vertical extent of puff
                                        Default: 1            ! MAVGNH3 =  1   !

     Monthly ammonia concentrations in ppb (BCKNH3)
     (Used only if MCHEM = 1 or 3, or
                if MCHEM = 6 or 7, and MNH3 = 0)
                                        Default: 12*10.
     !  BCKNH3 = 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00,
10.00, 10.00, 10.00 !

     Nighttime SO2 loss rate in %/hour (RNITE1)
     (Used only if MCHEM = 1, 6 or 7)
     This rate is used only at night for MCHEM=1
     and is added to the computed rate both day
     and night for MCHEM=6,7 (heterogeneous reactions)
                                        Default: 0.2          ! RNITE1 = .2 !

     Nighttime NOx loss rate in %/hour (RNITE2)
     (Used only if MCHEM = 1)
                                        Default: 2.0          ! RNITE2 = 2.0 !

     Nighttime HNO3 formation rate in %/hour (RNITE3)
     (Used only if MCHEM = 1)
                                        Default: 2.0          ! RNITE3 = 2.0 !

     H2O2 data input option (MH2O2)    Default: 1            ! MH2O2 =  1   !
     (Used only if MCHEM = 6 or 7, and MAQCHEM = 1)
        0 = use a monthly background H2O2 value
        1 = read hourly H2O2 concentrations from
            the H2O2.DAT data file

     Monthly H2O2 concentrations in ppb (BCKH2O2)
     (Used only if MQACHEM = 1 and either
        MH2O2 = 0 or
        MH2O2 = 1 and all hourly H2O2 data missing)
                                        Default: 12*1.
     !  BCKH2O2 = 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00,
1.00, 1.00 !
```

--- Data for SECONDARY ORGANIC AEROSOL (SOA) Options
(used only if MCHEM = 4 or 7)

The MCHEM = 4 SOA module uses monthly values of:
Fine particulate concentration in ug/m^3 (BCKPMF)
Organic fraction of fine particulate (OFRAC)
VOC / NOX ratio (after reaction) (VCNX)

The MCHEM = 7 SOA module uses monthly values of:
Fine particulate concentration in ug/m^3 (BCKPMF)
Organic fraction of fine particulate (OFRAC)

These characterize the air mass when computing
the formation of SOA from VOC emissions.
Typical values for several distinct air mass types are:

Month	1 Jan	2 Feb	3 Mar	4 Apr	5 May	6 Jun	7 Jul	8 Aug	9 Sep	10 Oct	11 Nov	12 Dec
Clean Continental												
BCKPMF	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
OFRAC	.15	.15	.20	.20	.20	.20	.20	.20	.20	.20	.20	.15
VCNX	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.
Clean Marine (surface)												
BCKPMF	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
OFRAC	.25	.25	.30	.30	.30	.30	.30	.30	.30	.30	.30	.25
VCNX	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.
Urban - low biogenic (controls present)												
BCKPMF	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.
OFRAC	.20	.20	.25	.25	.25	.25	.25	.25	.20	.20	.20	.20
VCNX	4.	4.	4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
Urban - high biogenic (controls present)												
BCKPMF	60.	60.	60.	60.	60.	60.	60.	60.	60.	60.	60.	60.
OFRAC	.25	.25	.30	.30	.30	.55	.55	.55	.35	.35	.35	.25
VCNX	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.
Regional Plume												
BCKPMF	20.	20.	20.	20.	20.	20.	20.	20.	20.	20.	20.	20.
OFRAC	.20	.20	.25	.35	.25	.40	.40	.40	.30	.30	.30	.20
VCNX	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.
Urban - no controls present												
BCKPMF	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.
OFRAC	.30	.30	.35	.35	.35	.55	.55	.55	.35	.35	.35	.30
VCNX	2.	2.	2.	2.	2.	2.	2.	2.	2.	2.	2.	2.

Default: Clean Continental
! BCKPMF = 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00,
1.00, 1.00 !
! OFRAC = 0.15, 0.15, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20,

```
0.20, 0.15 !
     !  VCNX   = 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00,
50.00, 50.00, 50.00 !

 --- End Data for SECONDARY ORGANIC AEROSOL (SOA) Option


     Number of half-life decay specification blocks provided in Subgroup 11b
     (Used only if MCHEM = 5)
     (NDECAY)                                  Default: 0      ! NDECAY =  0
!

!END!


--------------
Subgroup (11b)
--------------

     Each species modeled may be assigned a decay half-life (sec), and the
associated
     mass lost may be assigned to one or more other modeled species using a
mass yield
     factor. This information is used only for MCHEM=5.

     Provide NDECAY blocks assigning the half-life for a parent species and
mass yield
     factors for each child species (if any) produced by the decay.
     Set HALF_LIFE=0.0 for NO decay (infinite half-life).


                              a            b
        SPECIES      Half-Life   Mass Yield
         NAME          (sec)       Factor
        -------      ---------   ----------

     *   SPEC1   =    3600.,        -1.0   *    (Parent)
     *   SPEC2   =     -1.0,         0.0   *    (Child)
   *END*

--------
    a
     Specify a half life that is greater than or equal to zero for 1 parent
species
     in each block, and set the yield factor for this species to -1
    b
     Specify a yield factor that is greater than or equal to zero for 1 or more
child
     species in each block, and set the half-life for each of these species to
-1

     NOTE: Assignments in each block are treated as a separate input
           subgroup and therefore must end with an input group terminator.
           If NDECAY=0, no assignments and input group terminators should
```

appear.

INPUT GROUP: 12 -- Misc. Dispersion and Computational Parameters
---

Horizontal size of puff (m) beyond which
time-dependent dispersion equations (Heffter)
are used to determine sigma-y and
sigma-z (SYTDEP) Default: 550. ! SYTDEP =
5.5E02 !

Switch for using Heffter equation for sigma z
as above (0 = Not use Heffter; 1 = use Heffter
(MHFTSZ) Default: 0 ! MHFTSZ = 0
!

Stability class used to determine plume
growth rates for puffs above the boundary
layer (JSUP) Default: 5 ! JSUP = 5 !

Vertical dispersion constant for stable
conditions (k1 in Eqn. 2.7-3) (CONK1) Default: 0.01 ! CONK1 = .01 !

Vertical dispersion constant for neutral/
unstable conditions (k2 in Eqn. 2.7-4)
(CONK2) Default: 0.1 ! CONK2 = .1 !

Factor for determining Transition-point from
Schulman-Scire to Huber-Snyder Building Downwash
scheme (SS used for Hs < Hb + TBD * HL)
(TBD) Default: 0.5 ! TBD = .5 !
TBD < 0 ==> always use Huber-Snyder
TBD = 1.5 ==> always use Schulman-Scire
TBD = 0.5 ==> ISC Transition-point

Range of land use categories for which
urban dispersion is assumed
(IURB1, IURB2) Default: 10 ! IURB1 = 10
!
19 ! IURB2 = 19
!

Site characterization parameters for single-point Met data files ---------
(needed for METFM = 2,3,4,5)

Land use category for modeling domain
(ILANDUIN) Default: 20 ! ILANDUIN =
20 !

Roughness length (m) for modeling domain
(Z0IN) Default: 0.25 ! Z0IN = .25 !

```
        Leaf area index for modeling domain
        (XLAIIN)                                Default: 3.0    ! XLAIIN = 3.0
!

        Elevation above sea level (m)
        (ELEVIN)                                Default: 0.0    ! ELEVIN = .0 !

        Latitude (degrees) for met location
        (XLATIN)                                Default: -999.  ! XLATIN =
-999.0 !

        Longitude (degrees) for met location
        (XLONIN)                                Default: -999.  ! XLONIN =
-999.0 !

     Specialized information for interpreting single-point Met data files -----

        Anemometer height (m) (Used only if METFM = 2,3)
        (ANEMHT)                                Default: 10.    ! ANEMHT = 10.0
!

        Form of lateral turbulance data in PROFILE.DAT file
        (Used only if METFM = 4,5 or MTURBVW = 1 or 3)
        (ISIGMAV)                               Default: 1      ! ISIGMAV =  1
!
            0 = read sigma-theta
            1 = read sigma-v

        Choice of mixing heights (Used only if METFM = 4)
        (IMIXCTDM)                              Default: 0      ! IMIXCTDM =  0
 !
            0 = read PREDICTED mixing heights
            1 = read OBSERVED mixing heights

     Maximum length of a slug (met. grid units)
     (XMXLEN)                                   Default: 1.0    ! XMXLEN = 1.0
!

     Maximum travel distance of a puff/slug (in
     grid units) during one sampling step
     (XSAMLEN)                                  Default: 1.0    ! XSAMLEN = 1.0
!

     Maximum Number of slugs/puffs release from
     one source during one time step
     (MXNEW)                                    Default: 99     ! MXNEW =  99
!

     Maximum Number of sampling steps for
     one puff/slug during one time step
     (MXSAM)                                    Default: 99     ! MXSAM =  99
!
```

```
     Number of iterations used when computing
     the transport wind for a sampling step
     that includes gradual rise (for CALMET
     and PROFILE winds)
     (NCOUNT)                                  Default: 2      ! NCOUNT =  2
!

     Minimum sigma y for a new puff/slug (m)
     (SYMIN)                                   Default: 1.0    ! SYMIN = 1.0
!

     Minimum sigma z for a new puff/slug (m)
     (SZMIN)                                   Default: 1.0    ! SZMIN = 1.0
!

     Maximum sigma z (m) allowed to avoid
     numerical problem in calculating virtual
     time or distance.  Cap should be large
     enough to have no influence on normal events.
     Enter a negative cap to disable.
     (SZCAP_M)                                 Default: 5.0e06 ! SZCAP_M =
5.0E06 !

     Default minimum turbulence velocities sigma-v and sigma-w
     for each stability class over land and over water (m/s)
     (SVMIN(12) and SWMIN(12))

                     ----------  LAND  ----------       ---------  WATER
----------
        Stab Class :  A    B    C    D    E    F         A    B    C    D    E
  F
                     ---  ---  ---  ---  ---  ---       ---  ---  ---  ---  ---
 ---
     Default SVMIN : .50, .50, .50, .50, .50, .50,      .37, .37, .37, .37,
.37, .37
     Default SWMIN : .20, .12, .08, .06, .03, .016,     .20, .12, .08, .06,
.03, .016

          ! SVMIN = 0.500, 0.500, 0.500, 0.500, 0.500, 0.500, 0.370, 0.370,
0.370, 0.370, 0.370, 0.370!
          ! SWMIN = 0.200, 0.120, 0.080, 0.060, 0.030, 0.016, 0.200, 0.120,
0.080, 0.060, 0.030, 0.016!

     Divergence criterion for dw/dz across puff
     used to initiate adjustment for horizontal
     convergence (1/s)
     Partial adjustment starts at CDIV(1), and
     full adjustment is reached at CDIV(2)
     (CDIV(2))                                 Default: 0.0,0.0  ! CDIV = .0,
.0 !

     Search radius (number of cells) for nearest
     land and water cells used in the subgrid
     TIBL module
```

```
     (NLUTIBL)                                  Default: 4      ! NLUTIBL =  4
!

     Minimum wind speed (m/s) allowed for
     non-calm conditions. Also used as minimum
     speed returned when using power-law
     extrapolation toward surface
     (WSCALM)                                   Default: 0.5    ! WSCALM = .5 !

     Maximum mixing height (m)
     (XMAXZI)                                   Default: 3000.  ! XMAXZI =
3000.0 !

     Minimum mixing height (m)
     (XMINZI)                                   Default: 50.    ! XMINZI = 50.0
!

     Default wind speed classes --
     5 upper bounds (m/s) are entered;
     the 6th class has no upper limit
     (WSCAT(5))                      Default   :
                                     ISC RURAL : 1.54, 3.09, 5.14, 8.23, 10.8
(10.8+)

                                Wind Speed Class :  1     2     3     4     5
                                                    ---   ---   ---   ---   ---
                                       ! WSCAT = 1.54, 3.09, 5.14, 8.23, 10.80
!

     Default wind speed profile power-law
     exponents for stabilities 1-6
     (PLX0(6))                       Default   : ISC RURAL values
                                     ISC RURAL : .07, .07, .10, .15, .35, .55
                                     ISC URBAN : .15, .15, .20, .25, .30, .30

                                 Stability Class :  A     B     C     D     E
F
                                                    ---   ---   ---   ---   ---
---
                                        ! PLX0 = 0.07, 0.07, 0.10, 0.15, 0.35,
0.55 !

     Default potential temperature gradient
     for stable classes E, F (degK/m)
     (PTG0(2))                       Default: 0.020, 0.035
                                        ! PTG0 = 0.020,   0.035 !

     Default plume path coefficients for
     each stability class (used when option
     for partial plume height terrain adjustment
     is selected -- MCTADJ=3)
     (PPC(6))                   Stability Class :  A     B     C     D     E
F
                                   Default  PPC : .50,  .50,  .50,  .50,  .35,
```

```
.35
                                                  ---   ---   ---   ---   ---
---
                                        !  PPC = 0.50, 0.50, 0.50, 0.50, 0.35,
0.35 !

     Slug-to-puff transition criterion factor
     equal to sigma-y/length of slug
     (SL2PF)                            Default: 10.        ! SL2PF = 10.0 !

     Puff-splitting control variables -----------------------

       VERTICAL SPLIT
       --------------

       Number of puffs that result every time a puff
       is split - nsplit=2 means that 1 puff splits
       into 2
       (NSPLIT)                         Default:   3        ! NSPLIT =  3  !

       Time(s) of a day when split puffs are eligible to
       be split once again; this is typically set once
       per day, around sunset before nocturnal shear develops.
       24 values: 0 is midnight (00:00) and 23 is 11 PM (23:00)
       0=do not re-split    1=eligible for re-split
       (IRESPLIT(24))                   Default:  Hour 17 = 1
       !  IRESPLIT = 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0,0,0,0 !

       Split is allowed only if last hour's mixing
       height (m) exceeds a minimum value
       (ZISPLIT)                        Default: 100.       ! ZISPLIT =
100.0 !

       Split is allowed only if ratio of last hour's
       mixing ht to the maximum mixing ht experienced
       by the puff is less than a maximum value (this
       postpones a split until a nocturnal layer develops)
       (ROLDMAX)                        Default: 0.25       ! ROLDMAX = 0.25
!


       HORIZONTAL SPLIT
       ----------------

       Number of puffs that result every time a puff
       is split - nsplith=5 means that 1 puff splits
       into 5
       (NSPLITH)                        Default:   5        ! NSPLITH =  5
!

       Minimum sigma-y (Grid Cells Units) of puff
       before it may be split
       (SYSPLITH)                       Default:  1.0       ! SYSPLITH = 1.0
!
```

```
       Minimum puff elongation rate (SYSPLITH/hr) due to
       wind shear, before it may be split
       (SHSPLITH)                          Default:  2.        ! SHSPLITH = 2.0
!

       Minimum concentration (g/m^3) of each
       species in puff before it may be split
       Enter array of NSPEC values; if a single value is
       entered, it will be used for ALL species
       (CNSPLITH)                          Default:  1.0E-07   ! CNSPLITH =
1.0E-07 !

     Integration control variables ------------------------

       Fractional convergence criterion for numerical SLUG
       sampling integration
       (EPSSLUG)                           Default:   1.0e-04  ! EPSSLUG =
1.0E-04 !

       Fractional convergence criterion for numerical AREA
       source integration
       (EPSAREA)                           Default:   1.0e-06  ! EPSAREA =
1.0E-06 !

       Trajectory step-length (m) used for numerical rise
       integration
       (DSRISE)                            Default:   1.0      ! DSRISE = 1.0 !

       Boundary Condition (BC) Puff control variables ------------------------

       Minimum height (m) to which BC puffs are mixed as they are emitted
       (MBCON=2 ONLY).  Actual height is reset to the current mixing height
       at the release point if greater than this minimum.
       (HTMINBC)                           Default:   500.     ! HTMINBC =
500.0 !

       Search radius (km) about a receptor for sampling nearest BC puff.
       BC puffs are typically emitted with a spacing of one grid cell
       length, so the search radius should be greater than DGRIDKM.
       (RSAMPBC)                           Default:   10.      ! RSAMPBC = 10.0
!

       Near-Surface depletion adjustment to concentration profile used when
       sampling BC puffs?
       (MDEPBC)                            Default:   1        ! MDEPBC =  1  !
          0 = Concentration is NOT adjusted for depletion
          1 = Adjust Concentration for depletion

!END!


------------------------------------------------------------------------------
```

```
INPUT GROUPS: 13a, 13b, 13c, 13d -- Point source parameters
--------------------------------

---------------
Subgroup (13a)
---------------

     Number of point sources with
     parameters provided below      (NPT1)  No default  !  NPT1 =  0  !

     Units used for point source
     emissions below                (IPTU)  Default: 1  !  IPTU =   1  !
           1 =        g/s
           2 =       kg/hr
           3 =       lb/hr
           4 =     tons/yr
           5 =     Odour Unit * m**3/s  (vol. flux of odour compound)
           6 =     Odour Unit * m**3/min
           7 =     metric tons/yr
           8 =     Bq/s  (Bq = becquerel = disintegrations/s)
           9 =     GBq/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (13d)        (NSPT1) Default: 0  !  NSPT1 =  0  !

     Number of point sources with
     variable emission parameters
     provided in external file      (NPT2)  No default  !  NPT2 =  0  !

     (If NPT2 > 0, these point
     source emissions are read from
     the file: PTEMARB.DAT)

!END!

---------------
Subgroup (13b)
---------------
                                      a
          POINT SOURCE: CONSTANT DATA
          ----------------------------
                                                                        b
         c
  Source       X         Y       Stack    Base     Stack    Exit  Exit    Bldg.
 Emission
   No.     Coordinate Coordinate Height Elevation Diameter  Vel.  Temp.   Dwash
  Rates
              (km)      (km)       (m)      (m)       (m)  (m/s) (deg. K)

  ------   ---------- ---------- ------  ------   -------- ----- -------- -----
--------
```

---

a
Data for each source are treated as a separate input subgroup
and therefore must end with an input group terminator.

SRCNAM is a 12-character name for a source
(No default)
X is an array holding the source data listed by the column headings
(No default)
SIGYZI is an array holding the initial sigma-y and sigma-z (m)
(Default: 0.,0.)
FMFAC is a vertical momentum flux factor (0. or 1.0) used to represent
the effect of rain-caps or other physical configurations that
reduce momentum rise associated with the actual exit velocity.
(Default: 1.0 -- full momentum used)
ZPLTFM is the platform height (m) for sources influenced by an isolated
structure that has a significant open area between the surface
and the bulk of the structure, such as an offshore oil platform.
The Base Elevation is that of the surface (ground or ocean),
and the Stack Height is the release height above the Base (not
above the platform). Building heights entered in Subgroup 13c
must be those of the buildings on the platform, measured from
the platform deck. ZPLTFM is used only with MBDW=1 (ISC
downwash method) for sources with building downwash.
(Default: 0.0)

b
0. = No building downwash modeled
1. = Downwash modeled for buildings resting on the surface
2. = Downwash modeled for buildings raised above the surface (ZPLTFM > 0.)
NOTE: must be entered as a REAL number (i.e., with decimal point)

c
An emission rate must be entered for every pollutant modeled.
Enter emission rate of zero for secondary pollutants that are
modeled, but not emitted. Units are specified by IPTU
(e.g. 1 for g/s).

Subgroup (13c)

BUILDING DIMENSION DATA FOR SOURCES SUBJECT TO DOWNWASH

Source No.	Effective building height, width, length and X/Y offset (in meters) every 10 degrees. LENGTH, XBADJ, and YBADJ are only needed for MBDW=2 (PRIME downwash option) [a]

---

a
Building height, width, length, and X/Y offset from the source are treated as a separate input subgroup for each source and therefore must end with an input group terminator. The X/Y offset is the position, relative to the stack, of the center of the upwind face of the projected building, with the x-axis pointing along the flow direction.

Subgroup (13d)

---

a

POINT SOURCE: VARIABLE EMISSIONS DATA

Use this subgroup to describe temporal variations in the emission rates given in 13b. Factors entered multiply the rates in 13b. Skip sources here that have constant emissions. For more elaborate variation in source parameters, use PTEMARB.DAT and NPT2 > 0.

IVARY determines the type of variation, and is source-specific:
(IVARY) Default: 1

- 0 = Constant
- 1 = Diurnal cycle (24 scaling factors: hours 1-24)
- 2 = Monthly cycle (12 scaling factors: months 1-12)
- 3 = Hour & Season (4 groups of 24 hourly scaling factors, where first group is DEC-JAN-FEB)
- 4 = Speed & Stab. (6 groups of 6 scaling factors, where first group is Stability Class A, and the speed classes have upper bounds (m/s) defined in Group 12
- 5 = Temperature (12 scaling factors, where temperature classes have upper bounds (C) of: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 50+)

---

a
Data for each species are treated as a separate input subgroup and therefore must end with an input group terminator.

INPUT GROUPS: 14a, 14b, 14c, 14d -- Area source parameters

Subgroup (14a)

```
---------------

     Number of polygon area sources with
     parameters specified below (NAR1)       No default  !  NAR1 =  3   !

     Units used for area source
     emissions below           (IARU)       Default: 1  !  IARU =   5  !
           1 =        g/m**2/s
           2 =       kg/m**2/hr
           3 =       lb/m**2/hr
           4 =     tons/m**2/yr
           5 =     Odour Unit * m/s  (vol. flux/m**2 of odour compound)
           6 =     Odour Unit * m/min
           7 =     metric tons/m**2/yr
           8 =     Bq/m**2/s  (Bq = becquerel = disintegrations/s)
           9 =     GBq/m**2/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (14d)        (NSAR1) Default: 0  !  NSAR1 = 3  !

     Number of buoyant polygon area sources
     with variable location and emission
     parameters (NAR2)                      No default  !  NAR2 =  0   !
     (If NAR2 > 0, ALL parameter data for
     these sources are read from the file: BAEMARB.DAT)

!END!

