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Spredningsberegninger for CO fra Kollsnes prosessanlegg

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(Foto: Øyvind Hagen)

Norsk institutt for luftforskning

Innhold

Side

Sammendrag og konklusjon

Norsk institutt for luftforskning (NILU) har på oppdrag fra Statoil utført spredningsberegninger for CO-utslipp fra ulike kilder fra anlegget på Kollsnes i Øygarden. Utgangspunkt er et årlig utslipp av 80 tonn CO fra følgende kilder ved anlegget; høytrykksfakkel, lavtrykksfakkel, vedlikeholdsfakkel, NGL-ovn og to troll-ovner.

Det er utført spredningsberegninger for maksimale timemiddelverdier i bakkenivå. Bidraget fra anlegget er sammenlignet med grenseverdi for luftkvalitet i "Veiledning til forskrift om luftkvalitet". Denne grenseverdien er 10 mg/m^3 som 8-timers middelverdi.

Beregningsresultater.
NILU har beregnet konsentrasjon av CO som funksjon av avstand fra kilde for de seks ulike kildene til utslipp. Bakkenære utslipp gir høyest konsentrasjon nær utslippet, mens utslipp fra høye skorsteiner gir maksimal bakkekonsentrasjon et stykke unna utslippet. Det er ca 1500 meter mellom kildene som ligger lengst fra hverandre – vedlikeholdsfakkel og NGL-ovn. Hver for seg vil ingen av kildene gi bidrag til bakkekonsentrasjoner som er i nærheten av grenseverdien. Det å summere bidragene som om de var plassert på samme sted er en grov overdrivelse, men selv dette totalbidraget som **timemiddel** vil kun utgjøre mindre enn 500 µg/m^3, som er kun 5% av grenseverdien som 8-timers middel. En grenseverdi som timemiddel ville naturligvis vært høyere enn 10 mg/m^3, og det prosentvise bidraget fra kildene ville ha vært ennå lavere sammenlignet med en grenseverdi som timemiddel.

Spredningsberegninger for CO fra Kollsnes prosessanlegg

1 Innledning

Norsk institutt for luftforskning (NILU) har på oppdrag fra Statoil utført spredningsberegninger for CO-utslipp fra seks ulike kilder fra Kollsnes prosessanlegg i Øygarden.

Det er tatt utgangspunkt i et totalutslipp på 80 tonn CO i året. Følgende kilder har utslipp av CO: høytrykksfakkel, lavtrykksfakkel, vedlikeholdsfakkel, en NGL-ovn og to troll-ovner.

2 Utslippsdata

Tekniske data og utslippsdata er gitt av oppdragsgiver og presentert i Tabell 1.

Tabell 1: Tekniske data og utslippsmengder for kilder til CO-utslipp ved Kollsnes prosessanlegg i Øygarden.

Kilde	Årlig utslipp av CO (tonn/år)	Pipe-høyde (m)	Pipe-diameter (mm)	Avgass-temperatur (°C)	Avgass-mengde (m^3/h)	Avgass-hastighet (m/s)	Utslipp CO (g/s)
Høytrykksfakkel	38	105	895	170	1733	1,2	1,205
Lavtrykksfakkel	3	15	489	170	133	0,3	0,095
Vedlikeholdsfakkel	2	5	346	170	83	0,4	0,063
NGL-ovn	17	46	1808	242	983	0,2	0,539
Troll-ovn A	10	48	1536	190	854	0,2	0,317
Troll-ovn B	10	48	1536	190	854	0,2	0,317

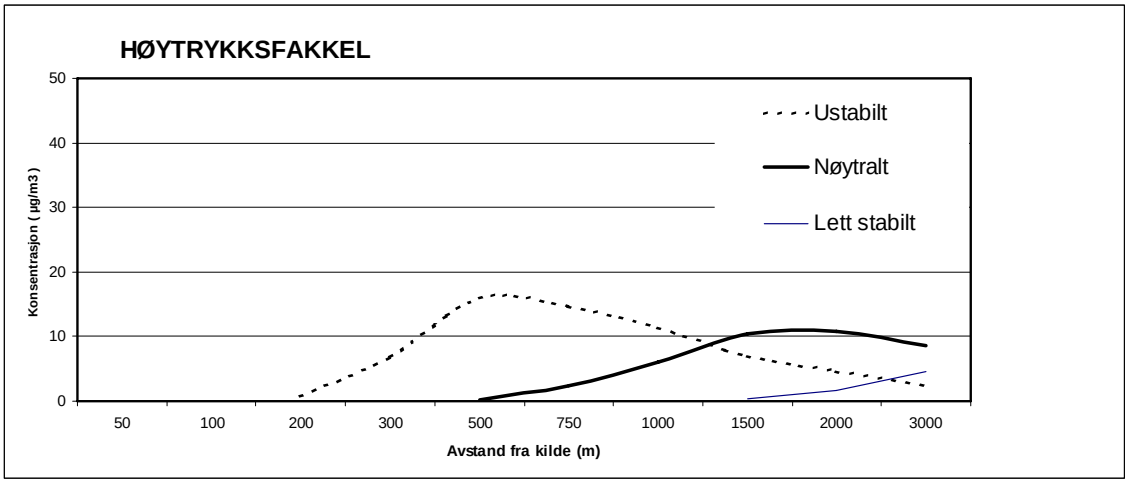
3 Meteorologi

De meteorologiske forholdene er kritiske for spredning av utslipp til luft. Spredningsforholdene kan klassifiseres i tre klasser; ustabile (U), nøytrale (N) og stabile/lett stabile (S/Ls) atmosfæriske forhold. Nedenfor er det gitt en kort beskrivelse av stabilitetsklassene.

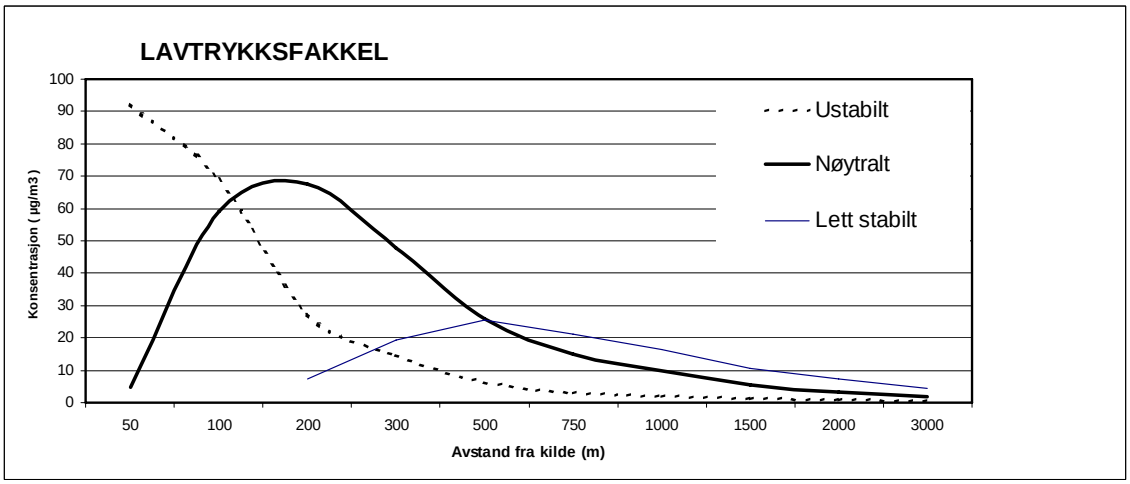
Ustabile atmosfæriske forhold (U) forekommer oftest om dagen og om sommeren, ved klarvær med sterk solinnstråling og svak til middels vindstyrke. Da varmer solen opp bakken, og det dannes vertikale turbulente luftstrømmer som gir god vertikal spredning av avgassene. For utslipp i bakkenivå vil disse fortynnes raskt, mens det for skorsteinsutslipp kan forekomme høye konsentrasjoner nær utslippet på grunn av kortvarige nedslag av avgass.

Nøytrale atmosfæriske forhold (N) forekommer ved høye til moderate vindstyrker og oftest ved overskyet vær. Høy vindstyrke og god mekanisk blanding gir moderat til god horisontal og vertikal fortynning av avgassene.

