

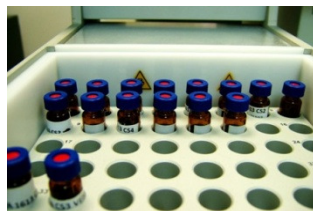


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IMPATTO DELLE DEPOSIZIONI ATMOSFERICHE TOTALI DI POPs: IL CASO TARANTO

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Direttore Generale ARPA PUGLIA

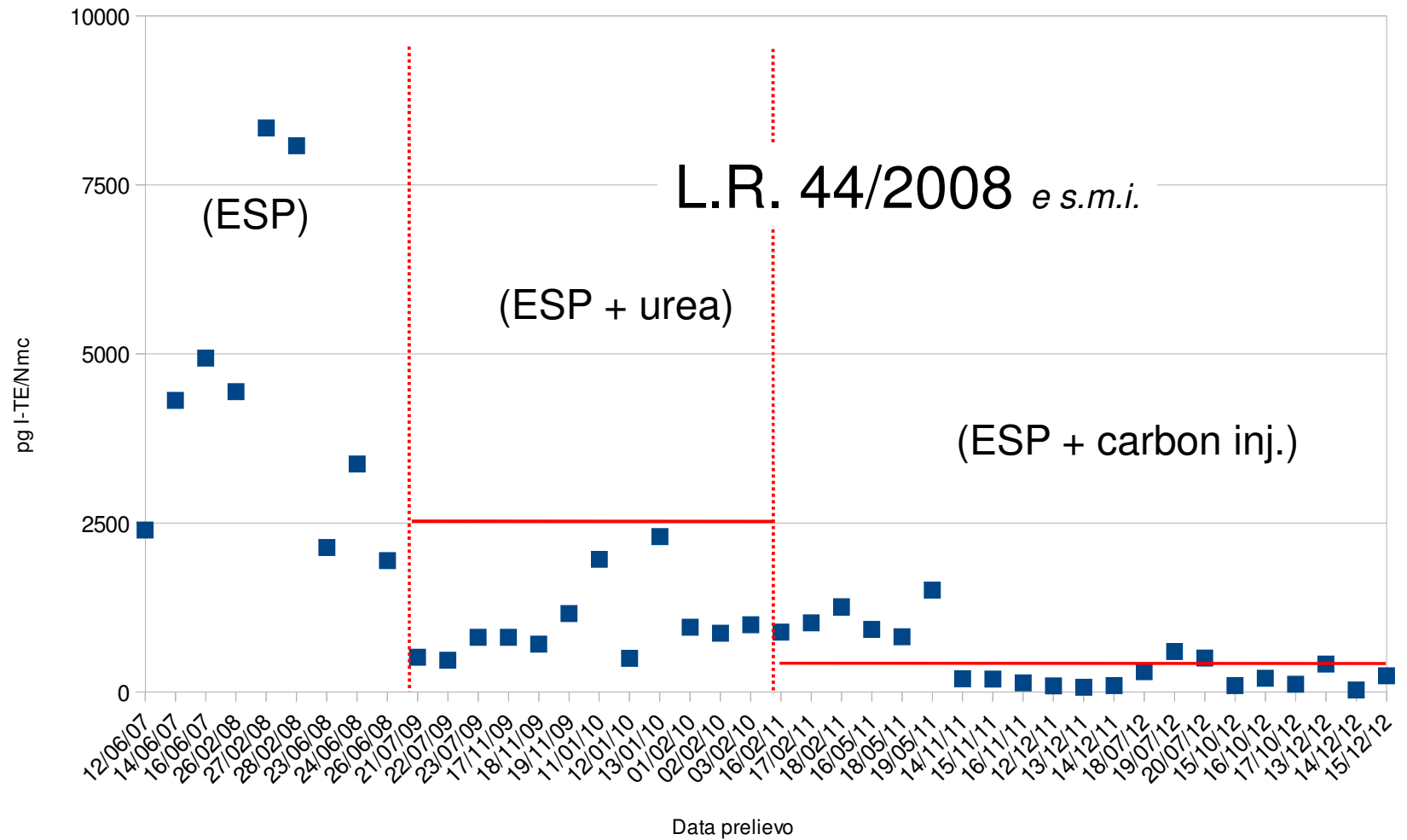


*XXIII Convegno Nazionale AIVI Associazione Italiana Veterinari Igienisti
Il contesto ambientale e la sicurezza degli alimenti
12-14 Giugno 2013, Ministero della Salute, Roma, Italy*



Taranto industrial facilities include: a large integrated steel plant (1), a medium-sized oil refinery (2), a large cement-works (3), two power plants (4,5), and three waste incinerators (6,7,8) as well as a large naval base with military shipyards (9).