---------------
Subgroup (14b)
---------------
                                    a
          AREA SOURCE: CONSTANT DATA
          --------------------------
                                                              b
Source           Effect.    Base      Initial    Emission
 No.             Height   Elevation   Sigma z     Rates
                   (m)       (m)        (m)
-------          ------    ------     --------   ---------

   1! SRCNAM = D1 !
   1! X =         0.0,      25.0,          .0,   0.14! !END!
   2! SRCNAM = D2 !
   2! X =         0.0,      25.0,          .0,   0.64! !END!
   3! SRCNAM = D3 !
   3! X =         0.0,      25.0,          .0,   6.35! !END!
--------
    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.
    b
     An emission rate must be entered for every pollutant modeled.
```

Enter emission rate of zero for secondary pollutants that are modeled, but not emitted. Units are specified by IARU (e.g. 1 for g/m**2/s).

Subgroup (14c)

COORDINATES (km) FOR EACH VERTEX(4) OF EACH POLYGON

Source No.	Ordered list of X followed by list of Y, grouped by source [a]
1	! SRCNAM = D1 !
1	! XVERT = 626.869, 626.972, 627.240, 627.225!
1	! YVERT = 4757.909, 4758.279, 4758.262, 4757.919!
	!END!
2	! SRCNAM = D2 !
2	! XVERT = 627.080, 627.297, 627.273, 627.022!
2	! YVERT = 4757.875, 4757.773, 4757.680, 4757.788!
	!END!
3	! SRCNAM = D3 !
3	! XVERT = 627.205, 627.206, 627.259, 627.261!
3	! YVERT = 4757.710, 4757.761, 4757.760, 4757.707!
	!END!

---

[a] Data for each source are treated as a separate input subgroup and therefore must end with an input group terminator.

Subgroup (14d)

AREA SOURCE: VARIABLE EMISSIONS DATA [a]

Use this subgroup to describe temporal variations in the emission rates given in 14b. Factors entered multiply the rates in 14b. Skip sources here that have constant emissions. For more elaborate variation in source parameters, use BAEMARB.DAT and NAR2 > 0.

IVARY determines the type of variation, and is source-specific:
(IVARY) Default: 0

- 0 = Constant
- 1 = Diurnal cycle (24 scaling factors: hours 1-24)
- 2 = Monthly cycle (12 scaling factors: months 1-12)
- 3 = Hour & Season (4 groups of 24 hourly scaling factors, where first group is DEC-JAN-FEB)
- 4 = Speed & Stab. (6 groups of 6 scaling factors, where first group is Stability Class A,

```
                                  and the speed classes have upper
                                  bounds (m/s) defined in Group 12
           5 =       Temperature  (12 scaling factors, where temperature
                                  classes have upper bounds (C) of:
                                  0, 5, 10, 15, 20, 25, 30, 35, 40,
                                  45, 50, 50+)

1  ! SRCNAM = D1 !
1  ! IVARY  = 1  ! (Diurnal Cycle)
1  ! ODR2 = 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1, 1!
!END!
2  ! SRCNAM = D2 !
2  ! IVARY  = 1  ! (Diurnal Cycle)
2  ! ODR2 = 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1, 1!
!END!
3  ! SRCNAM = D3 !
3  ! IVARY  = 1  ! (Diurnal Cycle)
3  ! ODR2 = 0.4, 0.4, 0.4, 0.4, 0.4, 0.4, 0.4, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
0.4, 0.4, 0.4, 0.4, 0.4, 0.4!
!END!


--------
    a
     Data for each species are treated as a separate input subgroup
     and therefore must end with an input group terminator.


-------------------------------------------------------------------------------

INPUT GROUPS: 15a, 15b, 15c -- Line source parameters
----------------------------

---------------
Subgroup (15a)
---------------

     Number of buoyant line sources
     with variable location and emission
     parameters (NLN2)                          No default  !  NLN2 =  0
!

     (If NLN2 > 0, ALL parameter data for
      these sources are read from the file: LNEMARB.DAT)

     Number of buoyant line sources (NLINES)    No default   ! NLINES =  0
!

     Units used for line source
     emissions below            (ILNU)          Default: 1  !  ILNU =   1
!
           1 =        g/s
```

```
           2 =       kg/hr
           3 =       lb/hr
           4 =     tons/yr
           5 =     Odour Unit * m**3/s  (vol. flux of odour compound)
           6 =     Odour Unit * m**3/min
           7 =     metric tons/yr
           8 =     Bq/s  (Bq = becquerel = disintegrations/s)
           9 =     GBq/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (15c)        (NSLN1) Default: 0  !  NSLN1 =  0  !

     Maximum number of segments used to model
     each line (MXNSEG)                              Default: 7   ! MXNSEG =  7
!

     The following variables are required only if NLINES > 0.  They are
     used in the buoyant line source plume rise calculations.

        Number of distances at which                 Default: 6   ! NLRISE =  6
!
        transitional rise is computed

        Average building length (XL)                 No default   ! XL = .0 !
                                                     (in meters)

        Average building height (HBL)                No default   ! HBL = .0 !
                                                     (in meters)

        Average building width (WBL)                 No default   ! WBL = .0 !
                                                     (in meters)

        Average line source width (WML)              No default   ! WML = .0 !
                                                     (in meters)

        Average separation between buildings (DXL)   No default   ! DXL = .0 !
                                                     (in meters)

        Average buoyancy parameter (FPRIMEL)         No default   ! FPRIMEL = .0
!
                                                     (in m**4/s**3)

!END!

---------------
Subgroup (15b)
---------------

          BUOYANT LINE SOURCE: CONSTANT DATA
          ----------------------------------

          a
```

Source No.	Beg. X Coordinate (km)	Beg. Y Coordinate (km)	End. X Coordinate (km)	End. Y Coordinate (km)	Release Height (m)	Base Elevation (m)	Emission Rates

a
Data for each source are treated as a separate input subgroup and therefore must end with an input group terminator.

b
An emission rate must be entered for every pollutant modeled. Enter emission rate of zero for secondary pollutants that are modeled, but not emitted. Units are specified by ILNTU (e.g. 1 for g/s).

Subgroup (15c)

---

a

BUOYANT LINE SOURCE: VARIABLE EMISSIONS DATA

Use this subgroup to describe temporal variations in the emission rates given in 15b. Factors entered multiply the rates in 15b. Skip sources here that have constant emissions.

IVARY determines the type of variation, and is source-specific:
(IVARY) Default: 0

- 0 = Constant
- 1 = Diurnal cycle (24 scaling factors: hours 1-24)
- 2 = Monthly cycle (12 scaling factors: months 1-12)
- 3 = Hour & Season (4 groups of 24 hourly scaling factors, where first group is DEC-JAN-FEB)
- 4 = Speed & Stab. (6 groups of 6 scaling factors, where first group is Stability Class A, and the speed classes have upper bounds (m/s) defined in Group 12
- 5 = Temperature (12 scaling factors, where temperature classes have upper bounds (C) of: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 50+)

---

a
Data for each species are treated as a separate input subgroup and therefore must end with an input group terminator.

```
--------------------------------------------------------------------------------


INPUT GROUPS: 16a, 16b, 16c -- Volume source parameters
---------------------------

---------------
Subgroup (16a)
---------------

     Number of volume sources with
     parameters provided in 16b,c (NVL1)     No default  !  NVL1 =  0   !

     Units used for volume source
     emissions below in 16b       (IVLU)     Default: 1  !  IVLU =   1  !
           1 =        g/s
           2 =       kg/hr
           3 =       lb/hr
           4 =     tons/yr
           5 =     Odour Unit * m**3/s  (vol. flux of odour compound)
           6 =     Odour Unit * m**3/min
           7 =     metric tons/yr
           8 =     Bq/s  (Bq = becquerel = disintegrations/s)
           9 =     GBq/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (16c)      (NSVL1)    Default: 0  !  NSVL1 =  0  !

     Number of volume sources with
     variable location and emission
     parameters                   (NVL2)     No default  !  NVL2 =   0   !

     (If NVL2 > 0, ALL parameter data for
      these sources are read from the VOLEMARB.DAT file(s) )

!END!

---------------
Subgroup (16b)
---------------
                                       a
           VOLUME SOURCE: CONSTANT DATA
           ----------------------------

b
         X           Y        Effect.    Base     Initial    Initial
Emission
     Coordinate  Coordinate   Height   Elevation  Sigma y    Sigma z     Rates
        (km)        (km)        (m)       (m)        (m)       (m)
     ----------  ----------   ------    ------    --------   --------
```

---

a
Data for each source are treated as a separate input subgroup
and therefore must end with an input group terminator.

b
An emission rate must be entered for every pollutant modeled.
Enter emission rate of zero for secondary pollutants that are
modeled, but not emitted. Units are specified by IVLU
(e.g. 1 for g/s).

Subgroup (16c)
---

a
VOLUME SOURCE: VARIABLE EMISSIONS DATA

Use this subgroup to describe temporal variations in the emission
rates given in 16b. Factors entered multiply the rates in 16b.
Skip sources here that have constant emissions. For more elaborate
variation in source parameters, use VOLEMARB.DAT and NVL2 > 0.

IVARY determines the type of variation, and is source-specific:
(IVARY) Default: 0

0 =	Constant	
1 =	Diurnal cycle	(24 scaling factors: hours 1-24)
2 =	Monthly cycle	(12 scaling factors: months 1-12)
3 =	Hour & Season	(4 groups of 24 hourly scaling factors, where first group is DEC-JAN-FEB)
4 =	Speed & Stab.	(6 groups of 6 scaling factors, where first group is Stability Class A, and the speed classes have upper bounds (m/s) defined in Group 12
5 =	Temperature	(12 scaling factors, where temperature classes have upper bounds (C) of: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 50+)

---

a
Data for each species are treated as a separate input subgroup
and therefore must end with an input group terminator.

INPUT GROUPS: 17a & 17b -- Non-gridded (discrete) receptor information
---

Subgroup (17a)

Number of non-gridded receptors (NREC) No default ! NREC = 24 !

!END!

Subgroup (17b)

NON-GRIDDED (DISCRETE) RECEPTOR DATA [a]

Receptor No.	X Coordinate (km)	Y Coordinate (km)	Ground Elevation (m)	Height Above Ground [b] (m)	
1 ! X =	625.881,	4758.441,	6.000,	2.000!	!END!
2 ! X =	629.505,	4760.275,	5.000,	2.000!	!END!
3 ! X =	624.476,	4759.954,	15.000,	2.000!	!END!
4 ! X =	626.506,	4758.008,	1.000,	2.000!	!END!
5 ! X =	625.270,	4757.623,	14.000,	2.000!	!END!
6 ! X =	625.404,	4755.270,	2.000,	2.000!	!END!
7 ! X =	623.288,	4755.253,	93.000,	2.000!	!END!
8 ! X =	622.569,	4755.324,	42.000,	2.000!	!END!
9 ! X =	624.618,	4753.865,	22.000,	2.000!	!END!
10 ! X =	626.490,	4758.302,	2.000,	2.000!	!END!
11 ! X =	626.732,	4756.595,	1.000,	2.000!	!END!
12 ! X =	626.042,	4756.848,	10.000,	2.000!	!END!
13 ! X =	625.710,	4756.140,	18.000,	2.000!	!END!
14 ! X =	630.273,	4757.648,	2.000,	2.000!	!END!
15 ! X =	627.012,	4758.717,	5.000,	2.000!	!END!
16 ! X =	627.710,	4757.634,	4.000,	2.000!	!END!
17 ! X =	627.856,	4757.882,	4.000,	2.000!	!END!
18 ! X =	625.709,	4757.216,	20.000,	2.000!	!END!
19 ! X =	626.325,	4757.737,	2.000,	2.000!	!END!
20 ! X =	626.247,	4757.333,	26.000,	2.000!	!END!
21 ! X =	626.346,	4757.478,	21.000,	2.000!	!END!
22 ! X =	626.271,	4757.513,	22.000,	2.000!	!END!
23 ! X =	626.918,	4758.552,	6.000,	2.000!	!END!
24 ! X =	626.693,	4758.573,	8.000,	2.000!	!END!

---

a
Data for each receptor are treated as a separate input subgroup and therefore must end with an input group terminator.

b
Receptor height above ground is optional. If no value is entered, the receptor is placed on the ground.

```
CALPUFF.INP     2.0             File version record

RIMATERIA ADR Var4, exLucchini superficie 24500 Odori Integrazione Fronte
Coltivazione H=25 Scenario 1 Massimo(ODR1)

---------------- Run title (3 lines) ----------------------------------------

                    CALPUFF MODEL CONTROL FILE
                    --------------------------

--------------------------------------------------------------------------------

INPUT GROUP: 0 -- Input and Output File Names

--------------
Default Name  Type          File Name
------------  ----          ---------
CALMET.DAT    input    ! METDAT =C:\Calpuff\RIM08\MET17.DAT  !
    or
ISCMET.DAT    input    * ISCDAT =             *
    or
PLMMET.DAT    input    * PLMDAT =             *
    or
PROFILE.DAT   input    * PRFDAT =             *
SURFACE.DAT   input    * SFCDAT =             *
RESTARTB.DAT  input    * RSTARTB=             *
--------------------------------------------------------------------------------
CALPUFF.LST   output   ! PUFLST =ODR19.LST  !
CONC.DAT      output   ! CONDAT =ODR19.DAT  !
DFLX.DAT      output   * DFDAT  =             *
WFLX.DAT      output   * WFDAT  =             *

VISB.DAT      output   * VISDAT =             *
TK2D.DAT      output   * T2DDAT =             *
RHO2D.DAT     output   * RHODAT =             *
RESTARTE.DAT  output   * RSTARTE=             *
--------------------------------------------------------------------------------
Emission Files
--------------
PTEMARB.DAT   input    * PTDAT  =             *
VOLEMARB.DAT  input    * VOLDAT =             *
BAEMARB.DAT   input    * ARDAT  =             *
LNEMARB.DAT   input    * LNDAT  =             *
--------------------------------------------------------------------------------
Other Files
-----------
OZONE.DAT     input    * OZDAT  =             *
VD.DAT        input    * VDDAT  =             *
CHEM.DAT      input    * CHEMDAT=             *
AUX           input    ! AUXEXT =AUX     !
(Extension added to METDAT filename(s) for files
 with auxiliary 2D and 3D data)
H2O2.DAT      input    * H2O2DAT=             *
NH3Z.DAT      input    * NH3ZDAT=             *
```

```
HILL.DAT      input    * HILDAT=             *
HILLRCT.DAT   input    * RCTDAT=             *
COASTLN.DAT   input    * CSTDAT=             *
FLUXBDY.DAT   input    * BDYDAT=             *
BCON.DAT      input    * BCNDAT=             *
DEBUG.DAT     output   * DEBUG =             *
MASSFLX.DAT   output   * FLXDAT=             *
MASSBAL.DAT   output   * BALDAT=             *
FOG.DAT       output   * FOGDAT=             *
RISE.DAT      output   * RISDAT=             *
------------------------------------------------------------------------------
All file names will be converted to lower case if LCFILES = T
Otherwise, if LCFILES = F, file names will be converted to UPPER CASE
         T = lower case      ! LCFILES = F !
         F = UPPER CASE
NOTE: (1) file/path names can be up to 132 characters in length


Provision for multiple input files
----------------------------------

     Number of Modeling Domains (NMETDOM)
                                   Default: 1       ! NMETDOM =  1  !

     Number of CALMET.DAT files for run (NMETDAT)
                                   Default: 1       ! NMETDAT =   1   !

     Number of PTEMARB.DAT files for run (NPTDAT)
                                   Default: 0       ! NPTDAT =   0   !

     Number of BAEMARB.DAT files for run (NARDAT)
                                   Default: 0       ! NARDAT =   0   !

     Number of VOLEMARB.DAT files for run (NVOLDAT)
                                   Default: 0       ! NVOLDAT =   0   !

!END!

-------------
Subgroup (0a)
-------------

  Provide a name for each CALMET domain if NMETDOM > 1
  Enter NMETDOM lines.
                                  a,b
Default Name             Domain Name
------------             ------------
 none                  * DOMAIN1=     *   *END*
 none                  * DOMAIN2=     *   *END*
 none                  * DOMAIN3=     *   *END*


  The following CALMET.DAT filenames are processed in sequence
  if NMETDAT > 1
```

Enter NMETDAT lines, 1 line for each file name.

Default Name	Type	File Name	a,c,d
none	input	* METDAT1=	* *END*
none	input	* METDAT2=	* *END*
none	input	* METDAT3=	* *END*

---

a
The name for each CALMET domain and each CALMET.DAT file is treated as a separate input subgroup and therefore must end with an input group terminator.

b
Use DOMAIN1= to assign the name for the outermost CALMET domain.
Use DOMAIN2= to assign the name for the next inner CALMET domain.
Use DOMAIN3= to assign the name for the next inner CALMET domain, etc.

> When inner domains with equal resolution (grid-cell size) overlap, the data from the FIRST such domain in the list will be used if all other criteria for choosing the controlling grid domain are inconclusive.

c
Use METDAT1= to assign the file names for the outermost CALMET domain.
Use METDAT2= to assign the file names for the next inner CALMET domain.
Use METDAT3= to assign the file names for the next inner CALMET domain, etc.

d
The filenames for each domain must be provided in sequential order

---

Subgroup (0b)

The following PTEMARB.DAT filenames are processed if NPTDAT>0
(Each file contains a subset of the sources, for the entire simulation)

Default Name	Type	File Name	
none	input	* PTDAT=	* *END*

Subgroup (0c)

The following BAEMARB.DAT filenames are processed if NARDAT>0
(Each file contains a subset of the sources, for the entire simulation)

Default Name	Type	File Name

```
 none         input       * ARDAT=     *   *END*


-------------
Subgroup (0d)
-------------

  The following VOLEMARB.DAT filenames are processed if NVOLDAT>0
  (Each file contains a subset of the sources, for the entire simulation)

Default Name  Type          File Name
------------  ----          ---------
 none         input       * VOLDAT=     *   *END*


------------------------------------------------------------------------------

INPUT GROUP: 1 -- General run control parameters
--------------

    Option to run all periods found
    in the met. file     (METRUN)   Default: 0       ! METRUN =   1  !

        METRUN = 0 - Run period explicitly defined below
        METRUN = 1 - Run all periods in met. file

     Starting date:    Year   (IBYR)  --    No default   ! IBYR  =  2017  !
                       Month  (IBMO)  --    No default   ! IBMO  =  0  !
                       Day    (IBDY)  --    No default   ! IBDY  =  0  !
     Starting time:    Hour   (IBHR)  --    No default   ! IBHR  =  0  !
                       Minute (IBMIN) --    No default   ! IBMIN =  0  !
                       Second (IBSEC) --    No default   ! IBSEC =  0  !

     Ending date:      Year   (IEYR)  --    No default   ! IEYR  =  0  !
                       Month  (IEMO)  --    No default   ! IEMO  =  0  !
                       Day    (IEDY)  --    No default   ! IEDY  =  0  !
     Ending time:      Hour   (IEHR)  --    No default   ! IEHR  =  0  !
                       Minute (IEMIN) --    No default   ! IEMIN =  0  !
                       Second (IESEC) --    No default   ! IESEC =  0  !

     (These are only used if METRUN = 0)

     Base time zone:          (ABTZ)  --    No default   ! ABTZ= UTC+0000 !
      (character*8)
     The modeling domain may span multiple time zones.  ABTZ defines the
     base time zone used for the entire simulation.  This must match the
     base time zone of the meteorological data.
     Examples:
         Los Angeles, USA          = UTC-0800
         New York, USA             = UTC-0500
         Santiago, Chile           = UTC-0400
         Greenwich Mean Time (GMT) = UTC+0000
         Rome, Italy               = UTC+0100
         Cape Town, S.Africa       = UTC+0200
```

```
    Sydney, Australia         = UTC+1000

Length of modeling time-step (seconds)
Equal to update period in the primary
meteorological data files, or an
integer fraction of it (1/2, 1/3 ...)
Must be no larger than 1 hour
(NSECDT)                      Default:3600     ! NSECDT =  3600  !
                              Units: seconds

Number of chemical species (NSPEC)
                              Default: 5       ! NSPEC = 1   !

Number of chemical species
to be emitted  (NSE)          Default: 3       ! NSE =  1   !

Flag to stop run after
SETUP phase (ITEST)           Default: 2       ! ITEST =  2   !
(Used to allow checking
of the model inputs, files, etc.)
      ITEST = 1 - STOPS program after SETUP phase
      ITEST = 2 - Continues with execution of program
                  after SETUP

Restart Configuration:

   Control flag (MRESTART)    Default: 0       ! MRESTART =  0   !

      0 = Do not read or write a restart file
      1 = Read a restart file at the beginning of
          the run
      2 = Write a restart file during run
      3 = Read a restart file at beginning of run
          and write a restart file during run

   Number of periods in Restart
   output cycle (NRESPD)      Default: 0       ! NRESPD =  0   !

      0 = File written only at last period
     >0 = File updated every NRESPD periods

Meteorological Data Format (METFM)
                              Default: 1       ! METFM =  1   !

      METFM = 1 - CALMET binary file (CALMET.MET)
      METFM = 2 - ISC ASCII file (ISCMET.MET)
      METFM = 3 - AUSPLUME ASCII file (PLMMET.MET)
      METFM = 4 - CTDM plus tower file (PROFILE.DAT) and
                  surface parameters file (SURFACE.DAT)
      METFM = 5 - AERMET tower file (PROFILE.DAT) and
                  surface parameters file (SURFACE.DAT)

Meteorological Profile Data Format (MPRFFM)
       (used only for METFM = 1, 2, 3)
```

```
                                   Default: 1       ! MPRFFM =  1   !

          MPRFFM = 1 - CTDM plus tower file (PROFILE.DAT)
          MPRFFM = 2 - AERMET tower file (PROFILE.DAT)

     PG sigma-y is adjusted by the factor (AVET/PGTIME)**0.2
     Averaging Time (minutes) (AVET)
                                   Default: 60.0    ! AVET = 60. !
     PG Averaging Time (minutes) (PGTIME)
                                   Default: 60.0    ! PGTIME = 60. !


     Output units for binary concentration and flux files
     written in Dataset v2.2 or later formats
     (IOUTU)                       Default: 1       ! IOUTU =  2   !
         1 = mass      -  g/m3 (conc) or g/m2/s (dep)
         2 = odour     -  odour_units (conc)
         3 = radiation -  Bq/m3 (conc) or Bq/m2/s (dep)


     Output Dataset format for binary concentration
     and flux files (e.g., CONC.DAT)
     (IOVERS)                      Default: 2       ! IOVERS =  2   !
         1 = Dataset Version 2.1
         2 = Dataset Version 2.2


!END!