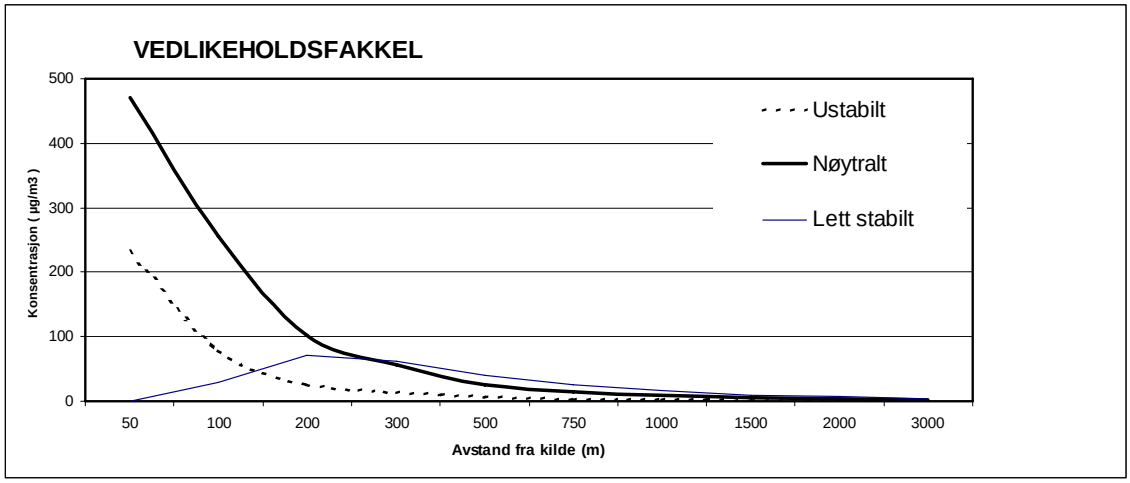
Stabile/lett stabile atmosfæriske forhold (S/Ls) er typisk for stille klare netter og vintersituasjoner med avkjøling av bakken og det nederste luftlaget. Temperaturen øker med høyden over bakken og dette gir dårlig vertikalspredning i det stabile laget. Når relativt varm luft fra sjø transporteres innover kaldt land, vil det nederste luftlaget stabiliseres. Dette gir dårlig spredning av røykfanen både vertikalt og horisontalt. For bakkeutslipp vil denne situasjonen være kritisk, idet den vertikale fortynningen er liten. For skorsteinsutslipp vil liten vertikal spredning føre til at utslippet først når ned til bakken langt fra utslippet.



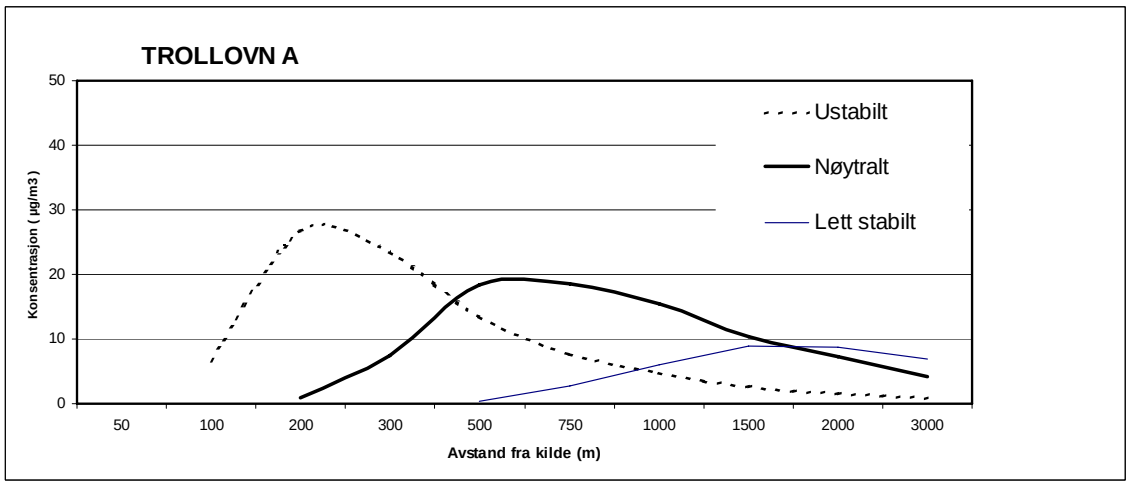
Figur 1: Høytrykksfakkel.
Figuren viser bakkekonsentrasjon som funksjon av avstand fra kilde.
NB: Enhet i µg/m^3 (grenseverdi i mg/m^3).



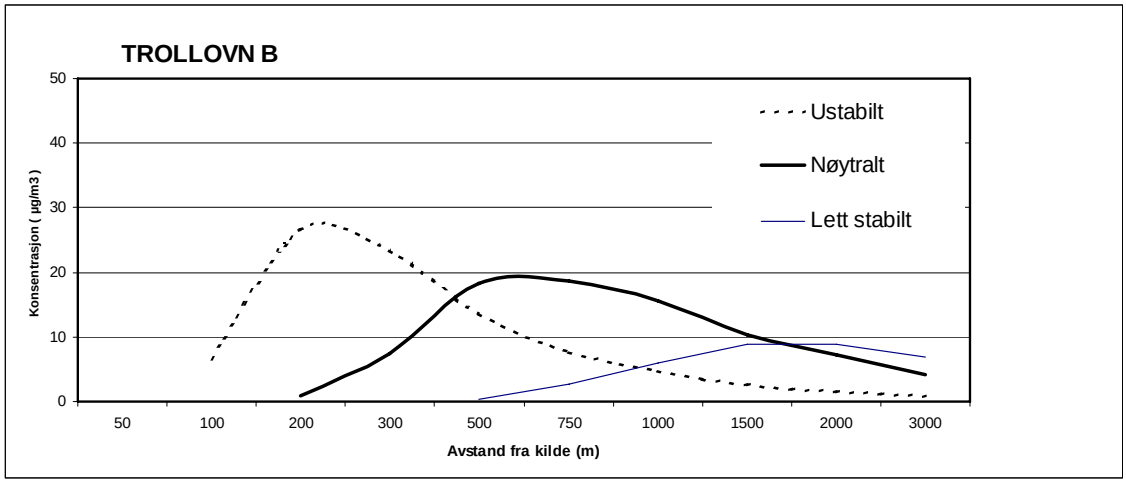
Figur 2: Lavtrykksfakkel.
Figuren viser bakkekonsentrasjon som funksjon av avstand fra kilde.
NB: Enhet i µg/m^3 (grenseverdi i mg/m^3).



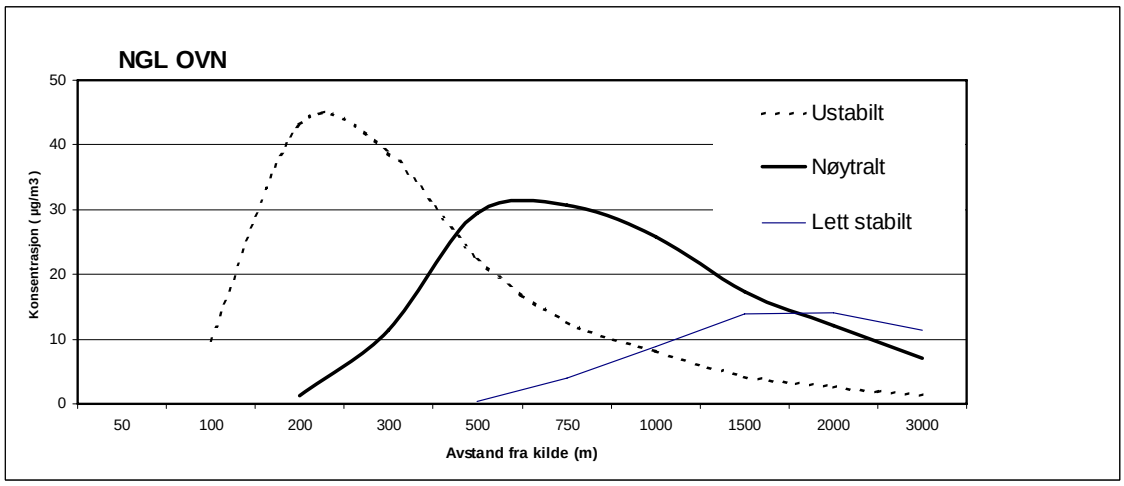
Figur 3: Vedlikeholdsfakkel.
Figuren viser bakkekonsentrasjon som funksjon av avstand fra kilde.
NB: Enhet i µg/m^3 (grenseverdi i mg/m^3).