Taranto sinter plant stack emissions



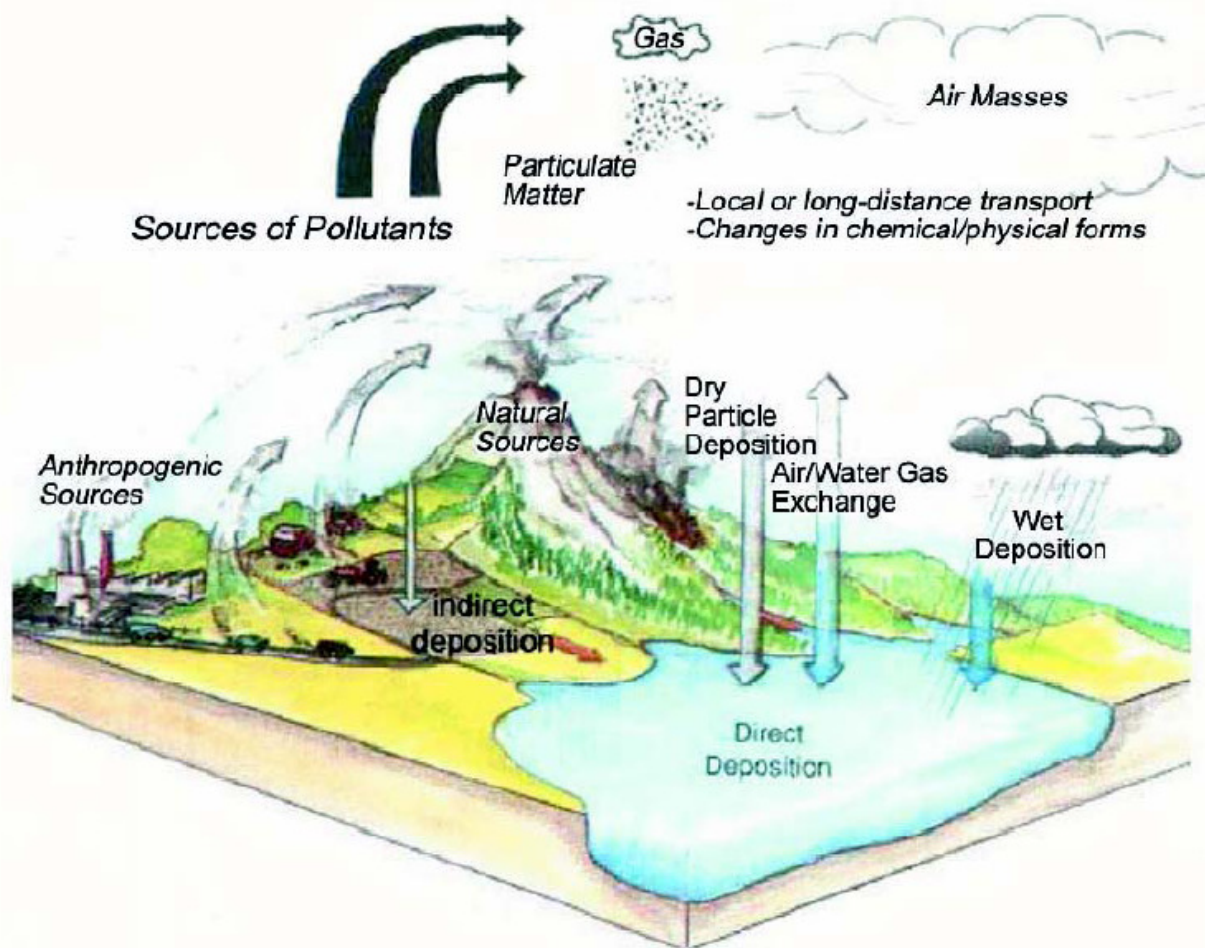
DEPOSIZIONI ATMOSFERICHE

D. Lgs 155/2010

Art. 2 punto 1

hh) **deposizione totale:**
massa totale di sostanze inquinanti che, in una data area e in un dato periodo, è trasferita dall'atmosfera al suolo, alla vegetazione, all'acqua, agli edifici e a qualsiasi altro tipo di superficie;