-------------------------------------------------------------------------------

INPUT GROUP: 2 -- Technical options
--------------


     Vertical distribution used in the
     near field (MGAUSS)                Default: 1     ! MGAUSS =  1   !
        0 = uniform
        1 = Gaussian

     Terrain adjustment method
     (MCTADJ)                           Default: 3     ! MCTADJ =  3   !
        0 = no adjustment
        1 = ISC-type of terrain adjustment
        2 = simple, CALPUFF-type of terrain
            adjustment
        3 = partial plume path adjustment

     Subgrid-scale complex terrain
     flag (MCTSG)                       Default: 0     ! MCTSG =  0   !
        0 = not modeled
        1 = modeled
```

```
Near-field puffs modeled as
elongated slugs? (MSLUG)              Default: 0     ! MSLUG =  0   !
   0 = no
   1 = yes (slug model used)

Transitional plume rise modeled?
(MTRANS)                              Default: 1     ! MTRANS =  1   !
   0 = no  (i.e., final rise only)
   1 = yes (i.e., transitional rise computed)

Stack tip downwash? (MTIP)            Default: 1     ! MTIP =  1  !
   0 = no  (i.e., no stack tip downwash)
   1 = yes (i.e., use stack tip downwash)

Method used to compute plume rise for
point sources not subject to building
downwash? (MRISE)                     Default: 1     ! MRISE =  1  !
   1 = Briggs plume rise
   2 = Numerical plume rise

Method used to simulate building
downwash? (MBDW)                      Default: 1     ! MBDW =   1  !
   1 = ISC method
   2 = PRIME method

Vertical wind shear modeled above
stack top (modified Briggs plume rise)?
(MSHEAR)                              Default: 0     ! MSHEAR =  1  !
   0 = no  (i.e., vertical wind shear not modeled)
   1 = yes (i.e., vertical wind shear modeled)

Puff splitting allowed? (MSPLIT)      Default: 0     ! MSPLIT =  0  !
   0 = no (i.e., puffs not split)
   1 = yes (i.e., puffs are split)

Chemical mechanism flag (MCHEM)       Default: 1     ! MCHEM =  0   !
   0 = chemical transformation not
       modeled
   1 = transformation rates computed
       internally (MESOPUFF II scheme)
   2 = user-specified transformation
       rates used
   3 = transformation rates computed
       internally (RIVAD/ARM3 scheme)
   4 = secondary organic aerosol formation
       computed (MESOPUFF II scheme for OH)
   5 = user-specified half-life with or
       without transfer to child species
   6 = transformation rates computed
       internally (Updated RIVAD scheme with
       ISORROPIA equilibrium)
   7 = transformation rates computed
       internally (Updated RIVAD scheme with
       ISORROPIA equilibrium and CalTech SOA)
```

```
Aqueous phase transformation flag (MAQCHEM)
(Used only if MCHEM = 6, or 7)        Default: 0     ! MAQCHEM =  0   !
   0 = aqueous phase transformation
       not modeled
   1 = transformation rates and wet
       scavenging coefficients adjusted
       for in-cloud aqueous phase reactions
       (adapted from RADM cloud model
        implementation in CMAQ/SCICHEM)

Liquid Water Content flag (MLWC)
(Used only if MAQCHEM = 1)            Default: 1     ! MLWC =  1   !
   0 = water content estimated from cloud cover
       and presence of precipitation
   1 = gridded cloud water data read from CALMET
       water content output files (filenames are
       the CALMET.DAT names PLUS the extension
       AUXEXT provided in Input Group 0)

Wet removal modeled ? (MWET)          Default: 1     ! MWET =  0   !
   0 = no
   1 = yes

Dry deposition modeled ? (MDRY)       Default: 1     ! MDRY =  0   !
   0 = no
   1 = yes
   (dry deposition method specified
    for each species in Input Group 3)


Gravitational settling (plume tilt)
modeled ? (MTILT)                     Default: 0     ! MTILT =  0   !
   0 = no
   1 = yes
   (puff center falls at the gravitational
    settling velocity for 1 particle species)

Restrictions:
    - MDRY  = 1
    - NSPEC = 1  (must be particle species as well)
    - sg    = 0  GEOMETRIC STANDARD DEVIATION in Group 8 is
                 set to zero for a single particle diameter

Method used to compute dispersion
coefficients (MDISP)                  Default: 3     ! MDISP =  3   !

   1 = dispersion coefficients computed from measured values
       of turbulence, sigma v, sigma w
   2 = dispersion coefficients from internally calculated
       sigma v, sigma w using micrometeorological variables
       (u*, w*, L, etc.)
   3 = PG dispersion coefficients for RURAL areas (computed using
       the ISCST multi-segment approximation) and MP coefficients in
```

```
        urban areas
   4 = same as 3 except PG coefficients computed using
       the MESOPUFF II eqns.
   5 = CTDM sigmas used for stable and neutral conditions.
       For unstable conditions, sigmas are computed as in
       MDISP = 3, described above.  MDISP = 5 assumes that
       measured values are read

Sigma-v/sigma-theta, sigma-w measurements used? (MTURBVW)
(Used only if MDISP = 1 or 5)         Default: 3     ! MTURBVW =  3  !
   1 = use sigma-v or sigma-theta measurements
       from PROFILE.DAT to compute sigma-y
       (valid for METFM = 1, 2, 3, 4, 5)
   2 = use sigma-w measurements
       from PROFILE.DAT to compute sigma-z
       (valid for METFM = 1, 2, 3, 4, 5)
   3 = use both sigma-(v/theta) and sigma-w
       from PROFILE.DAT to compute sigma-y and sigma-z
       (valid for METFM = 1, 2, 3, 4, 5)
   4 = use sigma-theta measurements
       from PLMMET.DAT to compute sigma-y
       (valid only if METFM = 3)

Back-up method used to compute dispersion
when measured turbulence data are
missing (MDISP2)                      Default: 3     ! MDISP2 =  3  !
(used only if MDISP = 1 or 5)
   2 = dispersion coefficients from internally calculated
       sigma v, sigma w using micrometeorological variables
       (u*, w*, L, etc.)
   3 = PG dispersion coefficients for RURAL areas (computed using
       the ISCST multi-segment approximation) and MP coefficients in
       urban areas
   4 = same as 3 except PG coefficients computed using
       the MESOPUFF II eqns.

[DIAGNOSTIC FEATURE]
Method used for Lagrangian timescale for Sigma-y
(used only if MDISP=1,2 or MDISP2=1,2)
(MTAULY)                              Default: 0     ! MTAULY =  0  !
   0 = Draxler default 617.284 (s)
   1 = Computed as Lag. Length / (.75 q) -- after SCIPUFF
  10 < Direct user input (s)             -- e.g., 306.9


[DIAGNOSTIC FEATURE]
Method used for Advective-Decay timescale for Turbulence
(used only if MDISP=2 or MDISP2=2)
(MTAUADV)                             Default: 0     ! MTAUADV =  0  !
   0 = No turbulence advection
   1 = Computed (OPTION NOT IMPLEMENTED)
  10 < Direct user input (s)   -- e.g., 800
```

```
Method used to compute turbulence sigma-v &
sigma-w using micrometeorological variables
(Used only if MDISP = 2 or MDISP2 = 2)
(MCTURB)                              Default: 1     ! MCTURB =  1  !
   1 = Standard CALPUFF subroutines
   2 = AERMOD subroutines

PG sigma-y,z adj. for roughness?      Default: 0     ! MROUGH =  0  !
(MROUGH)
   0 = no
   1 = yes

Partial plume penetration of          Default: 1     ! MPARTL =  1  !
elevated inversion modeled for
point sources?
(MPARTL)
   0 = no
   1 = yes

Partial plume penetration of          Default: 1     ! MPARTLBA =  1  !
elevated inversion modeled for
buoyant area sources?
(MPARTLBA)
   0 = no
   1 = yes

Strength of temperature inversion     Default: 0     ! MTINV =  0  !
provided in PROFILE.DAT extended records?
(MTINV)
   0 = no (computed from measured/default gradients)
   1 = yes

PDF used for dispersion under convective conditions?
                                      Default: 0     ! MPDF =  0  !
(MPDF)
   0 = no
   1 = yes

Sub-Grid TIBL module used for shore line?
                                      Default: 0     ! MSGTIBL = 0  !
(MSGTIBL)
   0 = no
   1 = yes

Boundary conditions (concentration) modeled?
                                      Default: 0     ! MBCON = 0  !
(MBCON)
   0 = no
   1 = yes, using formatted BCON.DAT file
   2 = yes, using unformatted CONC.DAT file

Note:  MBCON > 0 requires that the last species modeled
       be 'BCON'.  Mass is placed in species BCON when
       generating boundary condition puffs so that clean
```

```
       air entering the modeling domain can be simulated
       in the same way as polluted air.  Specify zero
       emission of species BCON for all regular sources.

Individual source contributions saved?
                                       Default: 0     ! MSOURCE = 0  !
(MSOURCE)
   0 = no
   1 = yes


Analyses of fogging and icing impacts due to emissions from
arrays of mechanically-forced cooling towers can be performed
using CALPUFF in conjunction with a cooling tower emissions
processor (CTEMISS) and its associated postprocessors.  Hourly
emissions of water vapor and temperature from each cooling tower
cell are computed for the current cell configuration and ambient
conditions by CTEMISS. CALPUFF models the dispersion of these
emissions and provides cloud information in a specialized format
for further analysis. Output to FOG.DAT is provided in either
'plume mode' or 'receptor mode' format.

Configure for FOG Model output?
                                       Default: 0     ! MFOG =  0   !
(MFOG)
   0 = no
   1 = yes  - report results in PLUME Mode format
   2 = yes  - report results in RECEPTOR Mode format


Test options specified to see if
they conform to regulatory
values? (MREG)                         Default: 1     ! MREG =  0   !

   0 = NO checks are made
   1 = Technical options must conform to USEPA
       Long Range Transport (LRT) guidance
                  METFM    1 or 2
                  AVET     60. (min)
                  PGTIME   60. (min)
                  MGAUSS   1
                  MCTADJ   3
                  MTRANS   1
                  MTIP     1
                  MRISE    1
                  MCHEM    1 or 3 (if modeling SOx, NOx)
                  MWET     1
                  MDRY     1
                  MDISP    2 or 3
                  MPDF     0 if MDISP=3
                           1 if MDISP=2
                  MROUGH   0
                  MPARTL   1
                  MPARTLBA 0
```

```
                        SYTDEP   550. (m)
                        MHFTSZ   0
                        SVMIN    0.5 (m/s)

!END!

-------------------------------------------------------------------------------

INPUT GROUP: 3a, 3b -- Species list
-------------------

------------
Subgroup (3a)
------------

  The following species are modeled:

! CSPEC =    ODR1 !         !END!




                                                        Dry                 OUTPUT
GROUP
    SPECIES          MODELED          EMITTED       DEPOSITED
NUMBER
     NAME         (0=NO, 1=YES)    (0=NO, 1=YES)    (0=NO,
(0=NONE,
   (Limit: 12                                        1=COMPUTED-GAS        1=1st
CGRUP,
    Characters                                       2=COMPUTED-PARTICLE   2=2nd
CGRUP,
    in length)                                       3=USER-SPECIFIED)     3=
etc.)

!    ODR1  =         1,               1,           0,                 0   !


!END!

  Note:  The last species in (3a) must be 'BCON' when using the
         boundary condition option (MBCON > 0).  Species BCON should
         typically be modeled as inert (no chem transformation or
         removal).


-------------
Subgroup (3b)
-------------
  The following names are used for Species-Groups in which results
  for certain species are combined (added) prior to output.  The
  CGRUP name will be used as the species name in output files.
```

```
  Use this feature to model specific particle-size distributions
  by treating each size-range as a separate species.
  Order must be consistent with 3(a) above.



--------------------------------------------------------------------------------


INPUT GROUP: 4 -- Map Projection and Grid control parameters
--------------

     Projection for all (X,Y):
     -------------------------

     Map projection
     (PMAP)                     Default: UTM    ! PMAP = UTM  !

         UTM :  Universal Transverse Mercator
         TTM :  Tangential Transverse Mercator
         LCC :  Lambert Conformal Conic
          PS :  Polar Stereographic
          EM :  Equatorial Mercator
        LAZA :  Lambert Azimuthal Equal Area

     False Easting and Northing (km) at the projection origin
     (Used only if PMAP= TTM, LCC, or LAZA)
     (FEAST)                    Default=0.0     ! FEAST  = 0.000  !
     (FNORTH)                   Default=0.0     ! FNORTH = 0.000  !

     UTM zone (1 to 60)
     (Used only if PMAP=UTM)
     (IUTMZN)                   No Default      ! IUTMZN =  32   !

     Hemisphere for UTM projection?
     (Used only if PMAP=UTM)
     (UTMHEM)                   Default: N      ! UTMHEM = N  !
         N   :  Northern hemisphere projection
         S   :  Southern hemisphere projection

     Latitude and Longitude (decimal degrees) of projection origin
     (Used only if PMAP= TTM, LCC, PS, EM, or LAZA)
     (RLAT0)                    No Default      ! RLAT0 =  0N  !
     (RLON0)                    No Default      ! RLON0 =  0E  !

         TTM :  RLON0 identifies central (true N/S) meridian of projection
                RLAT0 selected for convenience
         LCC :  RLON0 identifies central (true N/S) meridian of projection
                RLAT0 selected for convenience
         PS  :  RLON0 identifies central (grid N/S) meridian of projection
                RLAT0 selected for convenience
         EM  :  RLON0 identifies central meridian of projection
                RLAT0 is REPLACED by 0.0N (Equator)
         LAZA:  RLON0 identifies longitude of tangent-point of mapping plane
```

RLAT0 identifies latitude of tangent-point of mapping plane

Matching parallel(s) of latitude (decimal degrees) for projection
(Used only if PMAP= LCC or PS)
(XLAT1) No Default ! XLAT1 = 0N !
(XLAT2) No Default ! XLAT2 = 0N !

LCC : Projection cone slices through Earth's surface at XLAT1 and XLAT2
PS : Projection plane slices through Earth at XLAT1
(XLAT2 is not used)

Note: Latitudes and longitudes should be positive, and include a letter N,S,E, or W indicating north or south latitude, and east or west longitude. For example,
35.9 N Latitude = 35.9N
118.7 E Longitude = 118.7E

Datum-region

The Datum-Region for the coordinates is identified by a character string. Many mapping products currently available use the model of the Earth known as the World Geodetic System 1984 (WGS-84). Other local models may be in use, and their selection in CALMET will make its output0 official transformation parameters is provided by the National Imagery and Mapping Agency (NIMA).

NIMA Datum - Regions(Examples)

WGS-84	WGS-84 Reference Ellipsoid and Geoid, Global coverage (WGS84)
NAS-C	NORTH AMERICAN 1927 Clarke 1866 Spheroid, MEAN FOR CONUS (NAD27)
NAR-C	NORTH AMERICAN 1983 GRS 80 Spheroid, MEAN FOR CONUS (NAD83)
NWS-84	NWS 6370KM Radius, Sphere
ESR-S	ESRI REFERENCE 6371KM Radius, Sphere

Datum-region for output coordinates
(DATUM) Default: WGS-84 ! DATUM = WGS-84 !

METEOROLOGICAL Grid:

Rectangular grid defined for projection PMAP,
with X the Easting and Y the Northing coordinate

No. X grid cells (NX)	No default	! NX = 80 !
No. Y grid cells (NY)	No default	! NY = 80 !
No. vertical layers (NZ)	No default	! NZ = 7 !
Grid spacing (DGRIDKM)	No default Units: km	! DGRIDKM = .10 !

```
              Cell face heights
                  (ZFACE(nz+1))      No defaults
                                     Units: m
 ! ZFACE = 0.,20.,50.,100.,200.,500.,1000.,1500 !

          Reference Coordinates
         of SOUTHWEST corner of
               grid cell(1, 1):

          X coordinate (XORIGKM)     No default     ! XORIGKM = 622.273 !
          Y coordinate (YORIGKM)     No default     ! YORIGKM = 4753.048 !
                                    Units: km
```

COMPUTATIONAL Grid:

The computational grid is identical to or a subset of the MET. grid. The lower left (LL) corner of the computational grid is at grid point (IBCOMP, JBCOMP) of the MET. grid. The upper right (UR) corner of the computational grid is at grid point (IECOMP, JECOMP) of the MET. grid. The grid spacing of the computational grid is the same as the MET. grid.

```
   X index of LL corner (IBCOMP)      No default     ! IBCOMP =  1   !
             (1 <= IBCOMP <= NX)

   Y index of LL corner (JBCOMP)      No default     ! JBCOMP =  1   !
             (1 <= JBCOMP <= NY)


   X index of UR corner (IECOMP)      No default     ! IECOMP =  80   !
             (1 <= IECOMP <= NX)

   Y index of UR corner (JECOMP)      No default     ! JECOMP =  80   !
             (1 <= JECOMP <= NY)
```

SAMPLING Grid (GRIDDED RECEPTORS):

The lower left (LL) corner of the sampling grid is at grid point (IBSAMP, JBSAMP) of the MET. grid. The upper right (UR) corner of the sampling grid is at grid point (IESAMP, JESAMP) of the MET. grid. The sampling grid must be identical to or a subset of the computational grid. It may be a nested grid inside the computational grid. The grid spacing of the sampling grid is DGRIDKM/MESHDN.

```
   Logical flag indicating if gridded
   receptors are used (LSAMP)         Default: T     ! LSAMP = T !
   (T=yes, F=no)

   X index of LL corner (IBSAMP)      No default     ! IBSAMP =  1   !
    (IBCOMP <= IBSAMP <= IECOMP)
```

```
        Y index of LL corner (JBSAMP)      No default     ! JBSAMP =  1   !
         (JBCOMP <= JBSAMP <= JECOMP)


        X index of UR corner (IESAMP)      No default     ! IESAMP =  80   !
         (IBCOMP <= IESAMP <= IECOMP)

        Y index of UR corner (JESAMP)      No default     ! JESAMP =  80   !
         (JBCOMP <= JESAMP <= JECOMP)


       Nesting factor of the sampling
        grid (MESHDN)                      Default: 1     ! MESHDN =  1  !
        (MESHDN is an integer >= 1)

!END!


--------------------------------------------------------------------------------


INPUT GROUP: 5 -- Output Options
--------------
                                          *                          *
     FILE                        DEFAULT VALUE             VALUE THIS RUN
     ----                        -------------             --------------

   Concentrations (ICON)               1                   !  ICON =  1   !
   Dry Fluxes (IDRY)                   1                   !  IDRY =  0   !
   Wet Fluxes (IWET)                   1                   !  IWET =  0   !
   2D Temperature (IT2D)               0                   !  IT2D =  0   !
   2D Density (IRHO)                   0                   !  IRHO =  0   !
   Relative Humidity (IVIS)            1                   !  IVIS =  0   !
    (relative humidity file is
     required for visibility
     analysis)
   Use data compression option in output file?
   (LCOMPRS)                           Default: T          ! LCOMPRS = T !

   *
    0 = Do not create file, 1 = create file


    QA PLOT FILE OUTPUT OPTION:

       Create a standard series of output files (e.g.
       locations of sources, receptors, grids ...)
       suitable for plotting?
       (IQAPLOT)                       Default: 1          !  IQAPLOT =  1   !
         0 = no
         1 = yes

    DIAGNOSTIC PUFF-TRACKING OUTPUT OPTION:
```

```
   Puff locations and properties reported to
   PFTRAK.DAT file for postprocessing?
   (IPFTRAK)                      Default: 0         ! IPFTRAK =  0   !
     0 = no
     1 = yes, update puff output at end of each timestep
     2 = yes, update puff output at end of each sampling step

DIAGNOSTIC MASS FLUX OUTPUT OPTIONS:

   Mass flux across specified boundaries
   for selected species reported?
   (IMFLX)                        Default: 0         ! IMFLX =  0  !
     0 = no
     1 = yes (FLUXBDY.DAT and MASSFLX.DAT filenames
              are specified in Input Group 0)

   Mass balance for each species
   reported?
   (IMBAL)                        Default: 0         ! IMBAL =  0  !
     0 = no
     1 = yes (MASSBAL.DAT filename is
          specified in Input Group 0)


NUMERICAL RISE OUTPUT OPTION:

   Create a file with plume properties for each rise
   increment, for each model timestep?
   This applies to sources modeled with numerical rise
   and is limited to ONE source in the run.
   (INRISE)                       Default: 0         ! INRISE =  0  !
     0 = no
     1 = yes (RISE.DAT filename is
              specified in Input Group 0)


LINE PRINTER OUTPUT OPTIONS:

   Print concentrations (ICPRT)    Default: 0         ! ICPRT =  1   !
   Print dry fluxes (IDPRT)        Default: 0         ! IDPRT =  0   !
   Print wet fluxes (IWPRT)        Default: 0         ! IWPRT =  0   !
   (0 = Do not print, 1 = Print)

   Concentration print interval
   (ICFRQ) in timesteps            Default: 1         ! ICFRQ =  1   !
   Dry flux print interval
   (IDFRQ) in timesteps            Default: 1         ! IDFRQ =  1   !
   Wet flux print interval
   (IWFRQ) in timesteps            Default: 1         ! IWFRQ =  1   !

   Units for Line Printer Output
   (IPRTU)                        Default: 1         ! IPRTU =  5   !
                  for             for
              Concentration    Deposition
```

```
            1 =       g/m**3         g/m**2/s
            2 =      mg/m**3        mg/m**2/s
            3 =      ug/m**3        ug/m**2/s
            4 =      ng/m**3        ng/m**2/s
            5 =     Odour Units

       Messages tracking progress of run
       written to the screen ?
       (IMESG)                          Default: 2         ! IMESG =  2   !
         0 = no
         1 = yes (advection step, puff ID)
         2 = yes (YYYYJJJHH, # old puffs, # emitted puffs)


     SPECIES (or GROUP for combined species) LIST FOR OUTPUT OPTIONS

                  ---- CONCENTRATIONS ----   ------ DRY FLUXES ------   ------
WET FLUXES ------   -- MASS FLUX --
   SPECIES
   /GROUP        PRINTED?  SAVED ON DISK?   PRINTED?  SAVED ON DISK?   PRINTED?
SAVED ON DISK?   SAVED ON DISK?
   -------       ------------------------   ------------------------
-----------------------   ---------------
!     ODR1 =     1,           1,           0,           0,           0,
 0,           0   !


  Note:  Species BCON (for MBCON > 0) does not need to be saved on disk.


     OPTIONS FOR PRINTING "DEBUG" QUANTITIES (much output)

       Logical for debug output
       (LDEBUG)                                 Default: F     ! LDEBUG = F !

       First puff to track
       (IPFDEB)                                 Default: 1     ! IPFDEB =  1  !

       Number of puffs to track
       (NPFDEB)                                 Default: 1     ! NPFDEB =  1  !

       Met. period to start output
       (NN1)                                    Default: 1     ! NN1 =  1   !

       Met. period to end output
       (NN2)                                    Default: 10    ! NN2 =  10  !

!END!


-------------------------------------------------------------------------------


INPUT GROUP: 6a, 6b, & 6c -- Subgrid scale complex terrain inputs
```

```
-------------------------

---------------
Subgroup (6a)
---------------
       Number of terrain features (NHILL)       Default: 0     ! NHILL =  0   !

       Number of special complex terrain
       receptors  (NCTREC)                      Default: 0     ! NCTREC =  0   !

       Terrain and CTSG Receptor data for
       CTSG hills input in CTDM format ?
       (MHILL)                                  No Default     ! MHILL =  2   !
       1 = Hill and Receptor data created
           by CTDM processors & read from
           HILL.DAT and HILLRCT.DAT files
       2 = Hill data created by OPTHILL &
           input below in Subgroup (6b);
           Receptor data in Subgroup (6c)

       Factor to convert horizontal dimensions  Default: 1.0   ! XHILL2M = 1.0 !
       to meters (MHILL=1)

       Factor to convert vertical dimensions    Default: 1.0   ! ZHILL2M = 1.0 !
       to meters (MHILL=1)

       X-origin of CTDM system relative to      No Default     ! XCTDMKM = 0 !
       CALPUFF coordinate system, in Kilometers (MHILL=1)

       Y-origin of CTDM system relative to      No Default     ! YCTDMKM = 0 !
       CALPUFF coordinate system, in Kilometers (MHILL=1)

! END !