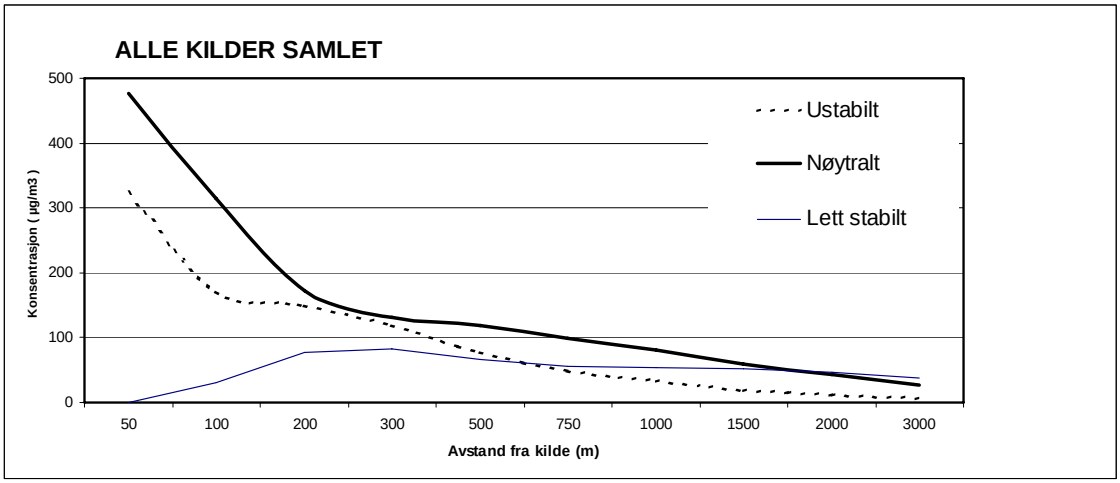
Figur 4: Troll-ovn A.
Figuren viser bakkekonsentrasjon som funksjon av avstand fra kilde.
NB: Enhet i µg/m^3 (grenseverdi i mg/m^3).



Figur 5: Troll-ovn B.
Figuren viser bakkekonsentrasjon som funksjon av avstand fra kilde.
NB: Enhet i µg/m^3 (grenseverdi i mg/m^3).



Figur 6: NGL-ovn.
Figuren viser bakkekonsentrasjon som funksjon av avstand fra kilde.
NB: Enhet i µg/m^3 (grenseverdi i mg/m^3).



Figur 7: Alle kilder samlet.
Figuren viser bakkekonsentrasjon som funksjon av avstand fra kilde.
NB: Enhet i µg/m^3 (grenseverdi i mg/m^3).

Ingen av kildene gir alene bidrag til bakkekonsentrasjon av CO som overstiger 0,5 mg/m^3, og dette utgjør kun 5% av grenseverdien på 10 mg/m^3 som 8-timers middel. En grenseverdi som timemiddel ville ha vært høyere enn 10 mg/m^3 og bidraget fra kilde hadde vært prosentvis enda lavere. I Figur 7 har vi summert bidragene fra alle kildene. Dette er i seg selv en stor overdrivelse av kildens totale bidrag, siden de er plassert på ulike steder på anlegget – det er ca 1500 meter mellom kildene som ligger lengst fra hverandre (vedlikeholdsfakkel og NGL-ovn). Selv en slik enkel summering av bidragene vil gi totalbidrag langt under 1 mg/m^3.

Spredningsberegningen viser således at CO-utslippene fra Statoils anlegg på Kollsnes er ubetydelige med hensyn på bidrag til overskridelser av grenseverdi for CO i bakkenivå i området omkring anlegget.

4 Referanser

Bøhler, T. (1987) Users guide for the Gaussian type dispersion models CONCX and CONDEP. Lillestrøm (NILU TR 8/87).

Miljøverndepartementet (2002) Forskrift om lokal luftkvalitet. Fastsatt ved Kgl. Res. 4.10.2002.

Vedlegg A

Resultater fra spredningsberegningene

```
SOURCE             : Høytrykksfakkel
STACK HEIGHT       : HS=  105.0 METERS
SOURCE STRENGTH    :  Q=   1.21 G/SEC
STACK DIMENSIONS   :  D=  0.45 M, W=  1.20 M/S, TG  443.0 K
AMBIENT TEMPERATURE: TA= 273.0 K
ELEVATED SURFACE   : HT=   0.0 M
MIXING HEIGHT      : HMIX=1000.0
BUILDING DIMENSIONS: HB=  0.0 M, BB=  0.0 M
GRAV. SETTLING VEL.: VG= 0.00 M/S


RN=    0.20    0.28    0.36    0.42
CY=    0.36    0.32    0.31    0.31
PY=    0.86    0.78    0.74    0.71
CZ=    0.33    0.22    0.16    0.06
PZ=    0.86    0.78    0.74    0.71


************************************************
* HEFF : EFFECTIVE PLUME HEIGHT DUE TO PLUME RISE *
* HNEW : MODIFIED PLUME HEIGHT DUE TO PENETRATION *
* XDIST: DISTANCE TO FINAL PLUME RISE             *
* PS   : PENETRATION COEFFICIENT                  *
* IDH  : PLUME RISE REGION:                       *
*        1 :NO BUILDING EFFECTS                   *
*        2 :REDUCED STACK HEIGHT DUE TO BUILDINGS *
*        3 :TRAPPED IN THE CAVITY SONE            *
* IH   : PLUME RISE OPTION:                       *
*        0 :PLUME RISE CALCULATIONS               *
*        1 :FIXED PLUME RISE EQUAL STACK HEIGHT   *
*        2 :VOLUME SOURCE AT HEIGHT HS            *
* ID   : STACK DOWNWASH:                          *
*        0 :INCLUDED                              *
*        1 :NOT INCLUDED                          *
* SD   : ON OUTPUT:                               *
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```
    *         STACK DOWNWASH (M)                          *
    ********************************************************
```

STABILITY CLASS	U10	HEFF	HNEW	XDIST	PS	IDH	IH	ID	SD
UNSTABLE									
	1.0	108.7	108.7	19.3	0.00	1	0	0	-0.7
	2.0	106.2	106.2	19.3	0.00	1	0	0	-1.0
	3.0	105.3	105.3	19.3	0.00	1	0	0	-1.1
	4.0	104.9	104.9	19.3	0.00	1	0	0	-1.2
	5.0	104.7	104.7	19.3	0.00	1	0	0	-1.2
	6.0	104.5	104.5	19.3	0.00	1	0	0	-1.2
	8.0	104.3	104.3	19.3	0.00	1	0	0	-1.3
	10.0	104.2	104.2	19.3	0.00	1	0	0	-1.3
	12.0	104.1	104.1	19.3	0.00	1	0	0	-1.3
NEUTRAL									
	1.0	107.8	107.8	19.3	0.00	1	0	0	-0.8
	2.0	105.8	105.8	19.3	0.00	1	0	0	-1.1
	3.0	105.1	105.1	19.3	0.00	1	0	0	-1.2
	4.0	104.7	104.7	19.3	0.00	1	0	0	-1.2
	5.0	104.5	104.5	19.3	0.00	1	0	0	-1.2
	6.0	104.4	104.4	19.3	0.00	1	0	0	-1.2
	8.0	104.2	104.2	19.3	0.00	1	0	0	-1.3
	10.0	104.1	104.1	19.3	0.00	1	0	0	-1.3
	12.0	104.0	104.0	19.3	0.00	1	0	0	-1.3
LIGHT STABLE									
	1.0	117.4	117.4	180.2	0.00	1	0	0	-0.9
	2.0	114.5	114.5	360.3	0.00	1	0	0	-1.1
	3.0	113.1	113.1	540.5	0.00	1	0	0	-1.2
	4.0	112.2	112.2	720.6	0.00	1	0	0	-1.2
	5.0	111.5	111.5	900.8	0.00	1	0	0	-1.2
	6.0	111.1	111.1	1080.9	0.00	1	0	0	-1.3
	8.0	110.4	110.4	1441.2	0.00	1	0	0	-1.3
	10.0	109.9	109.9	1801.5	0.00	1	0	0	-1.3
	12.0	109.5	109.5	2161.9	0.00	1	0	0	-1.3