Allegato III, punto 3, comma c)
fornire dati sui tassi di deposizione totale di arsenico, cadmio, mercurio, nichel e idrocarburi policiclici aromatici, utili a **valutare l'esposizione indiretta della popolazione agli inquinanti attraverso la catena alimentare.**



Metodi ufficiali:

- ISTISAN 36/08
- UNI EN 15980 (IPA)
- UNI EN 15853 (Mercurio)
- UNI EN 15841 (Metalli)

Threshold values for atmospheric bulk depositions

| | Monthly max <i>pg TE/mq die</i> | Yearly average max <i>pg TE/mq die</i> |
|------------------|------------------------------------|---|
| Belgium 2010 (1) | 21,6 (Total TEQ) | 8,2 (Total TEQ) |
| Germany 1994 (2) | 15 (I-TEQ) | 5 (I-TEQ) |
| Germany 2004 (3) | | 4 (Total TEQ) |
| France 2009 (4) | | 5 (I-TEQ) |

(1) Desmedt M., Roekens E., De Fré., Cornelis C., Van Holderbeke M., 2008. Organohalogen Compounds 70, 1232-1235.

(2) LAI - Bericht des Länderausschusses für Immissionsschutz (LAI). 1994.

(3) LAI - Bericht des Länderausschusses für Immissionsschutz (LAI). 2004. Vom 21.

(4) Bodéan F, Michel P, Cary L, Leynet A, Piantone P Organohalogen Compounds Vol. 73, 1855-1858 (2011) 1855

XtraFood Model (Belgium 2006)