---------------
Subgroup (6b)
---------------

                      1 **
     HILL information


HILL           XC         YC        THETAH  ZGRID  RELIEF    EXPO 1    EXPO 2
SCALE 1    SCALE 2    AMAX1     AMAX2
 NO.           (km)       (km)       (deg.)   (m)     (m)       (m)       (m)
(m)        (m)        (m)        (m)
----           ----       ----       ------  -----  ------    ------    ------
-------    -------    -----     -----

---------------
Subgroup (6c)
---------------

    COMPLEX TERRAIN RECEPTOR INFORMATION
```

XRCT (km)	YRCT (km)	ZRCT (m)	XHH

1
Description of Complex Terrain Variables:
XC, YC = Coordinates of center of hill
THETAH = Orientation of major axis of hill (clockwise from North)
ZGRID = Height of the 0 of the grid above mean sea level
RELIEF = Height of the crest of the hill above the grid elevation
EXPO 1 = Hill-shape exponent for the major axis
EXPO 2 = Hill-shape exponent for the major axis
SCALE 1 = Horizontal length scale along the major axis
SCALE 2 = Horizontal length scale along the minor axis
AMAX = Maximum allowed axis length for the major axis
BMAX = Maximum allowed axis length for the major axis

XRCT, YRCT = Coordinates of the complex terrain receptors
ZRCT = Height of the ground (MSL) at the complex terrain Receptor
XHH = Hill number associated with each complex terrain receptor (NOTE: MUST BE ENTERED AS A REAL NUMBER)

**
NOTE: DATA for each hill and CTSG receptor are treated as a separate input subgroup and therefore must end with an input group terminator.

INPUT GROUP: 7 -- Chemical parameters for dry deposition of gases
---

SPECIES NAME	DIFFUSIVITY (cm**2/s)	ALPHA STAR (dimensionless)	REACTIVITY	MESOPHYLL RESISTANCE (s/cm)	HENRY'S LAW COEFFICIENT

!END!

INPUT GROUP: 8 -- Size parameters for dry deposition of particles
---

For SINGLE SPECIES, the mean and standard deviation are used to compute a deposition velocity for NINT (see group 9) size-ranges, and these are then averaged to obtain a mean deposition velocity.

For GROUPED SPECIES, the size distribution should be explicitly specified (by the 'species' in the group), and the standard deviation for each should be entered as 0. The model will then use the deposition velocity for the stated mean diameter.

SPECIES NAME	GEOMETRIC MASS MEAN DIAMETER (microns)	GEOMETRIC STANDARD DEVIATION (microns)

!END!

INPUT GROUP: 9 -- Miscellaneous dry deposition parameters

Reference cuticle resistance (s/cm)
(RCUTR) Default: 30 ! RCUTR = 30.0 !
Reference ground resistance (s/cm)
(RGR) Default: 10 ! RGR = 10.0 !
Reference pollutant reactivity
(REACTR) Default: 8 ! REACTR = 8.0 !

Number of particle-size intervals used to evaluate effective particle deposition velocity
(NINT) Default: 9 ! NINT = 9 !

Vegetation state in unirrigated areas
(IVEG) Default: 1 ! IVEG = 1 !
IVEG=1 for active and unstressed vegetation
IVEG=2 for active and stressed vegetation
IVEG=3 for inactive vegetation

!END!

INPUT GROUP: 10 -- Wet Deposition Parameters

Scavenging Coefficient -- Units: (sec)**(-1)

Pollutant	Liquid Precip.	Frozen Precip.

--------- -------------- --------------

!END!

INPUT GROUP: 11a, 11b -- Chemistry Parameters

Subgroup (11a)

Several parameters are needed for one or more of the chemical transformation
mechanisms. Those used for each mechanism are:

Mechanism (MCHEM)	MOZ	BCK3	MNH3	MAVGNH3	BCKNH3	RNIT1	RNIT2	RNIT3	MH2O2	BCKH2O2	BCKPMF	OPRAC	VCNX	NDECAY
0 None	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1 MESOPUFF II	X	X	.	.	X	X	X	X	.	.	.	.	.	.
2 User Rates	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3 RIVAD	X	X	.	.	X	.	.	.	.	.	.	.	.	.
4 SOA	X	X	.	.	.	.	.	.	.	.	X	X	X	.
5 Radioactive Decay	.	.	.	.	.	.	.	.	.	.	.	.	.	X
6 RIVAD/ISORRPIA	X	X	X	X	X	X	.	.	X	X	.	.	.	.
7 RIVAD/ISORRPIA/SOA	X	X	X	X	X	X	.	.	X	X	X	X	.	.

Ozone data input option (MOZ) Default: 1 ! MOZ = 0 !
(Used only if MCHEM = 1, 3, 4, 6, or 7)
0 = use a monthly background ozone value
1 = read hourly ozone concentrations from
the OZONE.DAT data file

Monthly ozone concentrations in ppb (BCKO3)
(Used only if MCHEM = 1,3,4,6, or 7 and either
MOZ = 0, or
MOZ = 1 and all hourly O3 data missing)
Default: 12*80.
! BCKO3 = 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00 !

Ammonia data option (MNH3) Default: 0 ! MNH3 = 0 !
(Used only if MCHEM = 6 or 7)
0 = use monthly background ammonia values (BCKNH3) - no vertical variation

```
        1 = read monthly background ammonia values for each layer from
            the NH3Z.DAT data file

     Ammonia vertical averaging option (MAVGNH3)
     (Used only if MCHEM = 6 or 7, and MNH3 = 1)
        0 = use NH3 at puff center height (no averaging is done)
        1 = average NH3 values over vertical extent of puff
                                     Default: 1            ! MAVGNH3 =  1   !

     Monthly ammonia concentrations in ppb (BCKNH3)
     (Used only if MCHEM = 1 or 3, or
                if MCHEM = 6 or 7, and MNH3 = 0)
                                     Default: 12*10.
     !  BCKNH3 = 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00,
10.00, 10.00, 10.00 !

     Nighttime SO2 loss rate in %/hour (RNITE1)
     (Used only if MCHEM = 1, 6 or 7)
     This rate is used only at night for MCHEM=1
     and is added to the computed rate both day
     and night for MCHEM=6,7 (heterogeneous reactions)
                                     Default: 0.2          ! RNITE1 = .2 !

     Nighttime NOx loss rate in %/hour (RNITE2)
     (Used only if MCHEM = 1)
                                     Default: 2.0          ! RNITE2 = 2.0 !

     Nighttime HNO3 formation rate in %/hour (RNITE3)
     (Used only if MCHEM = 1)
                                     Default: 2.0          ! RNITE3 = 2.0 !

     H2O2 data input option (MH2O2)    Default: 1          ! MH2O2 =  1   !
     (Used only if MCHEM = 6 or 7, and MAQCHEM = 1)
        0 = use a monthly background H2O2 value
        1 = read hourly H2O2 concentrations from
            the H2O2.DAT data file

     Monthly H2O2 concentrations in ppb (BCKH2O2)
     (Used only if MQACHEM = 1 and either
        MH2O2 = 0 or
        MH2O2 = 1 and all hourly H2O2 data missing)
                                     Default: 12*1.
     !  BCKH2O2 = 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00,
1.00, 1.00 !


 --- Data for SECONDARY ORGANIC AEROSOL (SOA) Options
     (used only if MCHEM = 4 or 7)

     The MCHEM = 4 SOA module uses monthly values of:
          Fine particulate concentration in ug/m^3 (BCKPMF)
          Organic fraction of fine particulate     (OFRAC)
          VOC / NOX ratio (after reaction)         (VCNX)
```

The MCHEM = 7 SOA module uses monthly values of:
Fine particulate concentration in ug/m^3 (BCKPMF)
Organic fraction of fine particulate (OFRAC)

These characterize the air mass when computing
the formation of SOA from VOC emissions.
Typical values for several distinct air mass types are:

Month	1 Jan	2 Feb	3 Mar	4 Apr	5 May	6 Jun	7 Jul	8 Aug	9 Sep	10 Oct	11 Nov	12 Dec
Clean Continental												
BCKPMF	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
OFRAC	.15	.15	.20	.20	.20	.20	.20	.20	.20	.20	.20	.15
VCNX	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.
Clean Marine (surface)												
BCKPMF	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
OFRAC	.25	.25	.30	.30	.30	.30	.30	.30	.30	.30	.30	.25
VCNX	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.
Urban - low biogenic (controls present)												
BCKPMF	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.
OFRAC	.20	.20	.25	.25	.25	.25	.25	.25	.20	.20	.20	.20
VCNX	4.	4.	4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
Urban - high biogenic (controls present)												
BCKPMF	60.	60.	60.	60.	60.	60.	60.	60.	60.	60.	60.	60.
OFRAC	.25	.25	.30	.30	.30	.55	.55	.55	.35	.35	.35	.25
VCNX	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.
Regional Plume												
BCKPMF	20.	20.	20.	20.	20.	20.	20.	20.	20.	20.	20.	20.
OFRAC	.20	.20	.25	.35	.25	.40	.40	.40	.30	.30	.30	.20
VCNX	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.
Urban - no controls present												
BCKPMF	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.
OFRAC	.30	.30	.35	.35	.35	.55	.55	.55	.35	.35	.35	.30
VCNX	2.	2.	2.	2.	2.	2.	2.	2.	2.	2.	2.	2.

Default: Clean Continental
! BCKPMF = 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00 !
! OFRAC = 0.15, 0.15, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.15 !
! VCNX = 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00 !

--- End Data for SECONDARY ORGANIC AEROSOL (SOA) Option

Number of half-life decay specification blocks provided in Subgroup 11b
(Used only if MCHEM = 5)

```
     (NDECAY)                                    Default: 0      ! NDECAY =  0
!

!END!


--------------
Subgroup (11b)
--------------

     Each species modeled may be assigned a decay half-life (sec), and the
associated
     mass lost may be assigned to one or more other modeled species using a mass
yield
     factor. This information is used only for MCHEM=5.

     Provide NDECAY blocks assigning the half-life for a parent species and mass
yield
     factors for each child species (if any) produced by the decay.
     Set HALF_LIFE=0.0 for NO decay (infinite half-life).


                              a            b
        SPECIES      Half-Life   Mass Yield
         NAME          (sec)       Factor
        -------      ---------   ----------

     *   SPEC1   =    3600.,        -1.0   *    (Parent)
     *   SPEC2   =     -1.0,         0.0   *    (Child)
   *END*

--------
    a
     Specify a half life that is greater than or equal to zero for 1 parent
species
     in each block, and set the yield factor for this species to -1
    b
     Specify a yield factor that is greater than or equal to zero for 1 or more
child
     species in each block, and set the half-life for each of these species to
-1

     NOTE: Assignments in each block are treated as a separate input
           subgroup and therefore must end with an input group terminator.
           If NDECAY=0, no assignments and input group terminators should
appear.

-------------------------------------------------------------------------------


INPUT GROUP: 12 -- Misc. Dispersion and Computational Parameters
---------------

     Horizontal size of puff (m) beyond which
```

```
     time-dependent dispersion equations (Heffter)
     are used to determine sigma-y and
     sigma-z (SYTDEP)                          Default: 550.   ! SYTDEP =
5.5E02 !

     Switch for using Heffter equation for sigma z
     as above (0 = Not use Heffter; 1 = use Heffter
     (MHFTSZ)                                  Default: 0      ! MHFTSZ =  0
!

     Stability class used to determine plume
     growth rates for puffs above the boundary
     layer (JSUP)                              Default: 5      ! JSUP =  5   !

     Vertical dispersion constant for stable
     conditions (k1 in Eqn. 2.7-3)  (CONK1)    Default: 0.01   ! CONK1 = .01 !

     Vertical dispersion constant for neutral/
     unstable conditions (k2 in Eqn. 2.7-4)
     (CONK2)                                   Default: 0.1    ! CONK2 = .1 !

     Factor for determining Transition-point from
     Schulman-Scire to Huber-Snyder Building Downwash
     scheme (SS used for Hs < Hb + TBD * HL)
     (TBD)                                     Default: 0.5    ! TBD = .5 !
        TBD < 0   ==> always use Huber-Snyder
        TBD = 1.5 ==> always use Schulman-Scire
        TBD = 0.5 ==> ISC Transition-point

     Range of land use categories for which
     urban dispersion is assumed
     (IURB1, IURB2)                            Default: 10     ! IURB1 =  10  !
                                                        19     ! IURB2 =  19  !

     Site characterization parameters for single-point Met data files ---------
     (needed for METFM = 2,3,4,5)

        Land use category for modeling domain
        (ILANDUIN)                             Default: 20     ! ILANDUIN =  20
 !

        Roughness length (m) for modeling domain
        (Z0IN)                                 Default: 0.25   ! Z0IN = .25 !

        Leaf area index for modeling domain
        (XLAIIN)                               Default: 3.0    ! XLAIIN = 3.0 !

        Elevation above sea level (m)
        (ELEVIN)                               Default: 0.0    ! ELEVIN = .0 !

        Latitude (degrees) for met location
        (XLATIN)                               Default: -999.  ! XLATIN =
-999.0 !
```

```
        Longitude (degrees) for met location
        (XLONIN)                              Default: -999.  ! XLONIN =
-999.0 !

     Specialized information for interpreting single-point Met data files -----

        Anemometer height (m) (Used only if METFM = 2,3)
        (ANEMHT)                              Default: 10.    ! ANEMHT = 10.0
!

        Form of lateral turbulance data in PROFILE.DAT file
        (Used only if METFM = 4,5 or MTURBVW = 1 or 3)
        (ISIGMAV)                             Default: 1      ! ISIGMAV =  1
!
            0 = read sigma-theta
            1 = read sigma-v

        Choice of mixing heights (Used only if METFM = 4)
        (IMIXCTDM)                            Default: 0      ! IMIXCTDM =  0
!
            0 = read PREDICTED mixing heights
            1 = read OBSERVED mixing heights

     Maximum length of a slug (met. grid units)
     (XMXLEN)                                 Default: 1.0    ! XMXLEN = 1.0 !

     Maximum travel distance of a puff/slug (in
     grid units) during one sampling step
     (XSAMLEN)                                Default: 1.0    ! XSAMLEN = 1.0
!

     Maximum Number of slugs/puffs release from
     one source during one time step
     (MXNEW)                                  Default: 99     ! MXNEW =  99
!

     Maximum Number of sampling steps for
     one puff/slug during one time step
     (MXSAM)                                  Default: 99     ! MXSAM =  99
!

     Number of iterations used when computing
     the transport wind for a sampling step
     that includes gradual rise (for CALMET
     and PROFILE winds)
     (NCOUNT)                                 Default: 2      ! NCOUNT =  2
!

     Minimum sigma y for a new puff/slug (m)
     (SYMIN)                                  Default: 1.0    ! SYMIN = 1.0  !

     Minimum sigma z for a new puff/slug (m)
     (SZMIN)                                  Default: 1.0    ! SZMIN = 1.0  !
```

```
     Maximum sigma z (m) allowed to avoid
     numerical problem in calculating virtual
     time or distance.  Cap should be large
     enough to have no influence on normal events.
     Enter a negative cap to disable.
     (SZCAP_M)                                  Default: 5.0e06 ! SZCAP_M =
5.0E06 !

     Default minimum turbulence velocities sigma-v and sigma-w
     for each stability class over land and over water (m/s)
     (SVMIN(12) and SWMIN(12))

                     ----------  LAND  ----------       ---------  WATER
----------
        Stab Class :  A    B    C    D    E    F         A    B    C    D    E
 F
                     ---  ---  ---  ---  ---  ---       ---  ---  ---  ---  ---
---
     Default SVMIN : .50, .50, .50, .50, .50, .50,      .37, .37, .37, .37, .37,
.37
     Default SWMIN : .20, .12, .08, .06, .03, .016,     .20, .12, .08, .06, .03,
.016

           ! SVMIN = 0.500, 0.500, 0.500, 0.500, 0.500, 0.500, 0.370, 0.370,
0.370, 0.370, 0.370, 0.370!
           ! SWMIN = 0.200, 0.120, 0.080, 0.060, 0.030, 0.016, 0.200, 0.120,
0.080, 0.060, 0.030, 0.016!

     Divergence criterion for dw/dz across puff
     used to initiate adjustment for horizontal
     convergence (1/s)
     Partial adjustment starts at CDIV(1), and
     full adjustment is reached at CDIV(2)
     (CDIV(2))                                  Default: 0.0,0.0  ! CDIV = .0,
.0 !

     Search radius (number of cells) for nearest
     land and water cells used in the subgrid
     TIBL module
     (NLUTIBL)                                  Default: 4      ! NLUTIBL =  4
!

     Minimum wind speed (m/s) allowed for
     non-calm conditions. Also used as minimum
     speed returned when using power-law
     extrapolation toward surface
     (WSCALM)                                   Default: 0.5    ! WSCALM = .5 !

     Maximum mixing height (m)
     (XMAXZI)                                   Default: 3000.  ! XMAXZI =
3000.0 !

     Minimum mixing height (m)
     (XMINZI)                                   Default: 50.    ! XMINZI = 50.0
```

```
!

     Default wind speed classes --
     5 upper bounds (m/s) are entered;
     the 6th class has no upper limit
     (WSCAT(5))                    Default   :
                                   ISC RURAL : 1.54, 3.09, 5.14, 8.23, 10.8
(10.8+)

                              Wind Speed Class :  1     2     3     4     5
                                                 ---   ---   ---   ---   ---
                                        ! WSCAT = 1.54, 3.09, 5.14, 8.23, 10.80 !

     Default wind speed profile power-law
     exponents for stabilities 1-6
     (PLX0(6))                     Default   : ISC RURAL values
                                   ISC RURAL : .07, .07, .10, .15, .35, .55
                                   ISC URBAN : .15, .15, .20, .25, .30, .30

                               Stability Class :  A     B     C     D     E
F
                                                 ---   ---   ---   ---   ---
---
                                     ! PLX0 = 0.07, 0.07, 0.10, 0.15, 0.35,
0.55 !

     Default potential temperature gradient
     for stable classes E, F (degK/m)
     (PTG0(2))                     Default: 0.020, 0.035
                                      ! PTG0 = 0.020,   0.035 !

     Default plume path coefficients for
     each stability class (used when option
     for partial plume height terrain adjustment
     is selected -- MCTADJ=3)
     (PPC(6))                  Stability Class :  A     B     C     D     E
F
                                  Default  PPC : .50,  .50,  .50,  .50,  .35,
.35
                                                 ---   ---   ---   ---   ---
---
                                     !  PPC = 0.50, 0.50, 0.50, 0.50, 0.35,
0.35 !

     Slug-to-puff transition criterion factor
     equal to sigma-y/length of slug
     (SL2PF)                          Default: 10.        ! SL2PF = 10.0 !

     Puff-splitting control variables ------------------------

       VERTICAL SPLIT
       --------------

       Number of puffs that result every time a puff
```

```
       is split - nsplit=2 means that 1 puff splits
       into 2
       (NSPLIT)                          Default:   3        ! NSPLIT =  3  !

       Time(s) of a day when split puffs are eligible to
       be split once again; this is typically set once
       per day, around sunset before nocturnal shear develops.
       24 values: 0 is midnight (00:00) and 23 is 11 PM (23:00)
       0=do not re-split    1=eligible for re-split
       (IRESPLIT(24))                    Default:  Hour 17 = 1
       !  IRESPLIT = 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0,0,0,0 !

       Split is allowed only if last hour's mixing
       height (m) exceeds a minimum value
       (ZISPLIT)                         Default: 100.       ! ZISPLIT = 100.0
!

       Split is allowed only if ratio of last hour's
       mixing ht to the maximum mixing ht experienced
       by the puff is less than a maximum value (this
       postpones a split until a nocturnal layer develops)
       (ROLDMAX)                         Default: 0.25       ! ROLDMAX = 0.25
!


       HORIZONTAL SPLIT
       ----------------

       Number of puffs that result every time a puff
       is split - nsplith=5 means that 1 puff splits
       into 5
       (NSPLITH)                         Default:   5        ! NSPLITH =  5  !

       Minimum sigma-y (Grid Cells Units) of puff
       before it may be split
       (SYSPLITH)                        Default:  1.0       ! SYSPLITH = 1.0
!

       Minimum puff elongation rate (SYSPLITH/hr) due to
       wind shear, before it may be split
       (SHSPLITH)                        Default:  2.        ! SHSPLITH = 2.0
!

       Minimum concentration (g/m^3) of each
       species in puff before it may be split
       Enter array of NSPEC values; if a single value is
       entered, it will be used for ALL species
       (CNSPLITH)                        Default:  1.0E-07   ! CNSPLITH =
1.0E-07 !

     Integration control variables -----------------------

       Fractional convergence criterion for numerical SLUG
       sampling integration
```

```
       (EPSSLUG)                          Default:   1.0e-04  ! EPSSLUG =
1.0E-04 !

       Fractional convergence criterion for numerical AREA
       source integration
       (EPSAREA)                          Default:   1.0e-06  ! EPSAREA =
1.0E-06 !

       Trajectory step-length (m) used for numerical rise
       integration
       (DSRISE)                           Default:   1.0      ! DSRISE = 1.0 !

       Boundary Condition (BC) Puff control variables ------------------------

       Minimum height (m) to which BC puffs are mixed as they are emitted
       (MBCON=2 ONLY).  Actual height is reset to the current mixing height
       at the release point if greater than this minimum.
       (HTMINBC)                          Default:   500.     ! HTMINBC = 500.0
!

       Search radius (km) about a receptor for sampling nearest BC puff.
       BC puffs are typically emitted with a spacing of one grid cell
       length, so the search radius should be greater than DGRIDKM.
       (RSAMPBC)                          Default:   10.      ! RSAMPBC = 10.0
!

       Near-Surface depletion adjustment to concentration profile used when
       sampling BC puffs?
       (MDEPBC)                           Default:   1        ! MDEPBC =  1  !
          0 = Concentration is NOT adjusted for depletion
          1 = Adjust Concentration for depletion

!END!


-------------------------------------------------------------------------------


INPUT GROUPS: 13a, 13b, 13c, 13d -- Point source parameters
---------------------------------

---------------
Subgroup (13a)
---------------

     Number of point sources with
     parameters provided below      (NPT1)  No default  !  NPT1 =  0  !

     Units used for point source
     emissions below                (IPTU)  Default: 1  !  IPTU =   1  !
           1 =        g/s
           2 =       kg/hr
           3 =       lb/hr
           4 =     tons/yr
```

```
           5 =     Odour Unit * m**3/s  (vol. flux of odour compound)
           6 =     Odour Unit * m**3/min
           7 =     metric tons/yr
           8 =     Bq/s  (Bq = becquerel = disintegrations/s)
           9 =     GBq/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (13d)        (NSPT1) Default: 0  !  NSPT1 =  0  !

     Number of point sources with
     variable emission parameters
     provided in external file      (NPT2)  No default  !  NPT2 =  0  !

     (If NPT2 > 0, these point
     source emissions are read from
     the file: PTEMARB.DAT)

!END!