STABLE

1.0	114.6	114.6	156.8	0.00	1	0	0	-0.9
2.0	112.2	112.2	313.6	0.00	1	0	0	-1.1
3.0	111.1	111.1	470.5	0.00	1	0	0	-1.2
4.0	110.4	110.4	627.3	0.00	1	0	0	-1.2
5.0	109.9	109.9	784.1	0.00	1	0	0	-1.3
6.0	109.5	109.5	940.9	0.00	1	0	0	-1.3
8.0	109.0	109.0	1254.5	0.00	1	0	0	-1.3
10.0	108.6	108.6	1568.2	0.00	1	0	0	-1.3
12.0	108.3	108.3	1881.8	0.00	1	0	0	-1.3

****

* BRIGGS PLUME RISE FORMULAS (1969,1971,1976) *
CENTER-PLUME GROUND LEVEL CONCENTRATIONS(UG/M3)

****

STABILITY	WIND(M/S)	DOWNWIND DISTANCE(M)									
		50.0	100.0	200.0	300.0	500.0	750.0	1000.0	1500.0	2000.0	3000.0
UNSTABLE	1.0	0.0	0.0	0.7	6.7	15.9	14.7	11.4	6.9	4.5	2.4
	2.0	0.0	0.0	0.4	3.9	8.5	7.6	5.8	3.5	2.3	1.2
	3.0	0.0	0.0	0.3	2.7	5.8	5.1	3.9	2.3	1.5	0.8
	4.0	0.0	0.0	0.3	2.1	4.4	3.9	3.0	1.8	1.1	0.6
	5.0	0.0	0.0	0.2	1.7	3.5	3.1	2.4	1.4	0.9	0.5
	6.0	0.0	0.0	0.2	1.4	2.9	2.6	2.0	1.2	0.8	0.4
	8.0	0.0	0.0	0.1	1.1	2.2	2.0	1.5	0.9	0.6	0.3
	10.0	0.0	0.0	0.1	0.9	1.8	1.6	1.2	0.7	0.5	0.2
	12.0	0.0	0.0	0.1	0.7	1.5	1.3	1.0	0.6	0.4	0.2
NEUTRAL	1.0	0.0	0.0	0.0	0.0	0.1	2.3	6.1	10.5	10.8	8.6
	2.0	0.0	0.0	0.0	0.0	0.1	1.3	3.4	5.5	5.6	4.4

	3.0	0.0	0.0	0.0	0.0	0.1	0.9	2.3	3.8	3.8	2.9
	4.0	0.0	0.0	0.0	0.0	0.1	0.7	1.8	2.9	2.9	2.2
	5.0	0.0	0.0	0.0	0.0	0.0	0.6	1.4	2.3	2.3	1.8
	6.0	0.0	0.0	0.0	0.0	0.0	0.5	1.2	1.9	1.9	1.5
	8.0	0.0	0.0	0.0	0.0	0.0	0.4	0.9	1.4	1.4	1.1
	10.0	0.0	0.0	0.0	0.0	0.0	0.3	0.7	1.2	1.2	0.9
	12.0	0.0	0.0	0.0	0.0	0.0	0.3	0.6	1.0	1.0	0.7
LIGHT STABLE	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.7	4.5
	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.0	2.5
	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.7	1.8
	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.6	1.4
	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	1.1
	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.9
	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.7
	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.6
	12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.5
STABLE	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1

END OF PROGRAM CONCX

```
SOURCE             : Lavtrykksfakkel
STACK HEIGHT       : HS=   15.0 METERS
SOURCE STRENGTH    :  Q=   0.09 G/SEC
STACK DIMENSIONS   :  D=  0.24 M, W=  0.30 M/S, TG  443.0 K
AMBIENT TEMPERATURE: TA= 273.0 K
ELEVATED SURFACE   : HT=   0.0 M
MIXING HEIGHT      : HMIX=1000.0
BUILDING DIMENSIONS: HB=  0.0 M, BB=  0.0 M
GRAV. SETTLING VEL.: VG= 0.00 M/S


RN=    0.20    0.28    0.36    0.42
CY=    0.36    0.32    0.31    0.31
PY=    0.86    0.78    0.74    0.71
CZ=    0.33    0.22    0.16    0.06
PZ=    0.86    0.78    0.74    0.71


************************************************
* HEFF : EFFECTIVE PLUME HEIGHT DUE TO PLUME RISE *
* HNEW : MODIFIED PLUME HEIGHT DUE TO PENETRATION *
* XDIST: DISTANCE TO FINAL PLUME RISE             *
* PS   : PENETRATION COEFFICIENT                  *
* IDH  : PLUME RISE REGION:                       *
*        1 :NO BUILDING EFFECTS                   *
*        2 :REDUCED STACK HEIGHT DUE TO BUILDINGS *
*        3 :TRAPPED IN THE CAVITY SONE            *
* IH   : PLUME RISE OPTION:                       *
*        0 :PLUME RISE CALCULATIONS               *
*        1 :FIXED PLUME RISE EQUAL STACK HEIGHT   *
*        2 :VOLUME SOURCE AT HEIGHT HS            *
* ID   : STACK DOWNWASH:                          *
*        0 :INCLUDED                              *
*        1 :NOT INCLUDED                          *
* SD   : ON OUTPUT:                               *
```

```
    *         STACK DOWNWASH (M)                          *
    ********************************************************
```

STABILITY CLASS	U10	HEFF	HNEW	XDIST	PS	IDH	IH	ID	SD
UNSTABLE									
	1.0	15.3	15.3	3.8	0.00	1	0	0	-0.6
	2.0	14.8	14.8	3.8	0.00	1	0	0	-0.7
	3.0	14.6	14.6	3.8	0.00	1	0	0	-0.7
	4.0	14.5	14.5	3.8	0.00	1	0	0	-0.7
	5.0	14.5	14.5	3.8	0.00	1	0	0	-0.7
	6.0	14.4	14.4	3.8	0.00	1	0	0	-0.7
	8.0	14.4	14.4	3.8	0.00	1	0	0	-0.7
	10.0	14.4	14.4	3.8	0.00	1	0	0	-0.7
	12.0	14.4	14.4	3.8	0.00	1	0	0	-0.7
NEUTRAL									
	1.0	15.3	15.3	3.8	0.00	1	0	0	-0.6
	2.0	14.8	14.8	3.8	0.00	1	0	0	-0.7
	3.0	14.6	14.6	3.8	0.00	1	0	0	-0.7
	4.0	14.5	14.5	3.8	0.00	1	0	0	-0.7
	5.0	14.5	14.5	3.8	0.00	1	0	0	-0.7
	6.0	14.4	14.4	3.8	0.00	1	0	0	-0.7
	8.0	14.4	14.4	3.8	0.00	1	0	0	-0.7
	10.0	14.4	14.4	3.8	0.00	1	0	0	-0.7
	12.0	14.4	14.4	3.8	0.00	1	0	0	-0.7
LIGHT STABLE									
	1.0	21.5	21.5	89.4	0.00	1	0	0	-0.6
	2.0	20.0	20.0	178.8	0.00	1	0	0	-0.7
	3.0	19.2	19.2	268.2	0.00	1	0	0	-0.7
	4.0	18.8	18.8	357.7	0.00	1	0	0	-0.7
	5.0	18.4	18.4	447.1	0.00	1	0	0	-0.7
	6.0	18.2	18.2	536.5	0.00	1	0	0	-0.7
	8.0	17.8	17.8	715.3	0.00	1	0	0	-0.7
	10.0	17.6	17.6	894.1	0.00	1	0	0	-0.7
	12.0	17.4	17.4	1073.0	0.00	1	0	0	-0.7

STABLE

1.0	20.2	20.2	69.3	0.00	1	0	0	-0.6
2.0	19.0	19.0	138.5	0.00	1	0	0	-0.7
3.0	18.4	18.4	207.8	0.00	1	0	0	-0.7
4.0	18.0	18.0	277.0	0.00	1	0	0	-0.7
5.0	17.7	17.7	346.3	0.00	1	0	0	-0.7
6.0	17.5	17.5	415.5	0.00	1	0	0	-0.7
8.0	17.2	17.2	554.0	0.00	1	0	0	-0.7
10.0	17.0	17.0	692.6	0.00	1	0	0	-0.7
12.0	16.8	16.8	831.1	0.00	1	0	0	-0.7