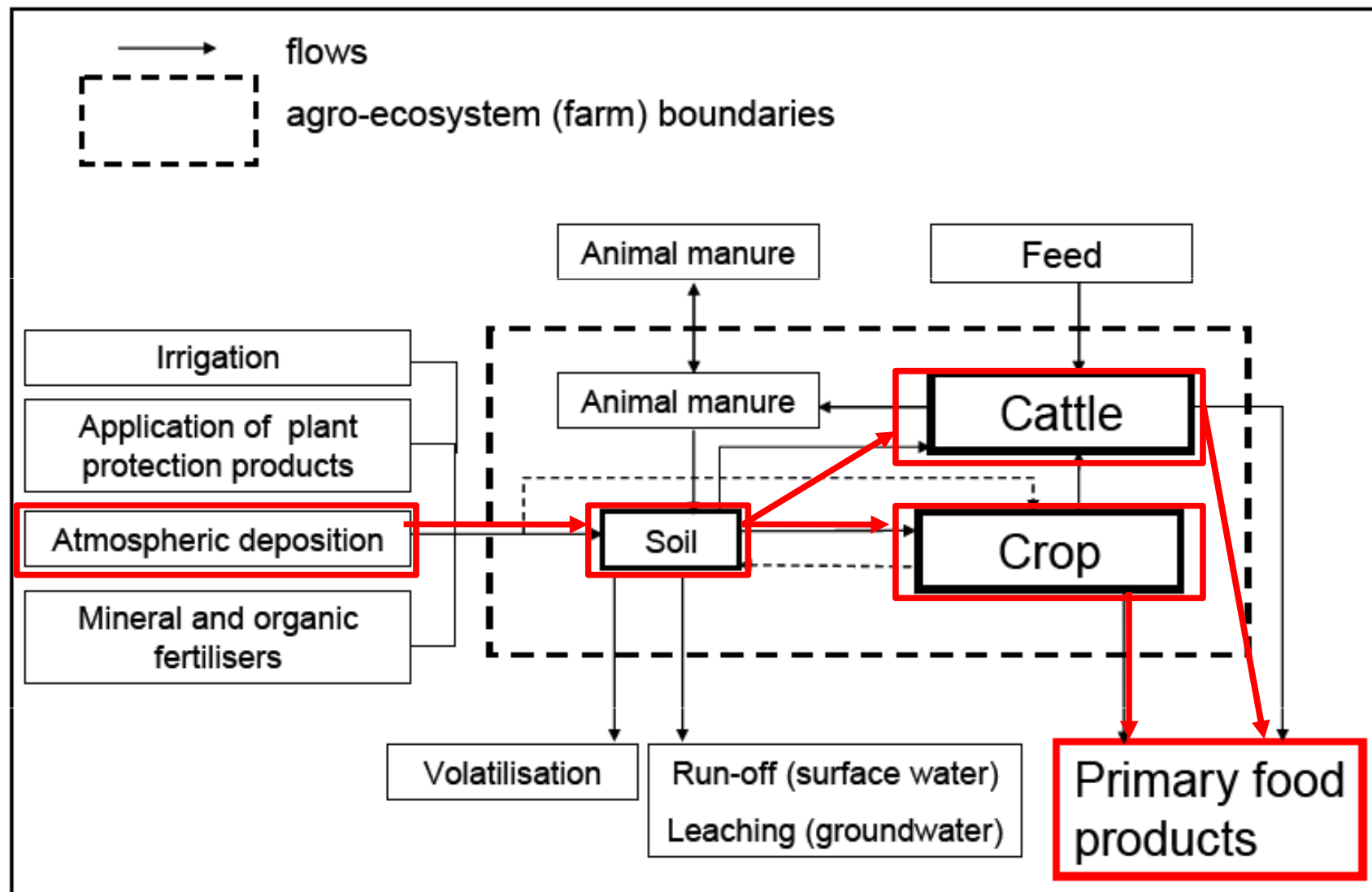


Figure 2: Overview of contaminant flows in the agro-ecosystem to the food chain

SOURCE: "Proposal for environmental guideline values for atmospheric deposition of dioxins and PCBs" Final report
C. Cornelis, K. De Brouwere, R. De Fré, M.P. Goyvaerts, G. Schoeters, W. Swaans, M. Van Holderbeke
2007/IMS/R/277

**Proposal for environmental guideline
values for atmospheric deposition of
dioxins and PCBs**

Final report

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M. Van Holderbeke

August 2007

Table 1: summary of toxicological criteria for PCDD/Fs and DL-PCBs based on animal studies

| group | LOAEL NOAEL | / | corresponding human intake | safety factor | toxicological criterion | Ref |
|-------------------|--------------------------|----------------------------------|---|------------------|--------------------------------|--|
| PCDD/PCDF | 10-40 ng/kg ¹ | | 14-37 pg TEQ/kg dag | 10 | 1-4 pg I-TEQ/kg.d | WHO (1998) |
| PCDD/F DL-PCBs | + | based on evaluation by WHO | | | | t-TWI: 7 pg TEQ/kg.week EU-SCF (2000) |
| PCDD/F DL-PCBs | + | NOAEL ng/kg LOAEL ng/kg | 16 ² 330-630 TEQ/kg month 28 ³ | pg 9,6 | pTMI: 70 pg WHO- TEQ/month | JECFA 2001 |
| PCDD/F DL-PCBs | + | | | | TWI: 14 pg WHO- TEQ/kg.week | EU-SCF (2001) |

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*Table 4: Overview of Belgian and European studies on intake of PCDD/F, DL-PCB and
NDL-PCB from food*

| | PCDD/F pg TEQ/kg.day | DL-PCB's pg TEQ/kg.day | PCDD/F + DL- PCB's (pg TEQ/kg.day) | NDL-PCB's (ng/kg.day) |
|-------------------|-------------------------|---------------------------|--|--------------------------|
| this report | | | | |
| M | 1.2 | 1.7 | 2.9 | 7.6 |
| F | 1.2 | 1.4 | 2.6 | 6.8 |
| Focant (2002) B | 0.9 | 0.97 | 1.9 | - |
| Vrijens (2002) B | - | - | 2.53 | - |
| Cornelis (2001) B | 1.3 | - | 69 | - |
| EFSA (2005) EU | | | | 10 - 45 |
| EFSA (2000) EU | | | 1.2 – 3.0 | - |
| SCOOP (2000) EU | 0.4 – 1.5* | 0.8 – 1.8* | | - |

*: I-TEQ

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The relationship between exposure and deposition shows a linear curve, that can be expressed as

$$\text{dose (pg TEQ/kg.day)} = A + B * \text{deposition (pg TEQ/m}^2\text{.day)} \text{ for PCDD/F and DL-PCBs}$$

or

$$\text{dose (ng/kg.day)} = A + B * \text{deposition (ng/m}^2\text{.day)} \text{ for NDL-PCBs}$$

In this regression, B reflects the model and the congener specific properties, whereas A reflects the constant contribution in exposure due to background exposure and non-deposition related concentrations. The regressions (given in Table 5) can be used to calculate a deposition value at a dose different from the TDI or to assess whether a certain deposition level results in exceeding of the TDI.