---------------
Subgroup (13b)
---------------
                                    a
          POINT SOURCE: CONSTANT DATA
          ---------------------------
                                                                        b
        c
  Source       X         Y       Stack    Base     Stack    Exit  Exit    Bldg.
Emission
   No.     Coordinate Coordinate Height Elevation Diameter  Vel.  Temp.   Dwash
 Rates
              (km)      (km)       (m)      (m)       (m)  (m/s) (deg. K)

  ------   ---------- ---------- ------  ------   -------- ----- -------- -----
--------

--------
```

a
Data for each source are treated as a separate input subgroup
and therefore must end with an input group terminator.

SRCNAM is a 12-character name for a source
(No default)
X is an array holding the source data listed by the column headings
(No default)
SIGYZI is an array holding the initial sigma-y and sigma-z (m)
(Default: 0.,0.)
FMFAC is a vertical momentum flux factor (0. or 1.0) used to represent
the effect of rain-caps or other physical configurations that
reduce momentum rise associated with the actual exit velocity.
(Default: 1.0 -- full momentum used)

ZPLTFM is the platform height (m) for sources influenced by an isolated structure that has a significant open area between the surface and the bulk of the structure, such as an offshore oil platform. The Base Elevation is that of the surface (ground or ocean), and the Stack Height is the release height above the Base (not above the platform). Building heights entered in Subgroup 13c must be those of the buildings on the platform, measured from the platform deck. ZPLTFM is used only with MBDW=1 (ISC downwash method) for sources with building downwash. (Default: 0.0)

b

0. = No building downwash modeled
1. = Downwash modeled for buildings resting on the surface
2. = Downwash modeled for buildings raised above the surface (ZPLTFM > 0.)

NOTE: must be entered as a REAL number (i.e., with decimal point)

c

An emission rate must be entered for every pollutant modeled. Enter emission rate of zero for secondary pollutants that are modeled, but not emitted. Units are specified by IPTU (e.g. 1 for g/s).

Subgroup (13c)

BUILDING DIMENSION DATA FOR SOURCES SUBJECT TO DOWNWASH

Source No.	Effective building height, width, length and X/Y offset (in meters) every 10 degrees. LENGTH, XBADJ, and YBADJ are only needed for MBDW=2 (PRIME downwash option) [a]

---

a

Building height, width, length, and X/Y offset from the source are treated as a separate input subgroup for each source and therefore must end with an input group terminator. The X/Y offset is the position, relative to the stack, of the center of the upwind face of the projected building, with the x-axis pointing along the flow direction.

Subgroup (13d)

POINT SOURCE: VARIABLE EMISSIONS DATA [a]

Use this subgroup to describe temporal variations in the emission rates given in 13b. Factors entered multiply the rates in 13b.

Skip sources here that have constant emissions. For more elaborate variation in source parameters, use PTEMARB.DAT and NPT2 > 0.

IVARY determines the type of variation, and is source-specific:
(IVARY) Default: 1

- 0 = Constant
- 1 = Diurnal cycle (24 scaling factors: hours 1-24)
- 2 = Monthly cycle (12 scaling factors: months 1-12)
- 3 = Hour & Season (4 groups of 24 hourly scaling factors, where first group is DEC-JAN-FEB)
- 4 = Speed & Stab. (6 groups of 6 scaling factors, where first group is Stability Class A, and the speed classes have upper bounds (m/s) defined in Group 12
- 5 = Temperature (12 scaling factors, where temperature classes have upper bounds (C) of: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 50+)

---

a

Data for each species are treated as a separate input subgroup and therefore must end with an input group terminator.

INPUT GROUPS: 14a, 14b, 14c, 14d -- Area source parameters

Subgroup (14a)

Number of polygon area sources with parameters specified below (NAR1) No default ! NAR1 = 3 !

Units used for area source emissions below (IARU) Default: 1 ! IARU = 5 !

- 1 = g/m**2/s
- 2 = kg/m**2/hr
- 3 = lb/m**2/hr
- 4 = tons/m**2/yr
- 5 = Odour Unit * m/s (vol. flux/m**2 of odour compound)
- 6 = Odour Unit * m/min
- 7 = metric tons/m**2/yr
- 8 = Bq/m**2/s (Bq = becquerel = disintegrations/s)
- 9 = GBq/m**2/yr

Number of source-species combinations with variable

```
     emissions scaling factors
     provided below in (14d)        (NSAR1) Default: 0  !  NSAR1 = 3  !

     Number of buoyant polygon area sources
     with variable location and emission
     parameters (NAR2)                      No default  !  NAR2 =  0   !
     (If NAR2 > 0, ALL parameter data for
     these sources are read from the file: BAEMARB.DAT)

!END!

---------------
Subgroup (14b)
---------------
                                    a
          AREA SOURCE: CONSTANT DATA
          --------------------------
                                                              b
Source           Effect.    Base      Initial    Emission
 No.             Height   Elevation   Sigma z     Rates
                   (m)       (m)        (m)
-------          ------    ------     --------   ---------

   1! SRCNAM = D1 !
   1! X =         0.0,      25.0,          .0,   0.22! !END!
   2! SRCNAM = D2 !
   2! X =         0.0,      25.0,          .0,   1.22! !END!
   3! SRCNAM = D3 !
   3! X =         0.0,      25.0,          .0,   7.78! !END!
--------
    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.
    b
     An emission rate must be entered for every pollutant modeled.
     Enter emission rate of zero for secondary pollutants that are
     modeled, but not emitted.  Units are specified by IARU
     (e.g. 1 for g/m**2/s).

---------------
Subgroup (14c)
---------------

          COORDINATES (km) FOR EACH VERTEX(4) OF EACH POLYGON
          ---------------------------------------------------------
Source                                                              a
 No.      Ordered list of X followed by list of Y, grouped by source
------    ---------------------------------------------------------------

 1    ! SRCNAM  =  D1 !
 1      !  XVERT = 626.869,    626.972,    627.240,    627.225!
 1      !  YVERT = 4757.909,    4758.279,    4758.262,  4757.919!
!END!
 2    ! SRCNAM  =   D2 !
```

```
 2      !  XVERT = 627.080,    627.297,    627.273,    627.022!
 2      !  YVERT = 4757.875,    4757.773,    4757.680,  4757.788!
!END!
 3    ! SRCNAM  =   D3 !
 3      !  XVERT = 627.205,    627.206,    627.259,    627.261!
 3      !  YVERT = 4757.710,    4757.761,    4757.760,  4757.707!
!END!
```

---

a

Data for each source are treated as a separate input subgroup and therefore must end with an input group terminator.

Subgroup (14d)

---

a

AREA SOURCE: VARIABLE EMISSIONS DATA

Use this subgroup to describe temporal variations in the emission rates given in 14b. Factors entered multiply the rates in 14b. Skip sources here that have constant emissions. For more elaborate variation in source parameters, use BAEMARB.DAT and NAR2 > 0.

IVARY determines the type of variation, and is source-specific:
(IVARY) Default: 0

- 0 = Constant
- 1 = Diurnal cycle (24 scaling factors: hours 1-24)
- 2 = Monthly cycle (12 scaling factors: months 1-12)
- 3 = Hour & Season (4 groups of 24 hourly scaling factors, where first group is DEC-JAN-FEB)
- 4 = Speed & Stab. (6 groups of 6 scaling factors, where first group is Stability Class A, and the speed classes have upper bounds (m/s) defined in Group 12
- 5 = Temperature (12 scaling factors, where temperature classes have upper bounds (C) of: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 50+)

```
1  ! SRCNAM = D1 !
1  ! IVARY  = 1  ! (Diurnal Cycle)
1  ! ODR1 = 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1!
!END!
2  ! SRCNAM = D2 !
2  ! IVARY  = 1  ! (Diurnal Cycle)
2  ! ODR1 = 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1!
!END!
3  ! SRCNAM = D3 !
3  ! IVARY  = 1  ! (Diurnal Cycle)
```

```
3  ! ODR1 = 0.4, 0.4, 0.4, 0.4, 0.4, 0.4, 0.4, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
0.4, 0.4, 0.4, 0.4, 0.4, 0.4!
!END!


--------
    a
     Data for each species are treated as a separate input subgroup
     and therefore must end with an input group terminator.


-------------------------------------------------------------------------------

INPUT GROUPS: 15a, 15b, 15c -- Line source parameters
---------------------------

---------------
Subgroup (15a)
---------------

     Number of buoyant line sources
     with variable location and emission
     parameters (NLN2)                              No default  !  NLN2 =  0   !

     (If NLN2 > 0, ALL parameter data for
      these sources are read from the file: LNEMARB.DAT)

     Number of buoyant line sources (NLINES)        No default   ! NLINES =  0
!

     Units used for line source
     emissions below               (ILNU)           Default: 1  !  ILNU =   1  !
           1 =        g/s
           2 =       kg/hr
           3 =       lb/hr
           4 =     tons/yr
           5 =     Odour Unit * m**3/s  (vol. flux of odour compound)
           6 =     Odour Unit * m**3/min
           7 =     metric tons/yr
           8 =     Bq/s  (Bq = becquerel = disintegrations/s)
           9 =     GBq/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (15c)        (NSLN1) Default: 0  !  NSLN1 =  0  !

     Maximum number of segments used to model
     each line (MXNSEG)                             Default: 7   ! MXNSEG =  7
!

     The following variables are required only if NLINES > 0.  They are
     used in the buoyant line source plume rise calculations.
```

```
        Number of distances at which                Default: 6   ! NLRISE =  6
!
        transitional rise is computed

        Average building length (XL)                No default   ! XL = .0 !
                                                    (in meters)

        Average building height (HBL)               No default   ! HBL = .0 !
                                                    (in meters)

        Average building width (WBL)                No default   ! WBL = .0 !
                                                    (in meters)

        Average line source width (WML)             No default   ! WML = .0 !
                                                    (in meters)

        Average separation between buildings (DXL)  No default   ! DXL = .0 !
                                                    (in meters)

        Average buoyancy parameter (FPRIMEL)        No default   ! FPRIMEL = .0
!
                                                    (in m**4/s**3)

!END!

---------------
Subgroup (15b)
---------------

          BUOYANT LINE SOURCE: CONSTANT DATA
          ----------------------------------

         a
Source     Beg. X      Beg. Y      End. X    End. Y     Release    Base
Emission
 No.     Coordinate  Coordinate  Coordinate Coordinate  Height    Elevation
Rates
            (km)        (km)        (km)       (km)       (m)       (m)

------   ----------  ----------  ---------  ----------  -------   ---------
---------

--------
```

a
Data for each source are treated as a separate input subgroup and therefore must end with an input group terminator.

b
An emission rate must be entered for every pollutant modeled. Enter emission rate of zero for secondary pollutants that are modeled, but not emitted. Units are specified by ILNTU (e.g. 1 for g/s).

Subgroup (15c)

BUOYANT LINE SOURCE: VARIABLE EMISSIONS DATA[a]

Use this subgroup to describe temporal variations in the emission rates given in 15b. Factors entered multiply the rates in 15b. Skip sources here that have constant emissions.

IVARY determines the type of variation, and is source-specific:
(IVARY) Default: 0

- 0 = Constant
- 1 = Diurnal cycle (24 scaling factors: hours 1-24)
- 2 = Monthly cycle (12 scaling factors: months 1-12)
- 3 = Hour & Season (4 groups of 24 hourly scaling factors, where first group is DEC-JAN-FEB)
- 4 = Speed & Stab. (6 groups of 6 scaling factors, where first group is Stability Class A, and the speed classes have upper bounds (m/s) defined in Group 12
- 5 = Temperature (12 scaling factors, where temperature classes have upper bounds (C) of: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 50+)

---

[a] Data for each species are treated as a separate input subgroup and therefore must end with an input group terminator.

INPUT GROUPS: 16a, 16b, 16c -- Volume source parameters

Subgroup (16a)

Number of volume sources with parameters provided in 16b,c (NVL1) No default ! NVL1 = 0 !

Units used for volume source emissions below in 16b (IVLU) Default: 1 ! IVLU = 1 !

- 1 = g/s
- 2 = kg/hr
- 3 = lb/hr
- 4 = tons/yr

```
           5 =     Odour Unit * m**3/s  (vol. flux of odour compound)
           6 =     Odour Unit * m**3/min
           7 =     metric tons/yr
           8 =     Bq/s  (Bq = becquerel = disintegrations/s)
           9 =     GBq/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (16c)      (NSVL1)    Default: 0  !  NSVL1 =  0  !

     Number of volume sources with
     variable location and emission
     parameters                   (NVL2)     No default  !  NVL2 =   0   !

     (If NVL2 > 0, ALL parameter data for
      these sources are read from the VOLEMARB.DAT file(s) )

!END!

---------------
Subgroup (16b)
---------------
                                    a
           VOLUME SOURCE: CONSTANT DATA
           ----------------------------
                                                                        b
         X           Y        Effect.    Base     Initial    Initial    Emission
     Coordinate  Coordinate   Height   Elevation  Sigma y    Sigma z     Rates
        (km)        (km)        (m)       (m)       (m)       (m)
     ----------  ----------   ------    ------    --------   --------   --------


--------
    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.

    b
     An emission rate must be entered for every pollutant modeled.
     Enter emission rate of zero for secondary pollutants that are
     modeled, but not emitted.  Units are specified by IVLU
     (e.g. 1 for g/s).

---------------
Subgroup (16c)
---------------
                                              a
          VOLUME SOURCE: VARIABLE EMISSIONS DATA
          --------------------------------------

     Use this subgroup to describe temporal variations in the emission
     rates given in 16b.  Factors entered multiply the rates in 16b.
     Skip sources here that have constant emissions.  For more elaborate
```

variation in source parameters, use VOLEMARB.DAT and NVL2 > 0.

IVARY determines the type of variation, and is source-specific:
(IVARY) Default: 0

- 0 = Constant
- 1 = Diurnal cycle (24 scaling factors: hours 1-24)
- 2 = Monthly cycle (12 scaling factors: months 1-12)
- 3 = Hour & Season (4 groups of 24 hourly scaling factors, where first group is DEC-JAN-FEB)
- 4 = Speed & Stab. (6 groups of 6 scaling factors, where first group is Stability Class A, and the speed classes have upper bounds (m/s) defined in Group 12
- 5 = Temperature (12 scaling factors, where temperature classes have upper bounds (C) of: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 50+)

---

a Data for each species are treated as a separate input subgroup and therefore must end with an input group terminator.

INPUT GROUPS: 17a & 17b -- Non-gridded (discrete) receptor information

---

Subgroup (17a)

Number of non-gridded receptors (NREC) No default ! NREC = 24 !

!END!

Subgroup (17b)

---

a

NON-GRIDDED (DISCRETE) RECEPTOR DATA

Receptor No.	X Coordinate (km)	Y Coordinate (km)	Ground Elevation (m)	Height Above Ground (m) b	
1 ! X =	625.881,	4758.441,	6.000,	2.000!	!END!
2 ! X =	629.505,	4760.275,	5.000,	2.000!	!END!
3 ! X =	624.476,	4759.954,	15.000,	2.000!	!END!

```
 4 ! X =     626.506,   4758.008,       1.000,       2.000!   !END!
 5 ! X =     625.270,   4757.623,      14.000,       2.000!   !END!
 6 ! X =     625.404,   4755.270,       2.000,       2.000!   !END!
 7 ! X =     623.288,   4755.253,      93.000,       2.000!   !END!
 8 ! X =     622.569,   4755.324,      42.000,       2.000!   !END!
 9 ! X =     624.618,   4753.865,      22.000,       2.000!   !END!
10 ! X =     626.490,   4758.302,       2.000,       2.000!   !END!
11 ! X =     626.732,   4756.595,       1.000,       2.000!   !END!
12 ! X =     626.042,   4756.848,      10.000,       2.000!   !END!
13 ! X =     625.710,   4756.140,      18.000,       2.000!   !END!
14 ! X =     630.273,   4757.648,       2.000,       2.000!   !END!
15 ! X =     627.012,   4758.717,       5.000,       2.000!   !END!
16 ! X =     627.710,   4757.634,       4.000,       2.000!   !END!
17 ! X =     627.856,   4757.882,       4.000,       2.000!   !END!
18 ! X =     625.709,   4757.216,      20.000,       2.000!   !END!
19 ! X =     626.325,   4757.737,       2.000,       2.000!   !END!
20 ! X =     626.247,   4757.333,      26.000,       2.000!   !END!
21 ! X =     626.346,   4757.478,      21.000,       2.000!   !END!
22 ! X =     626.271,   4757.513,      22.000,       2.000!   !END!
23 ! X =     626.918,   4758.552,       6.000,       2.000!   !END!
24 ! X =     626.693,   4758.573,       8.000,       2.000!   !END!
-------------
```

a

Data for each receptor are treated as a separate input subgroup and therefore must end with an input group terminator.

b

Receptor height above ground is optional. If no value is entered, the receptor is placed on the ground.

```
CALPUFF.INP     2.0             File version record

SC2.INP - RIMATERIA ADR Var4 (D1) Cop.Definitiva, exLucchini superficie 24500
(D2) Cop. Definitiva, LI53 Lotto 4 e 6 Cop.provvisoria (D3),Lotto 8
Cop.Gestionale D4, FC D5 H=25. Rimodulazione LI53 Scenario 2 Massimo(ODR1) Medio
(ODR2).

---------------- Run title (3 lines) ------------------------------------------

                    CALPUFF MODEL CONTROL FILE
                    --------------------------

--------------------------------------------------------------------------------

INPUT GROUP: 0 -- Input and Output File Names

--------------
Default Name  Type          File Name
------------  ----          ---------
CALMET.DAT    input    ! METDAT =C:\Calpuff\RIM08\MET17.DAT  !
    or
ISCMET.DAT    input    * ISCDAT =             *
    or
PLMMET.DAT    input    * PLMDAT =             *
    or
PROFILE.DAT   input    * PRFDAT =             *
SURFACE.DAT   input    * SFCDAT =             *
RESTARTB.DAT  input    * RSTARTB=             *
--------------------------------------------------------------------------------
CALPUFF.LST   output   ! PUFLST =LI53MOD.LST  !
CONC.DAT      output   ! CONDAT =LI53MOD.DAT  !
DFLX.DAT      output   * DFDAT  =             *
WFLX.DAT      output   * WFDAT  =             *

VISB.DAT      output   * VISDAT =             *
TK2D.DAT      output   * T2DDAT =             *
RHO2D.DAT     output   * RHODAT =             *
RESTARTE.DAT  output   * RSTARTE=             *
--------------------------------------------------------------------------------
Emission Files
--------------
PTEMARB.DAT   input    * PTDAT  =             *
VOLEMARB.DAT  input    * VOLDAT =             *
BAEMARB.DAT   input    * ARDAT  =             *
LNEMARB.DAT   input    * LNDAT  =             *
--------------------------------------------------------------------------------
Other Files
-----------
OZONE.DAT     input    * OZDAT  =             *
VD.DAT        input    * VDDAT  =             *
CHEM.DAT      input    * CHEMDAT=             *
AUX           input    ! AUXEXT =AUX     !
(Extension added to METDAT filename(s) for files
 with auxiliary 2D and 3D data)
```

```
H2O2.DAT      input    * H2O2DAT=             *
NH3Z.DAT      input    * NH3ZDAT=             *
HILL.DAT      input    * HILDAT=             *
HILLRCT.DAT   input    * RCTDAT=             *
COASTLN.DAT   input    * CSTDAT=             *
FLUXBDY.DAT   input    * BDYDAT=             *
BCON.DAT      input    * BCNDAT=             *
DEBUG.DAT     output   * DEBUG =             *
MASSFLX.DAT   output   * FLXDAT=             *
MASSBAL.DAT   output   * BALDAT=             *
FOG.DAT       output   * FOGDAT=             *
RISE.DAT      output   * RISDAT=             *
-------------------------------------------------------------------------------
All file names will be converted to lower case if LCFILES = T
Otherwise, if LCFILES = F, file names will be converted to UPPER CASE
         T = lower case      ! LCFILES = F !
         F = UPPER CASE
NOTE: (1) file/path names can be up to 132 characters in length


Provision for multiple input files
----------------------------------

     Number of Modeling Domains (NMETDOM)
                                    Default: 1       ! NMETDOM =  1  !

     Number of CALMET.DAT files for run (NMETDAT)
                                    Default: 1       ! NMETDAT =   1   !

     Number of PTEMARB.DAT files for run (NPTDAT)
                                    Default: 0       ! NPTDAT =   0   !

     Number of BAEMARB.DAT files for run (NARDAT)
                                    Default: 0       ! NARDAT =   0   !

     Number of VOLEMARB.DAT files for run (NVOLDAT)
                                    Default: 0       ! NVOLDAT =   0   !

!END!

-------------
Subgroup (0a)
-------------

  Provide a name for each CALMET domain if NMETDOM > 1
  Enter NMETDOM lines.
                                  a,b
Default Name             Domain Name
------------             ------------
 none                  * DOMAIN1=     *   *END*
 none                  * DOMAIN2=     *   *END*
 none                  * DOMAIN3=     *   *END*
```

The following CALMET.DAT filenames are processed in sequence
if NMETDAT > 1

Enter NMETDAT lines, 1 line for each file name.

```
                                    a,c,d
Default Name  Type          File Name
------------  ----          ---------
 none         input    * METDAT1=     *   *END*
 none         input    * METDAT2=     *   *END*
 none         input    * METDAT3=     *   *END*
```

---

a
The name for each CALMET domain and each CALMET.DAT file is treated as a separate input subgroup and therefore must end with an input group terminator.

b
Use DOMAIN1= to assign the name for the outermost CALMET domain.
Use DOMAIN2= to assign the name for the next inner CALMET domain.
Use DOMAIN3= to assign the name for the next inner CALMET domain, etc.

When inner domains with equal resolution (grid-cell size) overlap, the data from the FIRST such domain in the list will be used if all other criteria for choosing the controlling grid domain are inconclusive.

c
Use METDAT1= to assign the file names for the outermost CALMET domain.
Use METDAT2= to assign the file names for the next inner CALMET domain.
Use METDAT3= to assign the file names for the next inner CALMET domain, etc.

d
The filenames for each domain must be provided in sequential order

---

Subgroup (0b)

The following PTEMARB.DAT filenames are processed if NPTDAT>0
(Each file contains a subset of the sources, for the entire simulation)

```
Default Name  Type          File Name
------------  ----          ---------
 none         input       * PTDAT=     *   *END*
```

Subgroup (0c)

The following BAEMARB.DAT filenames are processed if NARDAT>0
(Each file contains a subset of the sources, for the entire simulation)

```
Default Name  Type          File Name
------------  ----          ---------
 none         input       * ARDAT=     *   *END*


-------------
Subgroup (0d)
-------------

  The following VOLEMARB.DAT filenames are processed if NVOLDAT>0
  (Each file contains a subset of the sources, for the entire simulation)

Default Name  Type          File Name
------------  ----          ---------
 none         input       * VOLDAT=     *   *END*


------------------------------------------------------------------------------

INPUT GROUP: 1 -- General run control parameters
--------------

    Option to run all periods found
    in the met. file     (METRUN)   Default: 0       ! METRUN =   1  !

         METRUN = 0 - Run period explicitly defined below
         METRUN = 1 - Run all periods in met. file

     Starting date:    Year   (IBYR)  --    No default   ! IBYR  =  2017  !
                       Month  (IBMO)  --    No default   ! IBMO  =  0  !
                       Day    (IBDY)  --    No default   ! IBDY  =  0  !
     Starting time:    Hour   (IBHR)  --    No default   ! IBHR  =  0  !
                       Minute (IBMIN) --    No default   ! IBMIN =  0  !
                       Second (IBSEC) --    No default   ! IBSEC =  0  !

     Ending date:      Year   (IEYR)  --    No default   ! IEYR  =  0  !
                       Month  (IEMO)  --    No default   ! IEMO  =  0  !
                       Day    (IEDY)  --    No default   ! IEDY  =  0  !
     Ending time:      Hour   (IEHR)  --    No default   ! IEHR  =  0  !
                       Minute (IEMIN) --    No default   ! IEMIN =  0  !
                       Second (IESEC) --    No default   ! IESEC =  0  !