****

* BRIGGS PLUME RISE FORMULAS (1969,1971,1976) *
CENTER-PLUME GROUND LEVEL CONCENTRATIONS(UG/M3)

****

STABILITY	WIND(M/S)	DOWNWIND DISTANCE(M)									
		50.0	100.0	200.0	300.0	500.0	750.0	1000.0	1500.0	2000.0	3000.0
UNSTABLE	1.0	92.2	68.8	27.4	14.5	6.2	3.1	1.9	1.0	0.6	0.3
	2.0	50.7	35.6	13.9	7.3	3.1	1.6	1.0	0.5	0.3	0.1
	3.0	34.8	24.0	9.3	4.9	2.1	1.1	0.6	0.3	0.2	0.1
	4.0	26.5	18.1	7.0	3.7	1.6	0.8	0.5	0.2	0.1	0.1
	5.0	21.4	14.5	5.6	3.0	1.3	0.6	0.4	0.2	0.1	0.1
	6.0	18.0	12.1	4.7	2.5	1.1	0.5	0.3	0.2	0.1	0.0
	8.0	13.6	9.1	3.5	1.8	0.8	0.4	0.2	0.1	0.1	0.0
	10.0	10.9	7.3	2.8	1.5	0.6	0.3	0.2	0.1	0.1	0.0
	12.0	9.1	6.1	2.3	1.2	0.5	0.3	0.2	0.1	0.0	0.0
NEUTRAL	1.0	4.9	59.2	67.4	47.9	25.9	14.8	9.7	5.3	3.4	1.8
	2.0	3.5	33.7	35.5	24.7	13.2	7.5	4.9	2.7	1.7	0.9

		3.0	2.7	23.5	24.0	16.7	8.9	5.0	3.3	1.8	1.1	0.6
		4.0	2.1	18.0	18.2	12.6	6.7	3.8	2.5	1.3	0.9	0.5
		5.0	1.8	14.6	14.6	10.1	5.3	3.0	2.0	1.1	0.7	0.4
		6.0	1.5	12.2	12.2	8.4	4.5	2.5	1.7	0.9	0.6	0.3
		8.0	1.2	9.3	9.2	6.3	3.4	1.9	1.2	0.7	0.4	0.2
		10.0	0.9	7.5	7.4	5.1	2.7	1.5	1.0	0.5	0.3	0.2
		12.0	0.8	6.2	6.2	4.2	2.2	1.3	0.8	0.4	0.3	0.2
	LIGHT STABLE	1.0	0.0	0.0	7.2	19.4	25.6	21.2	16.5	10.5	7.3	4.2
		2.0	0.0	0.1	6.0	13.0	14.9	11.7	8.9	5.5	3.8	2.2
		3.0	0.0	0.1	5.0	9.9	10.7	8.1	6.1	3.8	2.6	1.5
		4.0	0.0	0.1	4.4	8.1	8.3	6.3	4.7	2.9	2.0	1.1
		5.0	0.0	0.1	3.8	6.9	6.9	5.1	3.8	2.3	1.6	0.9
		6.0	0.0	0.1	3.5	6.0	5.9	4.3	3.2	2.0	1.3	0.8
		8.0	0.0	0.1	2.9	4.8	4.5	3.3	2.4	1.5	1.0	0.6
		10.0	0.0	0.1	2.5	4.0	3.7	2.7	2.0	1.2	0.8	0.5
		12.0	0.0	0.1	2.2	3.4	3.2	2.3	1.7	1.0	0.7	0.4
	STABLE	1.0	0.0	0.0	0.0	0.0	0.1	1.3	4.2	9.2	11.0	10.3
		2.0	0.0	0.0	0.0	0.0	0.1	1.2	3.1	5.8	6.5	5.7
		3.0	0.0	0.0	0.0	0.0	0.1	1.0	2.5	4.3	4.7	4.0
		4.0	0.0	0.0	0.0	0.0	0.1	0.9	2.1	3.5	3.7	3.1
		5.0	0.0	0.0	0.0	0.0	0.1	0.8	1.8	2.9	3.1	2.5
		6.0	0.0	0.0	0.0	0.0	0.1	0.7	1.6	2.5	2.6	2.1
		8.0	0.0	0.0	0.0	0.0	0.1	0.6	1.3	2.0	2.0	1.7
		10.0	0.0	0.0	0.0	0.0	0.1	0.6	1.1	1.7	1.7	1.3
		12.0	0.0	0.0	0.0	0.0	0.1	0.5	1.0	1.4	1.4	1.1