Table 5: Critical deposition values and relationship between deposition and exposure

| group | A | B* | deposition value |
|----------------------------|------|--------|---|
| PCDD/F – DL-PCBs | | | proposed critical deposition value |
| | | | (pg TEQ/m².day) |
| PCDD/F/DL-PCBs | 1.18 | 0.0998 | 8.2 |
| DL-PCBs (as PCB126) | 0.50 | 0.0948 | 15 |
| PCDD/F | 0.67 | 0.0998 | 13 |
| NDL-PCBs | | | deposition at NOAEL/10 |
| | | | (ng/m².day) |
| PCB28/52/101 (as PCB28) | 1.6 | 0.05 | 163.23 |
| PCB138/153/180 (as PCB153) | 6.4 | 0.15 | 27.21 |

PCDD/F and PCB transfer to milk in goats exposed to a long-term intake of contaminated hay

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ngTE/kg

| | PCDD/Fs | Dioxin-like PCBs | Marker PCBs |
|---------------------|-------------|------------------|-------------|
| Contaminated hay | 1.78 | 0.33 | 0.88 |
| Daily ration | 0.66 | 0.12 | 0.75 |

(Tenore Massimo di PCDD/F nel mangime = 0,75 ngTE/kg, quindi il mangime somministrato risultava “conforme”, seppur con un margine ridotto)