     (These are only used if METRUN = 0)

     Base time zone:          (ABTZ)  --    No default   ! ABTZ= UTC+0000 !
      (character*8)
     The modeling domain may span multiple time zones.  ABTZ defines the
     base time zone used for the entire simulation.  This must match the
     base time zone of the meteorological data.
     Examples:
         Los Angeles, USA          = UTC-0800
         New York, USA             = UTC-0500
         Santiago, Chile           = UTC-0400
         Greenwich Mean Time (GMT) = UTC+0000
```

```
    Rome, Italy               = UTC+0100
    Cape Town, S.Africa       = UTC+0200
    Sydney, Australia         = UTC+1000

Length of modeling time-step (seconds)
Equal to update period in the primary
meteorological data files, or an
integer fraction of it (1/2, 1/3 ...)
Must be no larger than 1 hour
(NSECDT)                      Default:3600     ! NSECDT =  3600  !
                              Units: seconds

Number of chemical species (NSPEC)
                              Default: 5       ! NSPEC = 2   !

Number of chemical species
to be emitted  (NSE)          Default: 3       ! NSE =  2   !

Flag to stop run after
SETUP phase (ITEST)           Default: 2       ! ITEST =  2   !
(Used to allow checking
of the model inputs, files, etc.)
      ITEST = 1 - STOPS program after SETUP phase
      ITEST = 2 - Continues with execution of program
                  after SETUP

Restart Configuration:

   Control flag (MRESTART)    Default: 0       ! MRESTART =  0   !

      0 = Do not read or write a restart file
      1 = Read a restart file at the beginning of
          the run
      2 = Write a restart file during run
      3 = Read a restart file at beginning of run
          and write a restart file during run

   Number of periods in Restart
   output cycle (NRESPD)      Default: 0       ! NRESPD =  0   !

      0 = File written only at last period
     >0 = File updated every NRESPD periods

Meteorological Data Format (METFM)
                              Default: 1       ! METFM =  1   !

      METFM = 1 - CALMET binary file (CALMET.MET)
      METFM = 2 - ISC ASCII file (ISCMET.MET)
      METFM = 3 - AUSPLUME ASCII file (PLMMET.MET)
      METFM = 4 - CTDM plus tower file (PROFILE.DAT) and
                  surface parameters file (SURFACE.DAT)
      METFM = 5 - AERMET tower file (PROFILE.DAT) and
                  surface parameters file (SURFACE.DAT)
```

```
     Meteorological Profile Data Format (MPRFFM)
            (used only for METFM = 1, 2, 3)
                                  Default: 1       ! MPRFFM =  1   !

           MPRFFM = 1 - CTDM plus tower file (PROFILE.DAT)
           MPRFFM = 2 - AERMET tower file (PROFILE.DAT)

     PG sigma-y is adjusted by the factor (AVET/PGTIME)**0.2
     Averaging Time (minutes) (AVET)
                                  Default: 60.0    ! AVET = 60. !
     PG Averaging Time (minutes) (PGTIME)
                                  Default: 60.0    ! PGTIME = 60. !


     Output units for binary concentration and flux files
     written in Dataset v2.2 or later formats
     (IOUTU)                      Default: 1       ! IOUTU =  2   !
         1 = mass      -  g/m3 (conc) or g/m2/s (dep)
         2 = odour     -  odour_units (conc)
         3 = radiation -  Bq/m3 (conc) or Bq/m2/s (dep)


     Output Dataset format for binary concentration
     and flux files (e.g., CONC.DAT)
     (IOVERS)                     Default: 2       ! IOVERS =  2   !
         1 = Dataset Version 2.1
         2 = Dataset Version 2.2


!END!


--------------------------------------------------------------------------------

INPUT GROUP: 2 -- Technical options
--------------


     Vertical distribution used in the
     near field (MGAUSS)                Default: 1     ! MGAUSS =  1   !
        0 = uniform
        1 = Gaussian

     Terrain adjustment method
     (MCTADJ)                           Default: 3     ! MCTADJ =  3   !
        0 = no adjustment
        1 = ISC-type of terrain adjustment
        2 = simple, CALPUFF-type of terrain
            adjustment
        3 = partial plume path adjustment

     Subgrid-scale complex terrain
     flag (MCTSG)                       Default: 0     ! MCTSG =  0   !
        0 = not modeled
```

```
   1 = modeled

Near-field puffs modeled as
elongated slugs? (MSLUG)              Default: 0     ! MSLUG =  0   !
   0 = no
   1 = yes (slug model used)

Transitional plume rise modeled?
(MTRANS)                              Default: 1     ! MTRANS =  1   !
   0 = no  (i.e., final rise only)
   1 = yes (i.e., transitional rise computed)

Stack tip downwash? (MTIP)            Default: 1     ! MTIP =  1  !
   0 = no  (i.e., no stack tip downwash)
   1 = yes (i.e., use stack tip downwash)

Method used to compute plume rise for
point sources not subject to building
downwash? (MRISE)                     Default: 1     ! MRISE =  1  !
   1 = Briggs plume rise
   2 = Numerical plume rise

Method used to simulate building
downwash? (MBDW)                      Default: 1     ! MBDW =   1  !
   1 = ISC method
   2 = PRIME method

Vertical wind shear modeled above
stack top (modified Briggs plume rise)?
(MSHEAR)                              Default: 0     ! MSHEAR =  1  !
   0 = no  (i.e., vertical wind shear not modeled)
   1 = yes (i.e., vertical wind shear modeled)

Puff splitting allowed? (MSPLIT)      Default: 0     ! MSPLIT =  0  !
   0 = no (i.e., puffs not split)
   1 = yes (i.e., puffs are split)

Chemical mechanism flag (MCHEM)       Default: 1     ! MCHEM =  0   !
   0 = chemical transformation not
       modeled
   1 = transformation rates computed
       internally (MESOPUFF II scheme)
   2 = user-specified transformation
       rates used
   3 = transformation rates computed
       internally (RIVAD/ARM3 scheme)
   4 = secondary organic aerosol formation
       computed (MESOPUFF II scheme for OH)
   5 = user-specified half-life with or
       without transfer to child species
   6 = transformation rates computed
       internally (Updated RIVAD scheme with
       ISORROPIA equilibrium)
   7 = transformation rates computed
```

```
       internally (Updated RIVAD scheme with
       ISORROPIA equilibrium and CalTech SOA)

Aqueous phase transformation flag (MAQCHEM)
(Used only if MCHEM = 6, or 7)        Default: 0     ! MAQCHEM =  0   !
   0 = aqueous phase transformation
       not modeled
   1 = transformation rates and wet
       scavenging coefficients adjusted
       for in-cloud aqueous phase reactions
       (adapted from RADM cloud model
        implementation in CMAQ/SCICHEM)

Liquid Water Content flag (MLWC)
(Used only if MAQCHEM = 1)            Default: 1     ! MLWC =  1   !
   0 = water content estimated from cloud cover
       and presence of precipitation
   1 = gridded cloud water data read from CALMET
       water content output files (filenames are
       the CALMET.DAT names PLUS the extension
       AUXEXT provided in Input Group 0)

Wet removal modeled ? (MWET)          Default: 1     ! MWET =  0   !
   0 = no
   1 = yes

Dry deposition modeled ? (MDRY)       Default: 1     ! MDRY =  0   !
   0 = no
   1 = yes
   (dry deposition method specified
    for each species in Input Group 3)


Gravitational settling (plume tilt)
modeled ? (MTILT)                     Default: 0     ! MTILT =  0   !
   0 = no
   1 = yes
   (puff center falls at the gravitational
    settling velocity for 1 particle species)

Restrictions:
    - MDRY  = 1
    - NSPEC = 1  (must be particle species as well)
    - sg    = 0  GEOMETRIC STANDARD DEVIATION in Group 8 is
                 set to zero for a single particle diameter

Method used to compute dispersion
coefficients (MDISP)                  Default: 3     ! MDISP =  3   !

   1 = dispersion coefficients computed from measured values
       of turbulence, sigma v, sigma w
   2 = dispersion coefficients from internally calculated
       sigma v, sigma w using micrometeorological variables
       (u*, w*, L, etc.)
```

```
   3 = PG dispersion coefficients for RURAL areas (computed using
       the ISCST multi-segment approximation) and MP coefficients in
       urban areas
   4 = same as 3 except PG coefficients computed using
       the MESOPUFF II eqns.
   5 = CTDM sigmas used for stable and neutral conditions.
       For unstable conditions, sigmas are computed as in
       MDISP = 3, described above.  MDISP = 5 assumes that
       measured values are read

Sigma-v/sigma-theta, sigma-w measurements used? (MTURBVW)
(Used only if MDISP = 1 or 5)         Default: 3     ! MTURBVW =  3  !
   1 = use sigma-v or sigma-theta measurements
       from PROFILE.DAT to compute sigma-y
       (valid for METFM = 1, 2, 3, 4, 5)
   2 = use sigma-w measurements
       from PROFILE.DAT to compute sigma-z
       (valid for METFM = 1, 2, 3, 4, 5)
   3 = use both sigma-(v/theta) and sigma-w
       from PROFILE.DAT to compute sigma-y and sigma-z
       (valid for METFM = 1, 2, 3, 4, 5)
   4 = use sigma-theta measurements
       from PLMMET.DAT to compute sigma-y
       (valid only if METFM = 3)

Back-up method used to compute dispersion
when measured turbulence data are
missing (MDISP2)                      Default: 3     ! MDISP2 =  3  !
(used only if MDISP = 1 or 5)
   2 = dispersion coefficients from internally calculated
       sigma v, sigma w using micrometeorological variables
       (u*, w*, L, etc.)
   3 = PG dispersion coefficients for RURAL areas (computed using
       the ISCST multi-segment approximation) and MP coefficients in
       urban areas
   4 = same as 3 except PG coefficients computed using
       the MESOPUFF II eqns.

[DIAGNOSTIC FEATURE]
Method used for Lagrangian timescale for Sigma-y
(used only if MDISP=1,2 or MDISP2=1,2)
(MTAULY)                              Default: 0     ! MTAULY =  0  !
   0 = Draxler default 617.284 (s)
   1 = Computed as Lag. Length / (.75 q) -- after SCIPUFF
  10 < Direct user input (s)             -- e.g., 306.9


[DIAGNOSTIC FEATURE]
Method used for Advective-Decay timescale for Turbulence
(used only if MDISP=2 or MDISP2=2)
(MTAUADV)                             Default: 0     ! MTAUADV =  0  !
   0 = No turbulence advection
   1 = Computed (OPTION NOT IMPLEMENTED)
  10 < Direct user input (s)   -- e.g., 800
```

```
Method used to compute turbulence sigma-v &
sigma-w using micrometeorological variables
(Used only if MDISP = 2 or MDISP2 = 2)
(MCTURB)                              Default: 1     ! MCTURB =  1  !
   1 = Standard CALPUFF subroutines
   2 = AERMOD subroutines

PG sigma-y,z adj. for roughness?      Default: 0     ! MROUGH =  0  !
(MROUGH)
   0 = no
   1 = yes

Partial plume penetration of          Default: 1     ! MPARTL =  1  !
elevated inversion modeled for
point sources?
(MPARTL)
   0 = no
   1 = yes

Partial plume penetration of          Default: 1     ! MPARTLBA =  1  !
elevated inversion modeled for
buoyant area sources?
(MPARTLBA)
   0 = no
   1 = yes

Strength of temperature inversion     Default: 0     ! MTINV =  0  !
provided in PROFILE.DAT extended records?
(MTINV)
   0 = no (computed from measured/default gradients)
   1 = yes

PDF used for dispersion under convective conditions?
                                      Default: 0     ! MPDF =  0  !
(MPDF)
   0 = no
   1 = yes

Sub-Grid TIBL module used for shore line?
                                      Default: 0     ! MSGTIBL = 0  !
(MSGTIBL)
   0 = no
   1 = yes

Boundary conditions (concentration) modeled?
                                      Default: 0     ! MBCON = 0  !
(MBCON)
   0 = no
   1 = yes, using formatted BCON.DAT file
   2 = yes, using unformatted CONC.DAT file

Note:  MBCON > 0 requires that the last species modeled
```

```
       be 'BCON'.  Mass is placed in species BCON when
       generating boundary condition puffs so that clean
       air entering the modeling domain can be simulated
       in the same way as polluted air.  Specify zero
       emission of species BCON for all regular sources.

Individual source contributions saved?
                                       Default: 0     ! MSOURCE = 0  !
(MSOURCE)
   0 = no
   1 = yes


Analyses of fogging and icing impacts due to emissions from
arrays of mechanically-forced cooling towers can be performed
using CALPUFF in conjunction with a cooling tower emissions
processor (CTEMISS) and its associated postprocessors.  Hourly
emissions of water vapor and temperature from each cooling tower
cell are computed for the current cell configuration and ambient
conditions by CTEMISS. CALPUFF models the dispersion of these
emissions and provides cloud information in a specialized format
for further analysis. Output to FOG.DAT is provided in either
'plume mode' or 'receptor mode' format.

Configure for FOG Model output?
                                       Default: 0     ! MFOG =  0   !
(MFOG)
   0 = no
   1 = yes  - report results in PLUME Mode format
   2 = yes  - report results in RECEPTOR Mode format


Test options specified to see if
they conform to regulatory
values? (MREG)                         Default: 1     ! MREG =  0   !

   0 = NO checks are made
   1 = Technical options must conform to USEPA
       Long Range Transport (LRT) guidance
                  METFM    1 or 2
                  AVET     60. (min)
                  PGTIME   60. (min)
                  MGAUSS   1
                  MCTADJ   3
                  MTRANS   1
                  MTIP     1
                  MRISE    1
                  MCHEM    1 or 3 (if modeling SOx, NOx)
                  MWET     1
                  MDRY     1
                  MDISP    2 or 3
                  MPDF     0 if MDISP=3
                           1 if MDISP=2
                  MROUGH   0
```

```
                      MPARTL   1
                      MPARTLBA 0
                      SYTDEP   550. (m)
                      MHFTSZ   0
                      SVMIN    0.5 (m/s)


!END!


--------------------------------------------------------------------------------

INPUT GROUP: 3a, 3b -- Species list
-------------------

------------
Subgroup (3a)
------------

  The following species are modeled:

! CSPEC =    ODR1 !         !END!
! CSPEC =    ODR2 !         !END!



                                                        Dry                 OUTPUT
GROUP
    SPECIES          MODELED          EMITTED       DEPOSITED
NUMBER
     NAME         (0=NO, 1=YES)    (0=NO, 1=YES)    (0=NO,
(0=NONE,
   (Limit: 12                                        1=COMPUTED-GAS        1=1st
CGRUP,
    Characters                                       2=COMPUTED-PARTICLE   2=2nd
CGRUP,
    in length)                                       3=USER-SPECIFIED)     3=
etc.)

!    ODR1  =         1,               1,           0,                 0   !
!    ODR2  =         1,               1,           0,                 0   !

!END!

  Note:  The last species in (3a) must be 'BCON' when using the
         boundary condition option (MBCON > 0).  Species BCON should
         typically be modeled as inert (no chem transformation or
         removal).


-------------
Subgroup (3b)
-------------
```

```
  The following names are used for Species-Groups in which results
  for certain species are combined (added) prior to output.  The
  CGRUP name will be used as the species name in output files.
  Use this feature to model specific particle-size distributions
  by treating each size-range as a separate species.
  Order must be consistent with 3(a) above.


-------------------------------------------------------------------------------


INPUT GROUP: 4 -- Map Projection and Grid control parameters
--------------

     Projection for all (X,Y):
     -------------------------

     Map projection
     (PMAP)                    Default: UTM    ! PMAP = UTM  !

         UTM :  Universal Transverse Mercator
         TTM :  Tangential Transverse Mercator
         LCC :  Lambert Conformal Conic
          PS :  Polar Stereographic
          EM :  Equatorial Mercator
        LAZA :  Lambert Azimuthal Equal Area

     False Easting and Northing (km) at the projection origin
     (Used only if PMAP= TTM, LCC, or LAZA)
     (FEAST)                   Default=0.0     ! FEAST  = 0.000  !
     (FNORTH)                  Default=0.0     ! FNORTH = 0.000  !

     UTM zone (1 to 60)
     (Used only if PMAP=UTM)
     (IUTMZN)                  No Default      ! IUTMZN =  32   !

     Hemisphere for UTM projection?
     (Used only if PMAP=UTM)
     (UTMHEM)                  Default: N      ! UTMHEM = N  !
         N   :  Northern hemisphere projection
         S   :  Southern hemisphere projection

     Latitude and Longitude (decimal degrees) of projection origin
     (Used only if PMAP= TTM, LCC, PS, EM, or LAZA)
     (RLAT0)                   No Default      ! RLAT0 =  0N  !
     (RLON0)                   No Default      ! RLON0 =  0E  !

         TTM :  RLON0 identifies central (true N/S) meridian of projection
                RLAT0 selected for convenience
         LCC :  RLON0 identifies central (true N/S) meridian of projection
                RLAT0 selected for convenience
         PS  :  RLON0 identifies central (grid N/S) meridian of projection
                RLAT0 selected for convenience
```

```
         EM  :  RLON0 identifies central meridian of projection
                RLAT0 is REPLACED by 0.0N (Equator)
         LAZA:  RLON0 identifies longitude of tangent-point of mapping plane
                RLAT0 identifies latitude of tangent-point of mapping plane

     Matching parallel(s) of latitude (decimal degrees) for projection
     (Used only if PMAP= LCC or PS)
     (XLAT1)                   No Default      ! XLAT1 =  0N  !
     (XLAT2)                   No Default      ! XLAT2 =  0N  !

         LCC :  Projection cone slices through Earth's surface at XLAT1 and
XLAT2
         PS  :  Projection plane slices through Earth at XLAT1
                (XLAT2 is not used)

     ----------
     Note:  Latitudes and longitudes should be positive, and include a
            letter N,S,E, or W indicating north or south latitude, and
            east or west longitude.  For example,
            35.9  N Latitude  =  35.9N
            118.7 E Longitude = 118.7E


     Datum-region
     ------------

     The Datum-Region for the coordinates is identified by a character
     string.  Many mapping products currently available use the model of the
     Earth known as the World Geodetic System 1984 (WGS-84).  Other local
     models may be in use, and their selection in CALMET will make its output0
   official transformation parameters is provided by the National Imagery and
     Mapping Agency (NIMA).

     NIMA Datum - Regions(Examples)

-------------------------------------------------------------------------------
     WGS-84    WGS-84 Reference Ellipsoid and Geoid, Global coverage (WGS84)
     NAS-C     NORTH AMERICAN 1927 Clarke 1866 Spheroid, MEAN FOR CONUS (NAD27)
     NAR-C     NORTH AMERICAN 1983 GRS 80 Spheroid, MEAN FOR CONUS (NAD83)
     NWS-84    NWS 6370KM Radius, Sphere
     ESR-S     ESRI REFERENCE 6371KM Radius, Sphere

     Datum-region for output coordinates
     (DATUM)                   Default: WGS-84    ! DATUM = WGS-84  !


METEOROLOGICAL Grid:

     Rectangular grid defined for projection PMAP,
     with X the Easting and Y the Northing coordinate

            No. X grid cells (NX)      No default     ! NX =  80   !
            No. Y grid cells (NY)      No default     ! NY =  80   !
         No. vertical layers (NZ)      No default     ! NZ =  7  !
```

```
          Grid spacing (DGRIDKM)      No default     ! DGRIDKM = .10 !
                                      Units: km

               Cell face heights
                   (ZFACE(nz+1))      No defaults
                                      Units: m
   ! ZFACE = 0.,20.,50.,100.,200.,500.,1000.,1500 !

           Reference Coordinates
          of SOUTHWEST corner of
               grid cell(1, 1):

           X coordinate (XORIGKM)     No default     ! XORIGKM = 622.273 !
           Y coordinate (YORIGKM)     No default     ! YORIGKM = 4753.048 !
                                     Units: km
```

COMPUTATIONAL Grid:

The computational grid is identical to or a subset of the MET. grid. The lower left (LL) corner of the computational grid is at grid point (IBCOMP, JBCOMP) of the MET. grid. The upper right (UR) corner of the computational grid is at grid point (IECOMP, JECOMP) of the MET. grid. The grid spacing of the computational grid is the same as the MET. grid.

```
   X index of LL corner (IBCOMP)      No default     ! IBCOMP =  1   !
             (1 <= IBCOMP <= NX)

   Y index of LL corner (JBCOMP)      No default     ! JBCOMP =  1   !
             (1 <= JBCOMP <= NY)


   X index of UR corner (IECOMP)      No default     ! IECOMP =  80   !
             (1 <= IECOMP <= NX)

   Y index of UR corner (JECOMP)      No default     ! JECOMP =  80   !
             (1 <= JECOMP <= NY)
```

SAMPLING Grid (GRIDDED RECEPTORS):

The lower left (LL) corner of the sampling grid is at grid point (IBSAMP, JBSAMP) of the MET. grid. The upper right (UR) corner of the sampling grid is at grid point (IESAMP, JESAMP) of the MET. grid. The sampling grid must be identical to or a subset of the computational grid. It may be a nested grid inside the computational grid. The grid spacing of the sampling grid is DGRIDKM/MESHDN.

```
   Logical flag indicating if gridded
   receptors are used (LSAMP)         Default: T     ! LSAMP = T !
   (T=yes, F=no)
```

```
        X index of LL corner (IBSAMP)      No default     ! IBSAMP =  1   !
         (IBCOMP <= IBSAMP <= IECOMP)

        Y index of LL corner (JBSAMP)      No default     ! JBSAMP =  1   !
         (JBCOMP <= JBSAMP <= JECOMP)


        X index of UR corner (IESAMP)      No default     ! IESAMP =  80   !
         (IBCOMP <= IESAMP <= IECOMP)

        Y index of UR corner (JESAMP)      No default     ! JESAMP =  80   !
         (JBCOMP <= JESAMP <= JECOMP)


       Nesting factor of the sampling
        grid (MESHDN)                      Default: 1     ! MESHDN =  1  !
        (MESHDN is an integer >= 1)

!END!


--------------------------------------------------------------------------------


INPUT GROUP: 5 -- Output Options
--------------
                                          *                          *
     FILE                        DEFAULT VALUE             VALUE THIS RUN
     ----                        -------------             --------------

   Concentrations (ICON)               1                   !  ICON =  1   !
   Dry Fluxes (IDRY)                   1                   !  IDRY =  0   !
   Wet Fluxes (IWET)                   1                   !  IWET =  0   !
   2D Temperature (IT2D)               0                   !  IT2D =  0   !
   2D Density (IRHO)                   0                   !  IRHO =  0   !
   Relative Humidity (IVIS)            1                   !  IVIS =  0   !
    (relative humidity file is
     required for visibility
     analysis)
   Use data compression option in output file?
   (LCOMPRS)                          Default: T          ! LCOMPRS = T !