1

END OF PROGRAM CONCX

```
SOURCE             : Vedlikeholdsfakkel
STACK HEIGHT       : HS=    5.0 METERS
SOURCE STRENGTH    :  Q=   0.06 G/SEC
STACK DIMENSIONS   :  D=  0.17 M, W=  0.40 M/S, TG  443.0 K
AMBIENT TEMPERATURE: TA= 273.0 K
ELEVATED SURFACE   : HT=   0.0 M
MIXING HEIGHT      : HMIX=1000.0
BUILDING DIMENSIONS: HB=  0.0 M, BB=  0.0 M
GRAV. SETTLING VEL.: VG= 0.00 M/S


RN=    0.20    0.28    0.36    0.42
CY=    0.36    0.32    0.31    0.31
PY=    0.86    0.78    0.74    0.71
CZ=    0.33    0.22    0.16    0.06
PZ=    0.86    0.78    0.74    0.71


************************************************
* HEFF : EFFECTIVE PLUME HEIGHT DUE TO PLUME RISE *
* HNEW : MODIFIED PLUME HEIGHT DUE TO PENETRATION *
* XDIST: DISTANCE TO FINAL PLUME RISE             *
* PS   : PENETRATION COEFFICIENT                  *
* IDH  : PLUME RISE REGION:                       *
*        1 :NO BUILDING EFFECTS                   *
*        2 :REDUCED STACK HEIGHT DUE TO BUILDINGS *
*        3 :TRAPPED IN THE CAVITY SONE            *
* IH   : PLUME RISE OPTION:                       *
*        0 :PLUME RISE CALCULATIONS               *
*        1 :FIXED PLUME RISE EQUAL STACK HEIGHT   *
*        2 :VOLUME SOURCE AT HEIGHT HS            *
* ID   : STACK DOWNWASH:                          *
*        0 :INCLUDED                              *
*        1 :NOT INCLUDED                          *
* SD   : ON OUTPUT:                               *
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    *         STACK DOWNWASH (M)                          *
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```

STABILITY CLASS	U10	HEFF	HNEW	XDIST	PS	IDH	IH	ID	SD
UNSTABLE									
	1.0	5.5	5.5	3.0	0.00	1	0	0	-0.4
	2.0	5.0	5.0	3.0	0.00	1	0	0	-0.4
	3.0	4.8	4.8	3.0	0.00	1	0	0	-0.5
	4.0	4.7	4.7	3.0	0.00	1	0	0	-0.5
	5.0	4.7	4.7	3.0	0.00	1	0	0	-0.5
	6.0	4.6	4.6	3.0	0.00	1	0	0	-0.5
	8.0	4.6	4.6	3.0	0.00	1	0	0	-0.5
	10.0	4.6	4.6	3.0	0.00	1	0	0	-0.5
	12.0	4.6	4.6	3.0	0.00	1	0	0	-0.5
NEUTRAL									
	1.0	5.5	5.5	3.0	0.00	1	0	0	-0.4
	2.0	5.0	5.0	3.0	0.00	1	0	0	-0.4
	3.0	4.8	4.8	3.0	0.00	1	0	0	-0.5
	4.0	4.7	4.7	3.0	0.00	1	0	0	-0.5
	5.0	4.7	4.7	3.0	0.00	1	0	0	-0.5
	6.0	4.7	4.7	3.0	0.00	1	0	0	-0.5
	8.0	4.6	4.6	3.0	0.00	1	0	0	-0.5
	10.0	4.6	4.6	3.0	0.00	1	0	0	-0.5
	12.0	4.6	4.6	3.0	0.00	1	0	0	-0.5
LIGHT STABLE									
	1.0	11.7	11.7	60.2	0.00	1	0	0	-0.3
	2.0	10.2	10.2	120.4	0.00	1	0	0	-0.4
	3.0	9.4	9.4	180.6	0.00	1	0	0	-0.5
	4.0	9.0	9.0	240.8	0.00	1	0	0	-0.5
	5.0	8.7	8.7	301.0	0.00	1	0	0	-0.5
	6.0	8.4	8.4	361.2	0.00	1	0	0	-0.5
	8.0	8.0	8.0	481.7	0.00	1	0	0	-0.5
	10.0	7.8	7.8	602.1	0.00	1	0	0	-0.5
	12.0	7.6	7.6	722.5	0.00	1	0	0	-0.5

STABLE

1.0	10.6	10.6	43.7	0.00	1	0	0	-0.3
2.0	9.3	9.3	87.3	0.00	1	0	0	-0.4
3.0	8.7	8.7	131.0	0.00	1	0	0	-0.5
4.0	8.3	8.3	174.6	0.00	1	0	0	-0.5
5.0	8.0	8.0	218.3	0.00	1	0	0	-0.5
6.0	7.8	7.8	261.9	0.00	1	0	0	-0.5
8.0	7.5	7.5	349.3	0.00	1	0	0	-0.5
10.0	7.3	7.3	436.6	0.00	1	0	0	-0.5
12.0	7.1	7.1	523.9	0.00	1	0	0	-0.5

****

* BRIGGS PLUME RISE FORMULAS (1969,1971,1976) *
CENTER-PLUME GROUND LEVEL CONCENTRATIONS(UG/M3)

****

STABILITY	WIND(M/S)	DOWNWIND DISTANCE(M)									
		50.0	100.0	200.0	300.0	500.0	750.0	1000.0	1500.0	2000.0	3000.0
UNSTABLE	1.0	231.2	78.8	24.8	12.4	5.2	2.6	1.6	0.8	0.5	0.2
	2.0	121.3	40.5	12.7	6.3	2.6	1.3	0.8	0.4	0.2	0.1
	3.0	82.2	27.3	8.5	4.3	1.8	0.9	0.5	0.3	0.2	0.1
	4.0	62.1	20.6	6.4	3.2	1.3	0.7	0.4	0.2	0.1	0.1
	5.0	49.9	16.5	5.1	2.6	1.1	0.5	0.3	0.2	0.1	0.0
	6.0	41.7	13.8	4.3	2.1	0.9	0.4	0.3	0.1	0.1	0.0
	8.0	31.4	10.4	3.2	1.6	0.7	0.3	0.2	0.1	0.1	0.0
	10.0	25.2	8.3	2.6	1.3	0.5	0.3	0.2	0.1	0.0	0.0
	12.0	21.0	6.9	2.2	1.1	0.4	0.2	0.1	0.1	0.0	0.0
NEUTRAL	1.0	471.7	256.1	101.9	56.3	26.0	13.9	8.9	4.8	3.0	1.6
	2.0	276.4	137.7	53.2	29.2	13.4	7.2	4.6	2.4	1.6	0.8

		3.0	193.8	94.0	36.0	19.7	9.0	4.8	3.1	1.6	1.1	0.6
		4.0	149.0	71.3	27.2	14.9	6.8	3.6	2.3	1.2	0.8	0.4
		5.0	121.0	57.5	21.9	11.9	5.5	2.9	1.9	1.0	0.6	0.3
		6.0	101.8	48.1	18.3	10.0	4.6	2.4	1.6	0.8	0.5	0.3
		8.0	77.3	36.3	13.8	7.5	3.4	1.8	1.2	0.6	0.4	0.2
		10.0	62.3	29.2	11.0	6.0	2.8	1.5	0.9	0.5	0.3	0.2
		12.0	52.2	24.4	9.2	5.0	2.3	1.2	0.8	0.4	0.3	0.1
	LIGHT STABLE	1.0	0.4	29.9	70.9	62.7	40.0	24.8	17.1	9.8	6.5	3.6
		2.0	1.7	32.5	48.4	38.1	22.5	13.6	9.2	5.2	3.5	1.9
		3.0	2.8	30.4	37.1	27.7	15.9	9.4	6.4	3.6	2.4	1.3
		4.0	3.5	27.8	30.2	21.9	12.3	7.3	4.9	2.8	1.8	1.0
		5.0	4.0	25.6	25.6	18.2	10.1	5.9	4.0	2.2	1.5	0.8
		6.0	4.4	23.6	22.3	15.6	8.6	5.0	3.4	1.9	1.2	0.7
		8.0	4.8	20.4	17.8	12.2	6.6	3.9	2.6	1.4	1.0	0.5
		10.0	4.9	18.0	14.9	10.1	5.4	3.1	2.1	1.2	0.8	0.4
		12.0	5.0	16.2	12.8	8.6	4.6	2.6	1.8	1.0	0.6	0.4
	STABLE	1.0	0.0	0.0	0.2	3.9	22.0	33.8	34.7	28.4	22.2	14.4
		2.0	0.0	0.0	0.7	6.3	19.9	24.2	22.4	16.8	12.7	7.9
		3.0	0.0	0.0	1.0	6.9	17.2	18.9	16.8	12.1	9.0	5.5
		4.0	0.0	0.0	1.3	7.0	15.0	15.6	13.5	9.5	7.0	4.3
		5.0	0.0	0.0	1.5	6.9	13.4	13.3	11.3	7.9	5.8	3.5
		6.0	0.0	0.0	1.6	6.7	12.1	11.7	9.8	6.8	4.9	3.0
		8.0	0.0	0.0	1.8	6.2	10.1	9.4	7.8	5.3	3.8	2.3
		10.0	0.0	0.0	1.8	5.8	8.8	7.9	6.4	4.3	3.1	1.9
		12.0	0.0	0.0	1.8	5.4	7.7	6.8	5.5	3.7	2.6	1.6

1

END OF PROGRAM CONCX

```
SOURCE             : Troll-ovn A (Tilsvarende for Troll-ovn B)
STACK HEIGHT       : HS=   46.0 METERS
SOURCE STRENGTH    :  Q=   0.32 G/SEC
STACK DIMENSIONS   :  D=  0.77 M, W=  0.20 M/S, TG  463.0 K
AMBIENT TEMPERATURE: TA= 273.0 K
ELEVATED SURFACE   : HT=   0.0 M
MIXING HEIGHT      : HMIX=1000.0
BUILDING DIMENSIONS: HB=  0.0 M, BB=  0.0 M
GRAV. SETTLING VEL.: VG= 0.00 M/S


RN=    0.20    0.28    0.36    0.42
CY=    0.36    0.32    0.31    0.31
PY=    0.86    0.78    0.74    0.71
CZ=    0.33    0.22    0.16    0.06
PZ=    0.86    0.78    0.74    0.71


************************************************
* HEFF : EFFECTIVE PLUME HEIGHT DUE TO PLUME RISE *
* HNEW : MODIFIED PLUME HEIGHT DUE TO PENETRATION *
* XDIST: DISTANCE TO FINAL PLUME RISE             *
* PS   : PENETRATION COEFFICIENT                  *
* IDH  : PLUME RISE REGION:                       *
*        1 :NO BUILDING EFFECTS                   *
*        2 :REDUCED STACK HEIGHT DUE TO BUILDINGS *
*        3 :TRAPPED IN THE CAVITY SONE            *
* IH   : PLUME RISE OPTION:                       *
*        0 :PLUME RISE CALCULATIONS               *
*        1 :FIXED PLUME RISE EQUAL STACK HEIGHT   *
*        2 :VOLUME SOURCE AT HEIGHT HS            *
* ID   : STACK DOWNWASH:                          *
*        0 :INCLUDED                              *
*        1 :NOT INCLUDED                          *
* SD   : ON OUTPUT:                               *
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    *         STACK DOWNWASH (M)                          *
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```