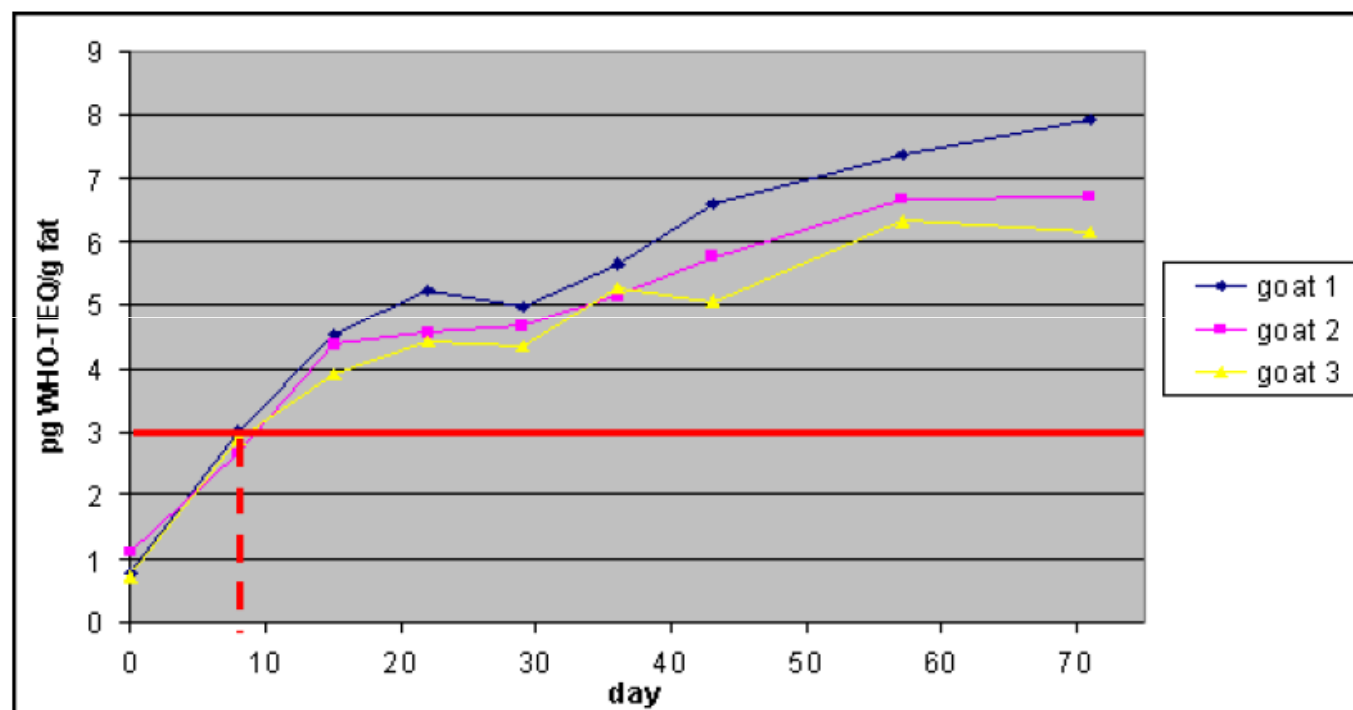
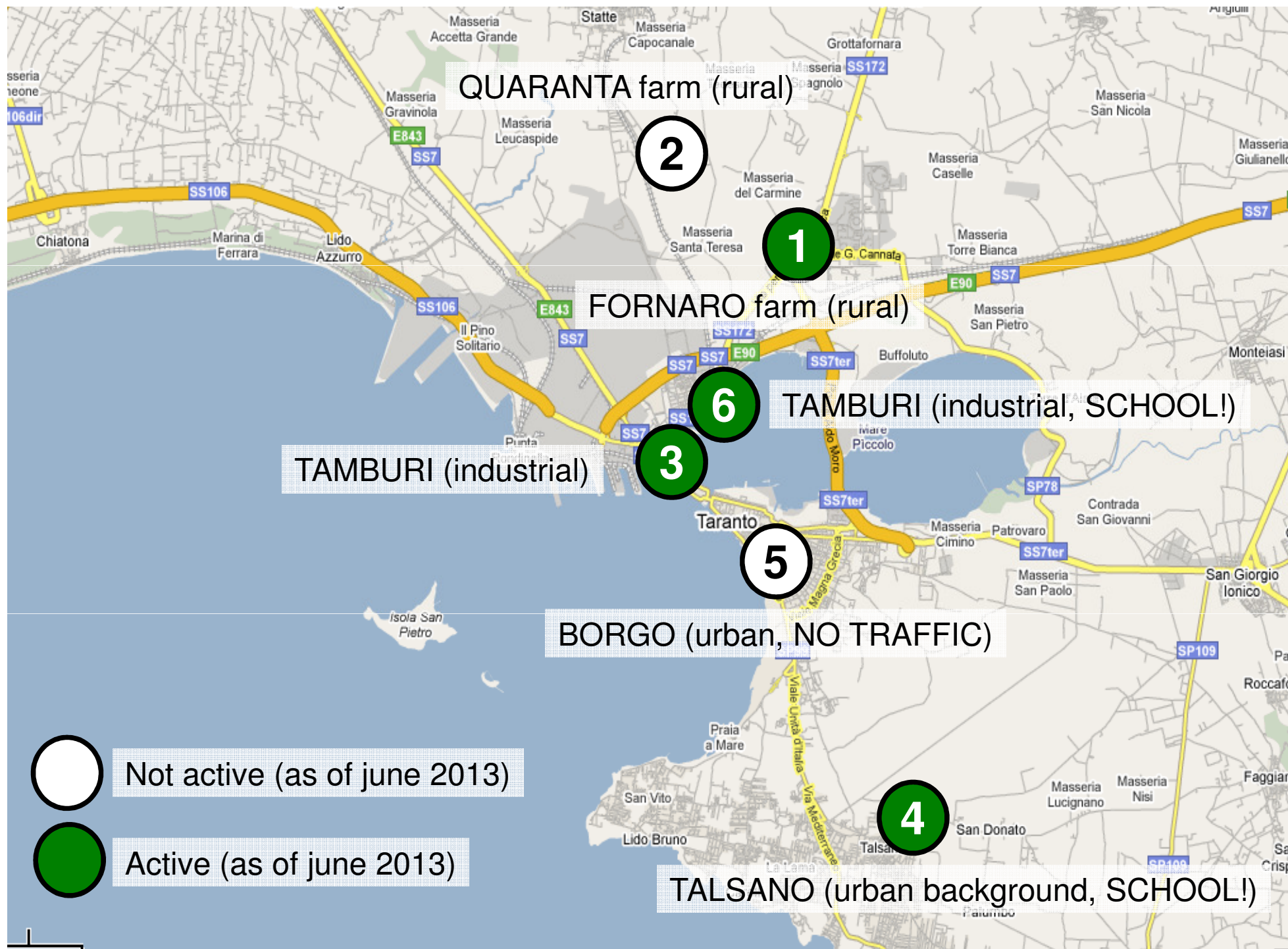