   *
    0 = Do not create file, 1 = create file


    QA PLOT FILE OUTPUT OPTION:

       Create a standard series of output files (e.g.
       locations of sources, receptors, grids ...)
       suitable for plotting?
       (IQAPLOT)                      Default: 1          !  IQAPLOT =  1   !
         0 = no
         1 = yes
```

```
DIAGNOSTIC PUFF-TRACKING OUTPUT OPTION:

   Puff locations and properties reported to
   PFTRAK.DAT file for postprocessing?
   (IPFTRAK)                      Default: 0         ! IPFTRAK =  0   !
     0 = no
     1 = yes, update puff output at end of each timestep
     2 = yes, update puff output at end of each sampling step

DIAGNOSTIC MASS FLUX OUTPUT OPTIONS:

   Mass flux across specified boundaries
   for selected species reported?
   (IMFLX)                        Default: 0         ! IMFLX =  0  !
     0 = no
     1 = yes (FLUXBDY.DAT and MASSFLX.DAT filenames
              are specified in Input Group 0)

   Mass balance for each species
   reported?
   (IMBAL)                        Default: 0         ! IMBAL =  0  !
     0 = no
     1 = yes (MASSBAL.DAT filename is
          specified in Input Group 0)


NUMERICAL RISE OUTPUT OPTION:

   Create a file with plume properties for each rise
   increment, for each model timestep?
   This applies to sources modeled with numerical rise
   and is limited to ONE source in the run.
   (INRISE)                       Default: 0         ! INRISE =  0  !
     0 = no
     1 = yes (RISE.DAT filename is
              specified in Input Group 0)


LINE PRINTER OUTPUT OPTIONS:

   Print concentrations (ICPRT)    Default: 0         ! ICPRT =  1   !
   Print dry fluxes (IDPRT)        Default: 0         ! IDPRT =  0   !
   Print wet fluxes (IWPRT)        Default: 0         ! IWPRT =  0   !
   (0 = Do not print, 1 = Print)

   Concentration print interval
   (ICFRQ) in timesteps            Default: 1         ! ICFRQ =  1   !
   Dry flux print interval
   (IDFRQ) in timesteps            Default: 1         ! IDFRQ =  1   !
   Wet flux print interval
   (IWFRQ) in timesteps            Default: 1         ! IWFRQ =  1   !

   Units for Line Printer Output
```

```
      (IPRTU)                          Default: 1         ! IPRTU =  5   !
                     for              for
                  Concentration    Deposition
          1 =        g/m**3          g/m**2/s
          2 =       mg/m**3         mg/m**2/s
          3 =       ug/m**3         ug/m**2/s
          4 =       ng/m**3         ng/m**2/s
          5 =      Odour Units

      Messages tracking progress of run
      written to the screen ?
      (IMESG)                          Default: 2         ! IMESG =  2   !
        0 = no
        1 = yes (advection step, puff ID)
        2 = yes (YYYYJJJHH, # old puffs, # emitted puffs)


    SPECIES (or GROUP for combined species) LIST FOR OUTPUT OPTIONS

                  ---- CONCENTRATIONS ----   ------ DRY FLUXES ------   ------
WET FLUXES ------   -- MASS FLUX --
   SPECIES
   /GROUP        PRINTED?  SAVED ON DISK?   PRINTED?  SAVED ON DISK?   PRINTED?
SAVED ON DISK?   SAVED ON DISK?
   -------       ------------------------   ------------------------
-----------------------   ---------------
!     ODR1 =     1,           1,           0,           0,           0,
 0,           0   !
!     ODR2 =     1,           1,           0,           0,           0,
 0,           0   !

  Note:  Species BCON (for MBCON > 0) does not need to be saved on disk.


    OPTIONS FOR PRINTING "DEBUG" QUANTITIES (much output)

      Logical for debug output
      (LDEBUG)                                 Default: F     ! LDEBUG = F !

      First puff to track
      (IPFDEB)                                 Default: 1     ! IPFDEB =  1  !

      Number of puffs to track
      (NPFDEB)                                 Default: 1     ! NPFDEB =  1  !

      Met. period to start output
      (NN1)                                    Default: 1     ! NN1 =  1   !

      Met. period to end output
      (NN2)                                    Default: 10    ! NN2 =  10  !

!END!
```

```
--------------------------------------------------------------------------------


INPUT GROUP: 6a, 6b, & 6c -- Subgrid scale complex terrain inputs
-------------------------

---------------
Subgroup (6a)
---------------
       Number of terrain features (NHILL)       Default: 0     ! NHILL =  0   !

       Number of special complex terrain
       receptors  (NCTREC)                      Default: 0     ! NCTREC =  0   !

       Terrain and CTSG Receptor data for
       CTSG hills input in CTDM format ?
       (MHILL)                                  No Default     ! MHILL =  2   !
       1 = Hill and Receptor data created
           by CTDM processors & read from
           HILL.DAT and HILLRCT.DAT files
       2 = Hill data created by OPTHILL &
           input below in Subgroup (6b);
           Receptor data in Subgroup (6c)

       Factor to convert horizontal dimensions  Default: 1.0   ! XHILL2M = 1.0 !
       to meters (MHILL=1)

       Factor to convert vertical dimensions    Default: 1.0   ! ZHILL2M = 1.0 !
       to meters (MHILL=1)

       X-origin of CTDM system relative to      No Default     ! XCTDMKM = 0 !
       CALPUFF coordinate system, in Kilometers (MHILL=1)

       Y-origin of CTDM system relative to      No Default     ! YCTDMKM = 0 !
       CALPUFF coordinate system, in Kilometers (MHILL=1)

! END !

---------------
Subgroup (6b)
---------------

                      1 **
     HILL information


HILL           XC         YC        THETAH  ZGRID  RELIEF    EXPO 1    EXPO 2
SCALE 1    SCALE 2    AMAX1     AMAX2
 NO.           (km)       (km)       (deg.)   (m)     (m)       (m)       (m)
(m)        (m)        (m)        (m)
----           ----       ----       ------  -----  ------    ------    ------
-------    -------    -----     -----

---------------
```

Subgroup (6c)

COMPLEX TERRAIN RECEPTOR INFORMATION

XRCT (km)	YRCT (km)	ZRCT (m)	XHH

1

Description of Complex Terrain Variables:

- XC, YC = Coordinates of center of hill
- THETAH = Orientation of major axis of hill (clockwise from North)
- ZGRID = Height of the 0 of the grid above mean sea level
- RELIEF = Height of the crest of the hill above the grid elevation
- EXPO 1 = Hill-shape exponent for the major axis
- EXPO 2 = Hill-shape exponent for the major axis
- SCALE 1 = Horizontal length scale along the major axis
- SCALE 2 = Horizontal length scale along the minor axis
- AMAX = Maximum allowed axis length for the major axis
- BMAX = Maximum allowed axis length for the major axis

- XRCT, YRCT = Coordinates of the complex terrain receptors
- ZRCT = Height of the ground (MSL) at the complex terrain Receptor
- XHH = Hill number associated with each complex terrain receptor (NOTE: MUST BE ENTERED AS A REAL NUMBER)

**

NOTE: DATA for each hill and CTSG receptor are treated as a separate input subgroup and therefore must end with an input group terminator.

INPUT GROUP: 7 -- Chemical parameters for dry deposition of gases
---

SPECIES NAME	DIFFUSIVITY (cm**2/s)	ALPHA STAR (dimensionless)	REACTIVITY	MESOPHYLL RESISTANCE (s/cm)	HENRY'S LAW COEFFICIENT

!END!

```
INPUT GROUP: 8 -- Size parameters for dry deposition of particles
--------------

     For SINGLE SPECIES, the mean and standard deviation are used to
     compute a deposition velocity for NINT (see group 9) size-ranges,
     and these are then averaged to obtain a mean deposition velocity.

     For GROUPED SPECIES, the size distribution should be explicitly
     specified (by the 'species' in the group), and the standard deviation
     for each should be entered as 0.  The model will then use the
     deposition velocity for the stated mean diameter.

      SPECIES      GEOMETRIC MASS MEAN        GEOMETRIC STANDARD
       NAME             DIAMETER                   DEVIATION
                        (microns)                  (microns)
      -------      -------------------        ------------------

!END!


-------------------------------------------------------------------------------


INPUT GROUP: 9 -- Miscellaneous dry deposition parameters
--------------

     Reference cuticle resistance (s/cm)
     (RCUTR)                          Default: 30    !  RCUTR = 30.0 !
     Reference ground resistance  (s/cm)
     (RGR)                            Default: 10    !    RGR = 10.0 !
     Reference pollutant reactivity
     (REACTR)                         Default: 8     ! REACTR = 8.0 !

     Number of particle-size intervals used to
     evaluate effective particle deposition velocity
     (NINT)                           Default: 9     !   NINT =  9  !

     Vegetation state in unirrigated areas
     (IVEG)                           Default: 1     !   IVEG =  1   !
        IVEG=1 for active and unstressed vegetation
        IVEG=2 for active and stressed vegetation
        IVEG=3 for inactive vegetation

!END!


-------------------------------------------------------------------------------


INPUT GROUP: 10 -- Wet Deposition Parameters
---------------
```

Scavenging Coefficient -- Units: (sec)**(-1)

Pollutant	Liquid Precip.	Frozen Precip.

!END!

INPUT GROUP: 11a, 11b -- Chemistry Parameters

Subgroup (11a)

Several parameters are needed for one or more of the chemical transformation
mechanisms. Those used for each mechanism are:

Mechanism (MCHEM)	MOZ	BCK3	MGN3	MAVG3	BCKN3	RNIT1	RNIT2	RNIT3	MH2O2	BCKH2O2	BCKPF	ORAC	VCXN	NDEPAY
0 None	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1 MESOPUFF II	X	X	.	.	X	X	X	X	.	.	.	.	.	.
2 User Rates	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3 RIVAD	X	X	.	.	X	.	.	.	.	.	.	.	.	.
4 SOA	X	X	.	.	.	.	.	.	.	.	X	X	X	.
5 Radioactive Decay	.	.	.	.	.	.	.	.	.	.	.	.	.	X
6 RIVAD/ISORRPIA	X	X	X	X	X	X	.	.	X	X	.	.	.	.
7 RIVAD/ISORRPIA/SOA	X	X	X	X	X	X	.	.	X	X	X	X	.	.

Ozone data input option (MOZ) Default: 1 ! MOZ = 0 !
(Used only if MCHEM = 1, 3, 4, 6, or 7)
0 = use a monthly background ozone value
1 = read hourly ozone concentrations from
the OZONE.DAT data file

Monthly ozone concentrations in ppb (BCKO3)
(Used only if MCHEM = 1,3,4,6, or 7 and either
MOZ = 0, or
MOZ = 1 and all hourly O3 data missing)
Default: 12*80.
! BCKO3 = 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00 !

```
     Ammonia data option (MNH3)        Default: 0            ! MNH3 =  0   !
     (Used only if MCHEM = 6 or 7)
        0 = use monthly background ammonia values (BCKNH3) - no vertical
variation
        1 = read monthly background ammonia values for each layer from
            the NH3Z.DAT data file

     Ammonia vertical averaging option (MAVGNH3)
     (Used only if MCHEM = 6 or 7, and MNH3 = 1)
        0 = use NH3 at puff center height (no averaging is done)
        1 = average NH3 values over vertical extent of puff
                                       Default: 1            ! MAVGNH3 =  1   !

     Monthly ammonia concentrations in ppb (BCKNH3)
     (Used only if MCHEM = 1 or 3, or
                if MCHEM = 6 or 7, and MNH3 = 0)
                                       Default: 12*10.
     !  BCKNH3 = 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00,
10.00, 10.00, 10.00 !

     Nighttime SO2 loss rate in %/hour (RNITE1)
     (Used only if MCHEM = 1, 6 or 7)
     This rate is used only at night for MCHEM=1
     and is added to the computed rate both day
     and night for MCHEM=6,7 (heterogeneous reactions)
                                       Default: 0.2          ! RNITE1 = .2 !

     Nighttime NOx loss rate in %/hour (RNITE2)
     (Used only if MCHEM = 1)
                                       Default: 2.0          ! RNITE2 = 2.0 !

     Nighttime HNO3 formation rate in %/hour (RNITE3)
     (Used only if MCHEM = 1)
                                       Default: 2.0          ! RNITE3 = 2.0 !

     H2O2 data input option (MH2O2)    Default: 1            ! MH2O2 =  1   !
     (Used only if MCHEM = 6 or 7, and MAQCHEM = 1)
        0 = use a monthly background H2O2 value
        1 = read hourly H2O2 concentrations from
            the H2O2.DAT data file

     Monthly H2O2 concentrations in ppb (BCKH2O2)
     (Used only if MQACHEM = 1 and either
        MH2O2 = 0 or
        MH2O2 = 1 and all hourly H2O2 data missing)
                                       Default: 12*1.
     !  BCKH2O2 = 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00,
1.00, 1.00 !


 --- Data for SECONDARY ORGANIC AEROSOL (SOA) Options
     (used only if MCHEM = 4 or 7)

     The MCHEM = 4 SOA module uses monthly values of:
```

Fine particulate concentration in ug/m^3 (BCKPMF)
Organic fraction of fine particulate (OFRAC)
VOC / NOX ratio (after reaction) (VCNX)

The MCHEM = 7 SOA module uses monthly values of:
Fine particulate concentration in ug/m^3 (BCKPMF)
Organic fraction of fine particulate (OFRAC)

These characterize the air mass when computing
the formation of SOA from VOC emissions.
Typical values for several distinct air mass types are:

Month	1 Jan	2 Feb	3 Mar	4 Apr	5 May	6 Jun	7 Jul	8 Aug	9 Sep	10 Oct	11 Nov	12 Dec
Clean Continental												
BCKPMF	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
OFRAC	.15	.15	.20	.20	.20	.20	.20	.20	.20	.20	.20	.15
VCNX	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.
Clean Marine (surface)												
BCKPMF	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
OFRAC	.25	.25	.30	.30	.30	.30	.30	.30	.30	.30	.30	.25
VCNX	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.
Urban - low biogenic (controls present)												
BCKPMF	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.
OFRAC	.20	.20	.25	.25	.25	.25	.25	.25	.20	.20	.20	.20
VCNX	4.	4.	4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
Urban - high biogenic (controls present)												
BCKPMF	60.	60.	60.	60.	60.	60.	60.	60.	60.	60.	60.	60.
OFRAC	.25	.25	.30	.30	.30	.55	.55	.55	.35	.35	.35	.25
VCNX	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.
Regional Plume												
BCKPMF	20.	20.	20.	20.	20.	20.	20.	20.	20.	20.	20.	20.
OFRAC	.20	.20	.25	.35	.25	.40	.40	.40	.30	.30	.30	.20
VCNX	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.
Urban - no controls present												
BCKPMF	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.
OFRAC	.30	.30	.35	.35	.35	.55	.55	.55	.35	.35	.35	.30
VCNX	2.	2.	2.	2.	2.	2.	2.	2.	2.	2.	2.	2.

Default: Clean Continental
! BCKPMF = 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00 !
! OFRAC = 0.15, 0.15, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.15 !
! VCNX = 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00 !

--- End Data for SECONDARY ORGANIC AEROSOL (SOA) Option

```
     Number of half-life decay specification blocks provided in Subgroup 11b
     (Used only if MCHEM = 5)
     (NDECAY)                                    Default: 0      ! NDECAY =  0
!

!END!


--------------
Subgroup (11b)
--------------

     Each species modeled may be assigned a decay half-life (sec), and the
associated
     mass lost may be assigned to one or more other modeled species using a mass
yield
     factor. This information is used only for MCHEM=5.

     Provide NDECAY blocks assigning the half-life for a parent species and mass
yield
     factors for each child species (if any) produced by the decay.
     Set HALF_LIFE=0.0 for NO decay (infinite half-life).


                              a            b
        SPECIES      Half-Life   Mass Yield
         NAME          (sec)       Factor
        -------      ---------   ----------

     *   SPEC1   =    3600.,        -1.0   *    (Parent)
     *   SPEC2   =     -1.0,         0.0   *    (Child)
   *END*

--------
    a
     Specify a half life that is greater than or equal to zero for 1 parent
species
     in each block, and set the yield factor for this species to -1
    b
     Specify a yield factor that is greater than or equal to zero for 1 or more
child
     species in each block, and set the half-life for each of these species to
-1

     NOTE: Assignments in each block are treated as a separate input
           subgroup and therefore must end with an input group terminator.
           If NDECAY=0, no assignments and input group terminators should
appear.

-------------------------------------------------------------------------------
```

```
INPUT GROUP: 12 -- Misc. Dispersion and Computational Parameters
---------------

     Horizontal size of puff (m) beyond which
     time-dependent dispersion equations (Heffter)
     are used to determine sigma-y and
     sigma-z (SYTDEP)                          Default: 550.   ! SYTDEP =
5.5E02 !

     Switch for using Heffter equation for sigma z
     as above (0 = Not use Heffter; 1 = use Heffter
     (MHFTSZ)                                  Default: 0      ! MHFTSZ =  0
!

     Stability class used to determine plume
     growth rates for puffs above the boundary
     layer (JSUP)                              Default: 5      ! JSUP =  5   !

     Vertical dispersion constant for stable
     conditions (k1 in Eqn. 2.7-3)  (CONK1)    Default: 0.01   ! CONK1 = .01 !

     Vertical dispersion constant for neutral/
     unstable conditions (k2 in Eqn. 2.7-4)
     (CONK2)                                   Default: 0.1    ! CONK2 = .1 !

     Factor for determining Transition-point from
     Schulman-Scire to Huber-Snyder Building Downwash
     scheme (SS used for Hs < Hb + TBD * HL)
     (TBD)                                     Default: 0.5    ! TBD = .5 !
        TBD < 0   ==> always use Huber-Snyder
        TBD = 1.5 ==> always use Schulman-Scire
        TBD = 0.5 ==> ISC Transition-point

     Range of land use categories for which
     urban dispersion is assumed
     (IURB1, IURB2)                            Default: 10     ! IURB1 =  10  !
                                                        19     ! IURB2 =  19  !

     Site characterization parameters for single-point Met data files ---------
     (needed for METFM = 2,3,4,5)

        Land use category for modeling domain
        (ILANDUIN)                             Default: 20     ! ILANDUIN =  20
 !

        Roughness length (m) for modeling domain
        (Z0IN)                                 Default: 0.25   ! Z0IN = .25 !

        Leaf area index for modeling domain
        (XLAIIN)                               Default: 3.0    ! XLAIIN = 3.0 !

        Elevation above sea level (m)
        (ELEVIN)                               Default: 0.0    ! ELEVIN = .0 !
```

```
        Latitude (degrees) for met location
        (XLATIN)                                Default: -999.  ! XLATIN =
-999.0 !

        Longitude (degrees) for met location
        (XLONIN)                                Default: -999.  ! XLONIN =
-999.0 !

     Specialized information for interpreting single-point Met data files -----

        Anemometer height (m) (Used only if METFM = 2,3)
        (ANEMHT)                                Default: 10.    ! ANEMHT = 10.0
!

        Form of lateral turbulance data in PROFILE.DAT file
        (Used only if METFM = 4,5 or MTURBVW = 1 or 3)
        (ISIGMAV)                               Default: 1      ! ISIGMAV =  1
!
            0 = read sigma-theta
            1 = read sigma-v

        Choice of mixing heights (Used only if METFM = 4)
        (IMIXCTDM)                              Default: 0      ! IMIXCTDM =  0
!
            0 = read PREDICTED mixing heights
            1 = read OBSERVED mixing heights

     Maximum length of a slug (met. grid units)
     (XMXLEN)                                   Default: 1.0    ! XMXLEN = 1.0 !

     Maximum travel distance of a puff/slug (in
     grid units) during one sampling step
     (XSAMLEN)                                  Default: 1.0    ! XSAMLEN = 1.0
!

     Maximum Number of slugs/puffs release from
     one source during one time step
     (MXNEW)                                    Default: 99     ! MXNEW =  99
!

     Maximum Number of sampling steps for
     one puff/slug during one time step
     (MXSAM)                                    Default: 99     ! MXSAM =  99
!

     Number of iterations used when computing
     the transport wind for a sampling step
     that includes gradual rise (for CALMET
     and PROFILE winds)
     (NCOUNT)                                   Default: 2      ! NCOUNT =  2
!

     Minimum sigma y for a new puff/slug (m)
     (SYMIN)                                    Default: 1.0    ! SYMIN = 1.0  !
```

```
     Minimum sigma z for a new puff/slug (m)
     (SZMIN)                                   Default: 1.0    ! SZMIN = 1.0  !

     Maximum sigma z (m) allowed to avoid
     numerical problem in calculating virtual
     time or distance.  Cap should be large
     enough to have no influence on normal events.
     Enter a negative cap to disable.
     (SZCAP_M)                                 Default: 5.0e06 ! SZCAP_M =
5.0E06 !

     Default minimum turbulence velocities sigma-v and sigma-w
     for each stability class over land and over water (m/s)
     (SVMIN(12) and SWMIN(12))

                     ----------  LAND  ----------       ---------  WATER
----------
        Stab Class :  A    B    C    D    E    F         A    B    C    D    E
 F
                     ---  ---  ---  ---  ---  ---       ---  ---  ---  ---  ---
---
     Default SVMIN : .50, .50, .50, .50, .50, .50,      .37, .37, .37, .37, .37,
.37
     Default SWMIN : .20, .12, .08, .06, .03, .016,     .20, .12, .08, .06, .03,
.016

           ! SVMIN = 0.500, 0.500, 0.500, 0.500, 0.500, 0.500, 0.370, 0.370,
0.370, 0.370, 0.370, 0.370!
           ! SWMIN = 0.200, 0.120, 0.080, 0.060, 0.030, 0.016, 0.200, 0.120,
0.080, 0.060, 0.030, 0.016!

     Divergence criterion for dw/dz across puff
     used to initiate adjustment for horizontal
     convergence (1/s)
     Partial adjustment starts at CDIV(1), and
     full adjustment is reached at CDIV(2)
     (CDIV(2))                                 Default: 0.0,0.0  ! CDIV = .0,
.0 !

     Search radius (number of cells) for nearest
     land and water cells used in the subgrid
     TIBL module
     (NLUTIBL)                                 Default: 4      ! NLUTIBL =  4
!

     Minimum wind speed (m/s) allowed for
     non-calm conditions. Also used as minimum
     speed returned when using power-law
     extrapolation toward surface
     (WSCALM)                                  Default: 0.5    ! WSCALM = .5 !

     Maximum mixing height (m)
     (XMAXZI)                                  Default: 3000.  ! XMAXZI =
```

```
3000.0 !

     Minimum mixing height (m)
     (XMINZI)                                  Default: 50.    ! XMINZI = 50.0
!

     Default wind speed classes --
     5 upper bounds (m/s) are entered;
     the 6th class has no upper limit
     (WSCAT(5))                     Default   :
                                    ISC RURAL : 1.54, 3.09, 5.14, 8.23, 10.8
(10.8+)

                               Wind Speed Class :  1     2     3     4     5
                                                   ---   ---   ---   ---   ---
                                      ! WSCAT = 1.54, 3.09, 5.14, 8.23, 10.80 !

     Default wind speed profile power-law
     exponents for stabilities 1-6
     (PLX0(6))                      Default   : ISC RURAL values
                                    ISC RURAL : .07, .07, .10, .15, .35, .55
                                    ISC URBAN : .15, .15, .20, .25, .30, .30

                                Stability Class :  A     B     C     D     E
F
                                                   ---   ---   ---   ---   ---
---
                                     ! PLX0 = 0.07, 0.07, 0.10, 0.15, 0.35,
0.55 !

     Default potential temperature gradient
     for stable classes E, F (degK/m)
     (PTG0(2))                      Default: 0.020, 0.035
                                       ! PTG0 = 0.020,   0.035 !

     Default plume path coefficients for
     each stability class (used when option
     for partial plume height terrain adjustment
     is selected -- MCTADJ=3)
     (PPC(6))                   Stability Class :  A     B     C     D     E
F
                                   Default  PPC : .50,  .50,  .50,  .50,  .35,
.35
                                                   ---   ---   ---   ---   ---
---
                                     !  PPC = 0.50, 0.50, 0.50, 0.50, 0.35,
0.35 !