STABILITY CLASS	U10	HEFF	HNEW	XDIST	PS	IDH	IH	ID	SD
UNSTABLE									
	1.0	47.1	47.1	12.9	0.00	1	0	0	-2.1
	2.0	45.4	45.4	12.9	0.00	1	0	0	-2.2
	3.0	44.8	44.8	12.9	0.00	1	0	0	-2.2
	4.0	44.6	44.6	12.9	0.00	1	0	0	-2.2
	5.0	44.4	44.4	12.9	0.00	1	0	0	-2.3
	6.0	44.3	44.3	12.9	0.00	1	0	0	-2.3
	8.0	44.1	44.1	12.9	0.00	1	0	0	-2.3
	10.0	44.0	44.0	12.9	0.00	1	0	0	-2.3
	12.0	44.0	44.0	12.9	0.00	1	0	0	-2.3
NEUTRAL									
	1.0	46.7	46.7	12.9	0.00	1	0	0	-2.1
	2.0	45.2	45.2	12.9	0.00	1	0	0	-2.2
	3.0	44.7	44.7	12.9	0.00	1	0	0	-2.2
	4.0	44.5	44.5	12.9	0.00	1	0	0	-2.3
	5.0	44.3	44.3	12.9	0.00	1	0	0	-2.3
	6.0	44.2	44.2	12.9	0.00	1	0	0	-2.3
	8.0	44.1	44.1	12.9	0.00	1	0	0	-2.3
	10.0	44.0	44.0	12.9	0.00	1	0	0	-2.3
	12.0	43.9	43.9	12.9	0.00	1	0	0	-2.3
LIGHT STABLE									
	1.0	55.8	55.8	133.8	0.00	1	0	0	-2.1
	2.0	53.2	53.2	267.7	0.00	1	0	0	-2.2
	3.0	52.0	52.0	401.5	0.00	1	0	0	-2.2
	4.0	51.2	51.2	535.4	0.00	1	0	0	-2.3
	5.0	50.7	50.7	669.2	0.00	1	0	0	-2.3
	6.0	50.3	50.3	803.1	0.00	1	0	0	-2.3
	8.0	49.7	49.7	1070.8	0.00	1	0	0	-2.3
	10.0	49.2	49.2	1338.5	0.00	1	0	0	-2.3
	12.0	48.9	48.9	1606.2	0.00	1	0	0	-2.3

```
      STABLE
                1.0   53.4   53.4  110.9  0.00   1  0  0  -2.1
                2.0   51.4   51.4  221.8  0.00   1  0  0  -2.2
                3.0   50.4   50.4  332.6  0.00   1  0  0  -2.3
                4.0   49.8   49.8  443.5  0.00   1  0  0  -2.3
                5.0   49.3   49.3  554.4  0.00   1  0  0  -2.3
                6.0   49.0   49.0  665.3  0.00   1  0  0  -2.3
                8.0   48.5   48.5  887.0  0.00   1  0  0  -2.3
               10.0   48.2   48.2 1108.8  0.00   1  0  0  -2.3
               12.0   47.9   47.9 1330.6  0.00   1  0  0  -2.3

           ************************************************

           *  BRIGGS PLUME RISE FORMULAS (1969,1971,1976)     *
             CENTER-PLUME GROUND LEVEL CONCENTRATIONS(UG/M3)

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STABILITY	WIND(M/S)	DOWNWIND DISTANCE(M)									
		50.0	100.0	200.0	300.0	500.0	750.0	1000.0	1500.0	2000.0	3000.0
UNSTABLE	1.0	0.0	6.7	26.7	23.4	13.5	7.6	4.8	2.5	1.5	0.8
	2.0	0.0	4.4	14.6	12.3	6.9	3.8	2.4	1.3	0.8	0.4
	3.0	0.0	3.2	10.0	8.3	4.6	2.6	1.6	0.8	0.5	0.3
	4.0	0.0	2.5	7.6	6.3	3.5	1.9	1.2	0.6	0.4	0.2
	5.0	0.0	2.1	6.1	5.0	2.8	1.5	1.0	0.5	0.3	0.2
	6.0	0.0	1.7	5.1	4.2	2.3	1.3	0.8	0.4	0.3	0.1
	8.0	0.0	1.3	3.9	3.2	1.8	1.0	0.6	0.3	0.2	0.1
	10.0	0.0	1.1	3.1	2.5	1.4	0.8	0.5	0.3	0.2	0.1
	12.0	0.0	0.9	2.6	2.1	1.2	0.6	0.4	0.2	0.1	0.1
NEUTRAL	1.0	0.0	0.0	0.9	7.5	18.3	18.6	15.5	10.3	7.2	4.1
	2.0	0.0	0.0	0.7	4.6	10.1	9.9	8.1	5.3	3.7	2.1

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                3.0     0.0     0.0     0.5     3.3     6.9     6.7     5.5     3.5     2.5     1.4
                4.0     0.0     0.0     0.4     2.5     5.3     5.1     4.1     2.7     1.9     1.1
                5.0     0.0     0.0     0.3     2.1     4.3     4.1     3.3     2.1     1.5     0.8
                6.0     0.0     0.0     0.3     1.7     3.6     3.4     2.8     1.8     1.2     0.7
                8.0     0.0     0.0     0.2     1.3     2.7     2.6     2.1     1.3     0.9     0.5
               10.0     0.0     0.0     0.2     1.1     2.2     2.1     1.7     1.1     0.7     0.4
               12.0     0.0     0.0     0.2     0.9     1.8     1.7     1.4     0.9     0.6     0.4

  LIGHT STABLE   1.0     0.0     0.0     0.0     0.0     0.3     2.8     6.0     8.9     8.8     6.9
                 2.0     0.0     0.0     0.0     0.0     0.3     1.9     3.7     5.0     4.8     3.6
                 3.0     0.0     0.0     0.0     0.0     0.2     1.5     2.7     3.5     3.3     2.5
                 4.0     0.0     0.0     0.0     0.0     0.2     1.2     2.2     2.8     2.6     1.9
                 5.0     0.0     0.0     0.0     0.0     0.2     1.1     1.8     2.3     2.1     1.5
                 6.0     0.0     0.0     0.0     0.0     0.2     0.9     1.6     1.9     1.8     1.3
                 8.0     0.0     0.0     0.0     0.0     0.1     0.7     1.2     1.5     1.4     1.0
                10.0     0.0     0.0     0.0     0.0     0.1     0.6     1.0     1.2     1.1     0.8
                12.0     0.0     0.0     0.0     0.0     0.1     0.5     0.9     1.0     0.9     0.7

        STABLE   1.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.5
                 2.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.3
                 3.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.3
                 4.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.2
                 5.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.2
                 6.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.2
                 8.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.1
                10.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.1
                12.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.1
1

 END OF PROGRAM CONCX
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SOURCE             : NGL-ovn
STACK HEIGHT       : HS=   46.0 METERS
SOURCE STRENGTH    :  Q=   0.54 G/SEC
STACK DIMENSIONS   :  D=  0.90 M, W=  0.20 M/S, TG  515.0 K
AMBIENT TEMPERATURE: TA= 273.0 K
ELEVATED SURFACE   : HT=   0.0 M
MIXING HEIGHT      : HMIX=1000.0
BUILDING DIMENSIONS: HB=  0.0 M, BB=  0.0 M
GRAV. SETTLING VEL.: VG= 0.00 M/S


RN=    0.20    0.28    0.36    0.42
CY=    0.36    0.32    0.31    0.31
PY=    0.86    0.78    0.74    0.71
CZ=    0.33    0.22    0.16    0.06