Figure 1: kinetic of PCDD/F contamination in milk

Atmospheric depositions sampling network



Bulk deposition gauge



Bulk deposition gauge

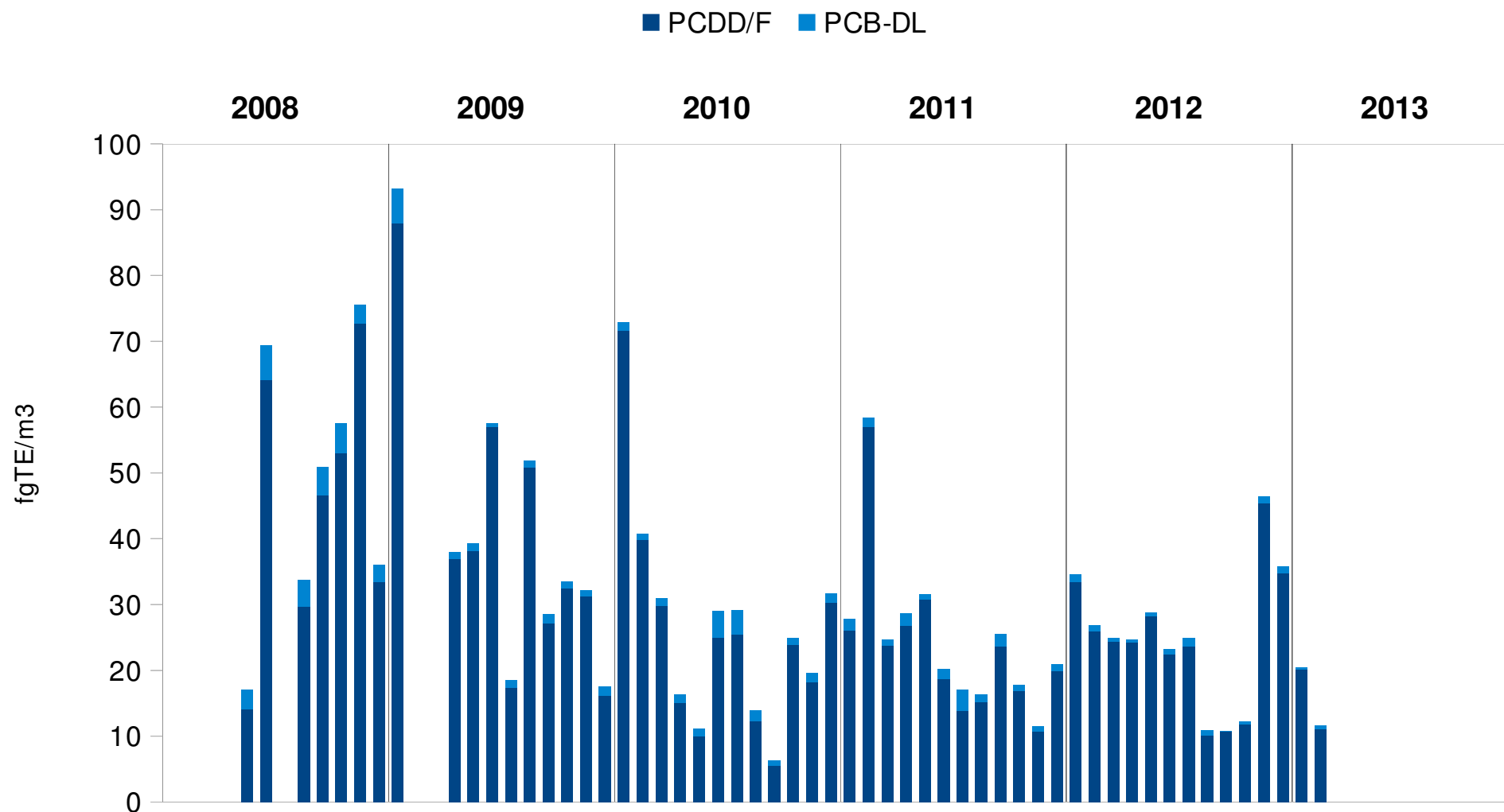