     Slug-to-puff transition criterion factor
     equal to sigma-y/length of slug
     (SL2PF)                           Default: 10.        ! SL2PF = 10.0 !

     Puff-splitting control variables ------------------------
```

```
      VERTICAL SPLIT
      --------------

      Number of puffs that result every time a puff
      is split - nsplit=2 means that 1 puff splits
      into 2
      (NSPLIT)                          Default:   3        ! NSPLIT =  3  !

      Time(s) of a day when split puffs are eligible to
      be split once again; this is typically set once
      per day, around sunset before nocturnal shear develops.
      24 values: 0 is midnight (00:00) and 23 is 11 PM (23:00)
      0=do not re-split    1=eligible for re-split
      (IRESPLIT(24))                    Default:  Hour 17 = 1
      !  IRESPLIT = 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0,0,0,0 !

      Split is allowed only if last hour's mixing
      height (m) exceeds a minimum value
      (ZISPLIT)                         Default: 100.       ! ZISPLIT = 100.0
!

      Split is allowed only if ratio of last hour's
      mixing ht to the maximum mixing ht experienced
      by the puff is less than a maximum value (this
      postpones a split until a nocturnal layer develops)
      (ROLDMAX)                         Default: 0.25       ! ROLDMAX = 0.25
!


      HORIZONTAL SPLIT
      ----------------

      Number of puffs that result every time a puff
      is split - nsplith=5 means that 1 puff splits
      into 5
      (NSPLITH)                         Default:   5        ! NSPLITH =  5  !

      Minimum sigma-y (Grid Cells Units) of puff
      before it may be split
      (SYSPLITH)                        Default:  1.0       ! SYSPLITH = 1.0
!

      Minimum puff elongation rate (SYSPLITH/hr) due to
      wind shear, before it may be split
      (SHSPLITH)                        Default:  2.        ! SHSPLITH = 2.0
!

      Minimum concentration (g/m^3) of each
      species in puff before it may be split
      Enter array of NSPEC values; if a single value is
      entered, it will be used for ALL species
      (CNSPLITH)                        Default:  1.0E-07   ! CNSPLITH =
1.0E-07 !
```

```
     Integration control variables ------------------------

       Fractional convergence criterion for numerical SLUG
       sampling integration
       (EPSSLUG)                          Default:   1.0e-04  ! EPSSLUG =
1.0E-04 !

       Fractional convergence criterion for numerical AREA
       source integration
       (EPSAREA)                          Default:   1.0e-06  ! EPSAREA =
1.0E-06 !

       Trajectory step-length (m) used for numerical rise
       integration
       (DSRISE)                           Default:   1.0      ! DSRISE = 1.0 !

       Boundary Condition (BC) Puff control variables ------------------------

       Minimum height (m) to which BC puffs are mixed as they are emitted
       (MBCON=2 ONLY).  Actual height is reset to the current mixing height
       at the release point if greater than this minimum.
       (HTMINBC)                          Default:   500.     ! HTMINBC = 500.0
!

       Search radius (km) about a receptor for sampling nearest BC puff.
       BC puffs are typically emitted with a spacing of one grid cell
       length, so the search radius should be greater than DGRIDKM.
       (RSAMPBC)                          Default:   10.      ! RSAMPBC = 10.0
!

       Near-Surface depletion adjustment to concentration profile used when
       sampling BC puffs?
       (MDEPBC)                           Default:   1        ! MDEPBC =  1  !
          0 = Concentration is NOT adjusted for depletion
          1 = Adjust Concentration for depletion

!END!


--------------------------------------------------------------------------------


INPUT GROUPS: 13a, 13b, 13c, 13d -- Point source parameters
---------------------------------

---------------
Subgroup (13a)
---------------

     Number of point sources with
     parameters provided below      (NPT1)  No default  !  NPT1 =  0  !

     Units used for point source
     emissions below                (IPTU)  Default: 1  !  IPTU =   1  !
```

```
           1 =        g/s
           2 =       kg/hr
           3 =       lb/hr
           4 =     tons/yr
           5 =     Odour Unit * m**3/s  (vol. flux of odour compound)
           6 =     Odour Unit * m**3/min
           7 =     metric tons/yr
           8 =     Bq/s  (Bq = becquerel = disintegrations/s)
           9 =     GBq/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (13d)        (NSPT1) Default: 0  !  NSPT1 =  0  !

     Number of point sources with
     variable emission parameters
     provided in external file      (NPT2)  No default  !  NPT2 =  0  !

     (If NPT2 > 0, these point
     source emissions are read from
     the file: PTEMARB.DAT)

!END!

---------------
Subgroup (13b)
---------------
                                      a
          POINT SOURCE: CONSTANT DATA
          ---------------------------
                                                                        b
        c
  Source       X         Y       Stack    Base     Stack    Exit  Exit    Bldg.
Emission
   No.     Coordinate Coordinate Height Elevation Diameter  Vel.  Temp.   Dwash
 Rates
              (km)      (km)       (m)      (m)       (m)  (m/s) (deg. K)

  ------   ---------- ---------- ------  ------   -------- ----- -------- -----
--------

--------

    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.

     SRCNAM  is a 12-character name for a source
             (No default)
     X       is an array holding the source data listed by the column headings
             (No default)
     SIGYZI  is an array holding the initial sigma-y and sigma-z (m)
             (Default: 0.,0.)
```

FMFAC is a vertical momentum flux factor (0. or 1.0) used to represent the effect of rain-caps or other physical configurations that reduce momentum rise associated with the actual exit velocity. (Default: 1.0 -- full momentum used)

ZPLTFM is the platform height (m) for sources influenced by an isolated structure that has a significant open area between the surface and the bulk of the structure, such as an offshore oil platform. The Base Elevation is that of the surface (ground or ocean), and the Stack Height is the release height above the Base (not above the platform). Building heights entered in Subgroup 13c must be those of the buildings on the platform, measured from the platform deck. ZPLTFM is used only with MBDW=1 (ISC downwash method) for sources with building downwash. (Default: 0.0)

b

0. = No building downwash modeled
1. = Downwash modeled for buildings resting on the surface
2. = Downwash modeled for buildings raised above the surface (ZPLTFM > 0.)
NOTE: must be entered as a REAL number (i.e., with decimal point)

c

An emission rate must be entered for every pollutant modeled. Enter emission rate of zero for secondary pollutants that are modeled, but not emitted. Units are specified by IPTU (e.g. 1 for g/s).

Subgroup (13c)

BUILDING DIMENSION DATA FOR SOURCES SUBJECT TO DOWNWASH

Source No.	Effective building height, width, length and X/Y offset (in meters) every 10 degrees. LENGTH, XBADJ, and YBADJ are only needed for MBDW=2 (PRIME downwash option) [a]

---

a

Building height, width, length, and X/Y offset from the source are treated as a separate input subgroup for each source and therefore must end with an input group terminator. The X/Y offset is the position, relative to the stack, of the center of the upwind face of the projected building, with the x-axis pointing along the flow direction.

Subgroup (13d)

POINT SOURCE: VARIABLE EMISSIONS DATA [a]

Use this subgroup to describe temporal variations in the emission rates given in 13b. Factors entered multiply the rates in 13b. Skip sources here that have constant emissions. For more elaborate variation in source parameters, use PTEMARB.DAT and NPT2 > 0.

IVARY determines the type of variation, and is source-specific:
(IVARY) Default: 1

- 0 = Constant
- 1 = Diurnal cycle (24 scaling factors: hours 1-24)
- 2 = Monthly cycle (12 scaling factors: months 1-12)
- 3 = Hour & Season (4 groups of 24 hourly scaling factors, where first group is DEC-JAN-FEB)
- 4 = Speed & Stab. (6 groups of 6 scaling factors, where first group is Stability Class A, and the speed classes have upper bounds (m/s) defined in Group 12
- 5 = Temperature (12 scaling factors, where temperature classes have upper bounds (C) of: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 50+)

---

a

Data for each species are treated as a separate input subgroup and therefore must end with an input group terminator.

INPUT GROUPS: 14a, 14b, 14c, 14d -- Area source parameters

Subgroup (14a)

Number of polygon area sources with parameters specified below (NAR1) No default ! NAR1 = 5 !

Units used for area source emissions below (IARU) Default: 1 ! IARU = 5 !

- 1 = g/m**2/s
- 2 = kg/m**2/hr
- 3 = lb/m**2/hr
- 4 = tons/m**2/yr
- 5 = Odour Unit * m/s (vol. flux/m**2 of odour compound)
- 6 = Odour Unit * m/min
- 7 = metric tons/m**2/yr
- 8 = Bq/m**2/s (Bq = becquerel = disintegrations/s)

```
           9 =     GBq/m**2/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (14d)        (NSAR1) Default: 0  !  NSAR1 = 10  !

     Number of buoyant polygon area sources
     with variable location and emission
     parameters (NAR2)                      No default  !  NAR2 =  0   !
     (If NAR2 > 0, ALL parameter data for
     these sources are read from the file: BAEMARB.DAT)

!END!

---------------
Subgroup (14b)
---------------
                                    a
          AREA SOURCE: CONSTANT DATA
          --------------------------
                                                              b
Source           Effect.    Base      Initial    Emission
 No.             Height   Elevation   Sigma z     Rates
                   (m)       (m)        (m)
-------          ------    ------     --------   ---------

   1! SRCNAM = D1 !
   1! X =         0.0,      25.0,          .0,   0.22, 0.14! !END!
   2! SRCNAM = D2 !
   2! X =         0.0,      25.0,          .0,   0.22, 0.14! !END!
   3! SRCNAM = D3 !
   3! X =         0.0,      25.0,          .0,   0.22, 0.14! !END!
   4! SRCNAM = D4 !
   4! X =         0.0,      25.0,          .0,   1.22, 0.64! !END!
   5! SRCNAM = D5 !
   5! X =         0.0,      25.0,          .0,   7.78, 6.35! !END!
--------
    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.
    b
     An emission rate must be entered for every pollutant modeled.
     Enter emission rate of zero for secondary pollutants that are
     modeled, but not emitted.  Units are specified by IARU
     (e.g. 1 for g/m**2/s).

---------------
Subgroup (14c)
---------------

           COORDINATES (km) FOR EACH VERTEX(4) OF EACH POLYGON
           ---------------------------------------------------
Source                                                          a
```

```
 No.       Ordered list of X followed by list of Y, grouped by source
------     ------------------------------------------------------------

 1    ! SRCNAM  =  D1 !
 1      !  XVERT = 626.869,    626.972,    627.240,    627.225!
 1      !  YVERT = 4757.909,    4758.279,    4758.262,  4757.919!
!END!
 2    ! SRCNAM  =   D2 !
 2      !  XVERT = 627.080,    627.297,    627.273,    627.022!
 2      !  YVERT = 4757.875,    4757.773,    4757.680,  4757.788!
!END!
 3    ! SRCNAM  =   D3 !
 3      !  XVERT = 627.120,    627.270,    627.101,    626.994!
 3      !  YVERT = 4757.642,    4757.598,    4757.371,  4757.436!
!END!
 4    ! SRCNAM  =   D4 !
 4      !  XVERT = 627.101,    626.994,    626.992,    627.088!
 4      !  YVERT = 4757.371,    4757.436,    4757.317,  4757.354!
!END!
 5    ! SRCNAM  =   D5 !
 5      !  XVERT = 626.992,    627.046,    627.046,    626.992!
 5      !  YVERT = 4757.403,    4757.403,    4757.356,  4757.356!
!END!

--------
    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.


---------------
Subgroup (14d)
---------------
                                                  a
          AREA SOURCE: VARIABLE EMISSIONS DATA
          ------------------------------------

     Use this subgroup to describe temporal variations in the emission
     rates given in 14b.  Factors entered multiply the rates in 14b.
     Skip sources here that have constant emissions.  For more elaborate
     variation in source parameters, use BAEMARB.DAT and NAR2 > 0.

     IVARY determines the type of variation, and is source-specific:
     (IVARY)                                  Default: 0
           0 =       Constant
           1 =       Diurnal cycle (24 scaling factors: hours 1-24)
           2 =       Monthly cycle (12 scaling factors: months 1-12)
           3 =       Hour & Season (4 groups of 24 hourly scaling factors,
                                    where first group is DEC-JAN-FEB)
           4 =       Speed & Stab. (6 groups of 6 scaling factors, where
                                    first group is Stability Class A,
                                    and the speed classes have upper
                                    bounds (m/s) defined in Group 12
           5 =       Temperature   (12 scaling factors, where temperature
```

```
                                    classes have upper bounds (C) of:
                                    0, 5, 10, 15, 20, 25, 30, 35, 40,
                                    45, 50, 50+)

1  ! SRCNAM = D1 !
1  ! IVARY  = 1  ! (Diurnal Cycle)
1  ! ODR1 = 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1!
!END!
1  ! SRCNAM = D1 !
1  ! IVARY  = 1  ! (Diurnal Cycle)
1  ! ODR2 = 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1!
!END!
2  ! SRCNAM = D2 !
2  ! IVARY  = 1  ! (Diurnal Cycle)
2  ! ODR1 = 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1!
!END!
2  ! SRCNAM = D2 !
2  ! IVARY  = 1  ! (Diurnal Cycle)
2  ! ODR2 = 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1!
!END!
3  ! SRCNAM = D3 !
3  ! IVARY  = 1  ! (Diurnal Cycle)
3  ! ODR1 = 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1!
!END!
3  ! SRCNAM = D3 !
3  ! IVARY  = 1  ! (Diurnal Cycle)
3  ! ODR2 = 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1!
!END!
4  ! SRCNAM = D4 !
4  ! IVARY  = 1  ! (Diurnal Cycle)
4  ! ODR1 = 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1!
!END!
4  ! SRCNAM = D4 !
4  ! IVARY  = 1  ! (Diurnal Cycle)
4  ! ODR2 = 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1!
!END!
5  ! SRCNAM = D5 !
5  ! IVARY  = 1  ! (Diurnal Cycle)
5  ! ODR1 = 0.4, 0.4, 0.4, 0.4, 0.4, 0.4, 0.4, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
0.4, 0.4, 0.4, 0.4, 0.4, 0.4!
!END!
5  ! SRCNAM = D5 !
5  ! IVARY  = 1  ! (Diurnal Cycle)
5  ! ODR2 = 0.4, 0.4, 0.4, 0.4, 0.4, 0.4, 0.4, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
0.4, 0.4, 0.4, 0.4, 0.4, 0.4!
!END!
```

```
--------
    a
     Data for each species are treated as a separate input subgroup
     and therefore must end with an input group terminator.


------------------------------------------------------------------------------

INPUT GROUPS: 15a, 15b, 15c -- Line source parameters
---------------------------

---------------
Subgroup (15a)
---------------

     Number of buoyant line sources
     with variable location and emission
     parameters (NLN2)                              No default  !  NLN2 =  0   !

     (If NLN2 > 0, ALL parameter data for
      these sources are read from the file: LNEMARB.DAT)

     Number of buoyant line sources (NLINES)        No default   ! NLINES =  0
!

     Units used for line source
     emissions below                (ILNU)          Default: 1  !  ILNU =   1  !
           1 =        g/s
           2 =       kg/hr
           3 =       lb/hr
           4 =     tons/yr
           5 =     Odour Unit * m**3/s  (vol. flux of odour compound)
           6 =     Odour Unit * m**3/min
           7 =     metric tons/yr
           8 =     Bq/s  (Bq = becquerel = disintegrations/s)
           9 =     GBq/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (15c)        (NSLN1) Default: 0  !  NSLN1 =  0  !

     Maximum number of segments used to model
     each line (MXNSEG)                             Default: 7   ! MXNSEG =  7
!

     The following variables are required only if NLINES > 0.  They are
     used in the buoyant line source plume rise calculations.

        Number of distances at which                Default: 6   ! NLRISE =  6
!
        transitional rise is computed
```

Average building length (XL) No default ! XL = .0 !
(in meters)

Average building height (HBL) No default ! HBL = .0 !
(in meters)

Average building width (WBL) No default ! WBL = .0 !
(in meters)

Average line source width (WML) No default ! WML = .0 !
(in meters)

Average separation between buildings (DXL) No default ! DXL = .0 !
(in meters)

Average buoyancy parameter (FPRIMEL) No default ! FPRIMEL = .0
!
(in m**4/s**3)

!END!

Subgroup (15b)

BUOYANT LINE SOURCE: CONSTANT DATA

Source No.	Beg. X Coordinate (km)	Beg. Y Coordinate (km)	End. X Coordinate (km)	End. Y Coordinate (km)	Release Height (m)	Base Elevation (m)	Emission Rates[a]
------	----------	----------	---------	----------	-------	---------	---------

---

[a] Data for each source are treated as a separate input subgroup and therefore must end with an input group terminator.

[b] An emission rate must be entered for every pollutant modeled. Enter emission rate of zero for secondary pollutants that are modeled, but not emitted. Units are specified by ILNTU (e.g. 1 for g/s).

Subgroup (15c)
---

a

BUOYANT LINE SOURCE: VARIABLE EMISSIONS DATA

Use this subgroup to describe temporal variations in the emission rates given in 15b. Factors entered multiply the rates in 15b. Skip sources here that have constant emissions.

IVARY determines the type of variation, and is source-specific:
(IVARY) Default: 0

- 0 = Constant
- 1 = Diurnal cycle (24 scaling factors: hours 1-24)
- 2 = Monthly cycle (12 scaling factors: months 1-12)
- 3 = Hour & Season (4 groups of 24 hourly scaling factors, where first group is DEC-JAN-FEB)
- 4 = Speed & Stab. (6 groups of 6 scaling factors, where first group is Stability Class A, and the speed classes have upper bounds (m/s) defined in Group 12
- 5 = Temperature (12 scaling factors, where temperature classes have upper bounds (C) of: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 50+)

---

a

Data for each species are treated as a separate input subgroup and therefore must end with an input group terminator.

INPUT GROUPS: 16a, 16b, 16c -- Volume source parameters

Subgroup (16a)

Number of volume sources with parameters provided in 16b,c (NVL1) No default ! NVL1 = 0 !

Units used for volume source emissions below in 16b (IVLU) Default: 1 ! IVLU = 1 !

- 1 = g/s
- 2 = kg/hr
- 3 = lb/hr
- 4 = tons/yr
- 5 = Odour Unit * m**3/s (vol. flux of odour compound)
- 6 = Odour Unit * m**3/min
- 7 = metric tons/yr
- 8 = Bq/s (Bq = becquerel = disintegrations/s)

```
           9 =     GBq/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (16c)      (NSVL1)    Default: 0  !  NSVL1 =  0  !

     Number of volume sources with
     variable location and emission
     parameters                   (NVL2)     No default  !  NVL2 =   0   !

     (If NVL2 > 0, ALL parameter data for
      these sources are read from the VOLEMARB.DAT file(s) )

!END!

---------------
Subgroup (16b)
---------------
                                        a
           VOLUME SOURCE: CONSTANT DATA
           ----------------------------
                                                                        b
         X           Y        Effect.    Base     Initial    Initial    Emission
     Coordinate  Coordinate   Height   Elevation  Sigma y    Sigma z     Rates
        (km)        (km)        (m)       (m)       (m)       (m)
     ----------  ----------   ------    ------    --------   --------   --------


--------
    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.

    b
     An emission rate must be entered for every pollutant modeled.
     Enter emission rate of zero for secondary pollutants that are
     modeled, but not emitted.  Units are specified by IVLU
     (e.g. 1 for g/s).

---------------
Subgroup (16c)
---------------
                                              a
          VOLUME SOURCE: VARIABLE EMISSIONS DATA
          --------------------------------------

     Use this subgroup to describe temporal variations in the emission
     rates given in 16b.  Factors entered multiply the rates in 16b.
     Skip sources here that have constant emissions.  For more elaborate
     variation in source parameters, use VOLEMARB.DAT and NVL2 > 0.

     IVARY determines the type of variation, and is source-specific:
     (IVARY)                                 Default: 0
```

```
          0 =       Constant
          1 =       Diurnal cycle (24 scaling factors: hours 1-24)
          2 =       Monthly cycle (12 scaling factors: months 1-12)
          3 =       Hour & Season (4 groups of 24 hourly scaling factors,
                                   where first group is DEC-JAN-FEB)
          4 =       Speed & Stab. (6 groups of 6 scaling factors, where
                                   first group is Stability Class A,
                                   and the speed classes have upper
                                   bounds (m/s) defined in Group 12
          5 =       Temperature   (12 scaling factors, where temperature
                                   classes have upper bounds (C) of:
                                   0, 5, 10, 15, 20, 25, 30, 35, 40,
                                   45, 50, 50+)
```

---

a
Data for each species are treated as a separate input subgroup and therefore must end with an input group terminator.

INPUT GROUPS: 17a & 17b -- Non-gridded (discrete) receptor information

---

Subgroup (17a)

Number of non-gridded receptors (NREC) No default ! NREC = 24 !

!END!

Subgroup (17b)

---

a

NON-GRIDDED (DISCRETE) RECEPTOR DATA

Receptor No.	X Coordinate (km)	Y Coordinate (km)	Ground Elevation (m)	Height Above Ground (m) b	
1 ! X =	625.881,	4758.441,	6.000,	2.000!	!END!
2 ! X =	629.505,	4760.275,	5.000,	2.000!	!END!
3 ! X =	624.476,	4759.954,	15.000,	2.000!	!END!
4 ! X =	626.506,	4758.008,	1.000,	2.000!	!END!
5 ! X =	625.270,	4757.623,	14.000,	2.000!	!END!
6 ! X =	625.404,	4755.270,	2.000,	2.000!	!END!
7 ! X =	623.288,	4755.253,	93.000,	2.000!	!END!

```
     8 ! X =     622.569,   4755.324,      42.000,       2.000!   !END!
     9 ! X =     624.618,   4753.865,      22.000,       2.000!   !END!
    10 ! X =     626.490,   4758.302,       2.000,       2.000!   !END!
    11 ! X =     626.732,   4756.595,       1.000,       2.000!   !END!
    12 ! X =     626.042,   4756.848,      10.000,       2.000!   !END!
    13 ! X =     625.710,   4756.140,      18.000,       2.000!   !END!
    14 ! X =     630.273,   4757.648,       2.000,       2.000!   !END!
    15 ! X =     627.012,   4758.717,       5.000,       2.000!   !END!
    16 ! X =     627.710,   4757.634,       4.000,       2.000!   !END!
    17 ! X =     627.856,   4757.882,       4.000,       2.000!   !END!
    18 ! X =     625.709,   4757.216,      20.000,       2.000!   !END!
    19 ! X =     626.325,   4757.737,       2.000,       2.000!   !END!
    20 ! X =     626.247,   4757.333,      26.000,       2.000!   !END!
    21 ! X =     626.346,   4757.478,      21.000,       2.000!   !END!
    22 ! X =     626.271,   4757.513,      22.000,       2.000!   !END!
    23 ! X =     626.918,   4758.552,       6.000,       2.000!   !END!
    24 ! X =     626.693,   4758.573,       8.000,       2.000!   !END!
-------------
```

a

Data for each receptor are treated as a separate input subgroup and therefore must end with an input group terminator.

b

Receptor height above ground is optional. If no value is entered, the receptor is placed on the ground.