PZ=    0.86    0.78    0.74    0.71


************************************************
* HEFF : EFFECTIVE PLUME HEIGHT DUE TO PLUME RISE *
* HNEW : MODIFIED PLUME HEIGHT DUE TO PENETRATION *
* XDIST: DISTANCE TO FINAL PLUME RISE             *
* PS   : PENETRATION COEFFICIENT                  *
* IDH  : PLUME RISE REGION:                       *
*        1 :NO BUILDING EFFECTS                   *
*        2 :REDUCED STACK HEIGHT DUE TO BUILDINGS *
*        3 :TRAPPED IN THE CAVITY SONE            *
* IH   : PLUME RISE OPTION:                       *
*        0 :PLUME RISE CALCULATIONS               *
*        1 :FIXED PLUME RISE EQUAL STACK HEIGHT   *
*        2 :VOLUME SOURCE AT HEIGHT HS            *
* ID   : STACK DOWNWASH:                          *
*        0 :INCLUDED                              *
*        1 :NOT INCLUDED                          *
* SD   : ON OUTPUT:                               *
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*        STACK DOWNWASH (M)                              *
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STABILITY CLASS	U10	HEFF	HNEW	XDIST	PS	IDH	IH	ID	SD
UNSTABLE									
	1.0	48.1	48.1	17.3	0.00	1	0	0	-2.4
	2.0	45.7	45.7	17.3	0.00	1	0	0	-2.6
	3.0	44.9	44.9	17.3	0.00	1	0	0	-2.6
	4.0	44.5	44.5	17.3	0.00	1	0	0	-2.6
	5.0	44.2	44.2	17.3	0.00	1	0	0	-2.7
	6.0	44.1	44.1	17.3	0.00	1	0	0	-2.7
	8.0	43.9	43.9	17.3	0.00	1	0	0	-2.7
	10.0	43.8	43.8	17.3	0.00	1	0	0	-2.7
	12.0	43.7	43.7	17.3	0.00	1	0	0	-2.7
NEUTRAL									
	1.0	47.5	47.5	17.3	0.00	1	0	0	-2.5
	2.0	45.4	45.4	17.3	0.00	1	0	0	-2.6
	3.0	44.7	44.7	17.3	0.00	1	0	0	-2.6
	4.0	44.3	44.3	17.3	0.00	1	0	0	-2.7
	5.0	44.1	44.1	17.3	0.00	1	0	0	-2.7
	6.0	44.0	44.0	17.3	0.00	1	0	0	-2.7
	8.0	43.8	43.8	17.3	0.00	1	0	0	-2.7
	10.0	43.7	43.7	17.3	0.00	1	0	0	-2.7
	12.0	43.6	43.6	17.3	0.00	1	0	0	-2.7
LIGHT STABLE									
	1.0	57.4	57.4	133.8	0.00	1	0	0	-2.5
	2.0	54.4	54.4	267.7	0.00	1	0	0	-2.6
	3.0	53.0	53.0	401.5	0.00	1	0	0	-2.6
	4.0	52.1	52.1	535.4	0.00	1	0	0	-2.7
	5.0	51.4	51.4	669.2	0.00	1	0	0	-2.7
	6.0	50.9	50.9	803.1	0.00	1	0	0	-2.7
	8.0	50.2	50.2	1070.8	0.00	1	0	0	-2.7
	10.0	49.7	49.7	1338.5	0.00	1	0	0	-2.7
	12.0	49.4	49.4	1606.2	0.00	1	0	0	-2.7

STABLE

1.0	54.6	54.6	110.9	0.00	1	0	0	-2.5
2.0	52.2	52.2	221.8	0.00	1	0	0	-2.6
3.0	51.1	51.1	332.6	0.00	1	0	0	-2.6
4.0	50.4	50.4	443.5	0.00	1	0	0	-2.7
5.0	49.8	49.8	554.4	0.00	1	0	0	-2.7
6.0	49.5	49.5	665.3	0.00	1	0	0	-2.7
8.0	48.9	48.9	887.0	0.00	1	0	0	-2.7
10.0	48.5	48.5	1108.8	0.00	1	0	0	-2.7
12.0	48.2	48.2	1330.6	0.00	1	0	0	-2.7

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* BRIGGS PLUME RISE FORMULAS (1969,1971,1976) *
CENTER-PLUME GROUND LEVEL CONCENTRATIONS(UG/M3)

****

STABILITY	WIND(M/S)	DOWNWIND DISTANCE(M)									
		50.0	100.0	200.0	300.0	500.0	750.0	1000.0	1500.0	2000.0	3000.0
UNSTABLE	1.0	0.0	9.7	43.2	38.8	22.6	12.7	8.1	4.2	2.6	1.3
	2.0	0.0	7.1	24.5	20.7	11.7	6.5	4.1	2.1	1.3	0.7
	3.0	0.0	5.4	17.0	14.1	7.9	4.4	2.8	1.4	0.9	0.4
	4.0	0.0	4.3	13.0	10.7	6.0	3.3	2.1	1.1	0.7	0.3
	5.0	0.0	3.6	10.5	8.6	4.8	2.6	1.7	0.9	0.5	0.3
	6.0	0.0	3.0	8.8	7.2	4.0	2.2	1.4	0.7	0.4	0.2
	8.0	0.0	2.3	6.7	5.4	3.0	1.7	1.0	0.5	0.3	0.2
	10.0	0.0	1.9	5.4	4.4	2.4	1.3	0.8	0.4	0.3	0.1
	12.0	0.0	1.6	4.5	3.6	2.0	1.1	0.7	0.4	0.2	0.1
NEUTRAL	1.0	0.0	0.0	1.3	11.3	29.5	30.7	25.9	17.3	12.1	7.0
	2.0	0.0	0.0	1.1	7.6	16.9	16.6	13.7	8.9	6.2	3.5

	3.0	0.0	0.0	0.9	5.6	11.8	11.4	9.3	6.0	4.2	2.4
	4.0	0.0	0.0	0.7	4.4	9.0	8.6	7.0	4.6	3.2	1.8
	5.0	0.0	0.0	0.6	3.6	7.3	7.0	5.6	3.7	2.5	1.4
	6.0	0.0	0.0	0.5	3.0	6.2	5.8	4.7	3.1	2.1	1.2
	8.0	0.0	0.0	0.4	2.3	4.7	4.4	3.6	2.3	1.6	0.9
	10.0	0.0	0.0	0.3	1.9	3.8	3.5	2.9	1.8	1.3	0.7
	12.0	0.0	0.0	0.3	1.6	3.2	3.0	2.4	1.5	1.1	0.6
LIGHT STABLE	1.0	0.0	0.0	0.0	0.0	0.4	3.9	8.8	13.9	14.1	11.3
	2.0	0.0	0.0	0.0	0.0	0.4	2.9	5.7	8.1	7.8	6.0
	3.0	0.0	0.0	0.0	0.0	0.3	2.3	4.3	5.8	5.5	4.2
	4.0	0.0	0.0	0.0	0.0	0.3	1.9	3.4	4.5	4.2	3.2
	5.0	0.0	0.0	0.0	0.0	0.3	1.6	2.9	3.7	3.5	2.6
	6.0	0.0	0.0	0.0	0.0	0.3	1.4	2.5	3.2	2.9	2.2
	8.0	0.0	0.0	0.0	0.0	0.2	1.2	2.0	2.5	2.3	1.7
	10.0	0.0	0.0	0.0	0.0	0.2	1.0	1.7	2.0	1.8	1.3
	12.0	0.0	0.0	0.0	0.0	0.2	0.9	1.4	1.7	1.5	1.1
STABLE	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6
	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
	12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2

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END OF PROGRAM CONCX

Norsk institutt for luftforskning (NILU)
Postboks 100, N-2027 Kjeller

RAPPORTTYPE OPPDRAGSRAPPORT	RAPPORT NR. OR 51/2005	ISBN 82-425-1698-7 ISSN 0807-7185	
DATO	ANSV. SIGN.	ANT. SIDER 28	PRIS NOK 150,-

TITTEL	PROSJEKTLEDER
Spredningsberegninger for CO fra Kollsnes prosessanlegg	Ivar Haugsbakk
	NILU PROSJEKT NR. O-105071
FORFATTER(E) Ivar Haugsbakk	TILGJENGELIGHET * A
	OPPDRAGSGIVERS REF. Kirsti Krüger

OPPDRAGSGIVER
Statoil
Kollsnes prosessanlegg
Postboks 7210
5020 BERGEN

STIKKORD		
Utslipp	Spredningsberegninger	Karbonmonoksid

REFERAT
Det er utført spredningsberegninger for utslipp av CO fra ulike kilder ved Statoils prosessanlegg på Kollsnes i Øygarden. Beregningene viste at det med oppgitte data ikke er fare for overskridelser av grenseverdi for CO.

TITLE

Dispersion calculations of CO at Statoil process plant at Kollsnes.

ABSTRACT
Dispersion calculations have been carried out for CO at Statoils plant at Kollsnes. Calculations concluded this: no danger of limit values for CO with contributions from the process plant.

** Kategorier:*
A Åpen - kan bestilles fra NILU
B Begrenset distribusjon
C Kan ikke utleveres