Bulk deposition gauge

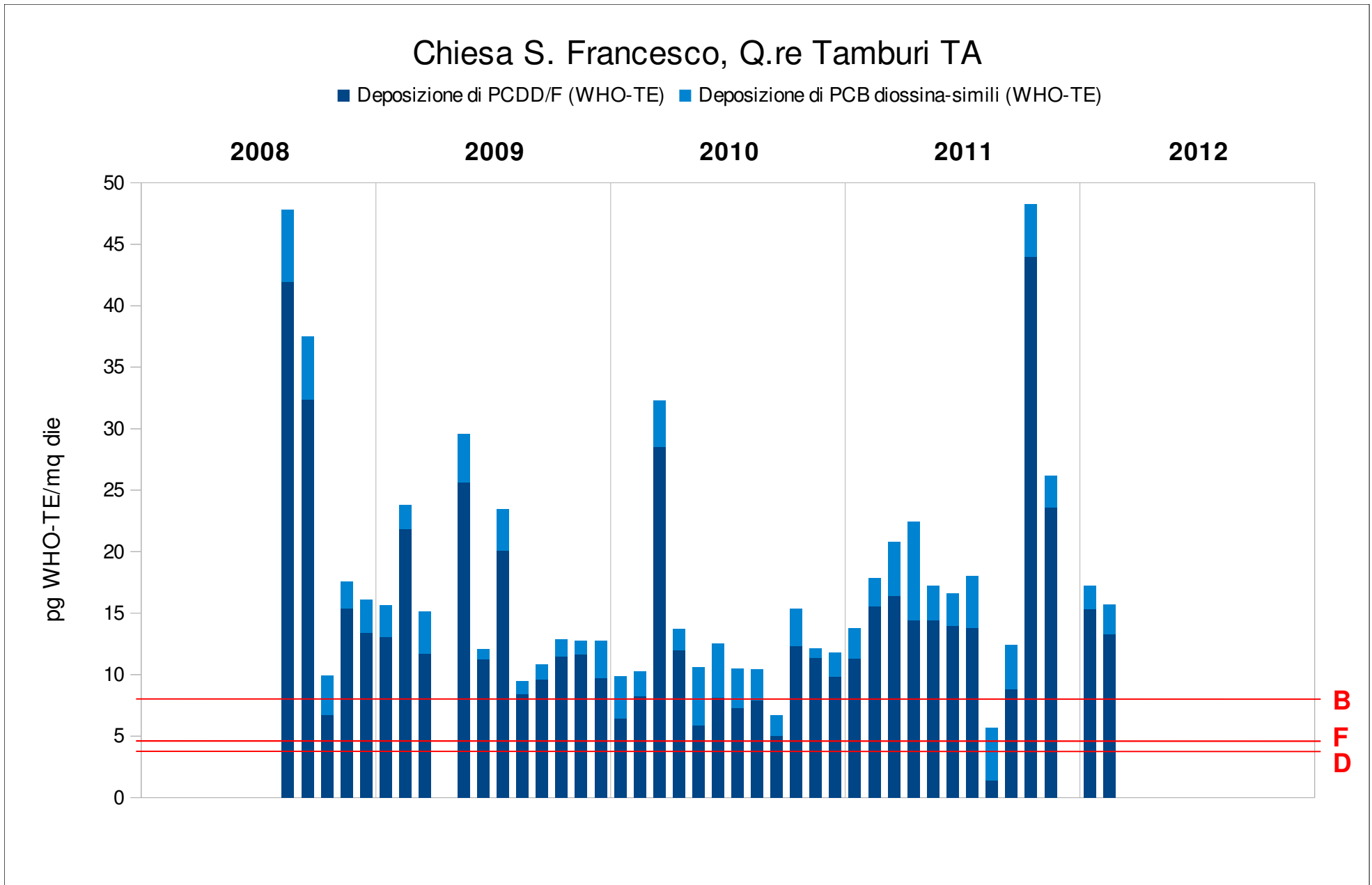


Monthly ambient air (PM10) levels (urban-industrial)

PCDD/F e PCB-DL nel PM10 Via Machiavelli (urbano-industriale)



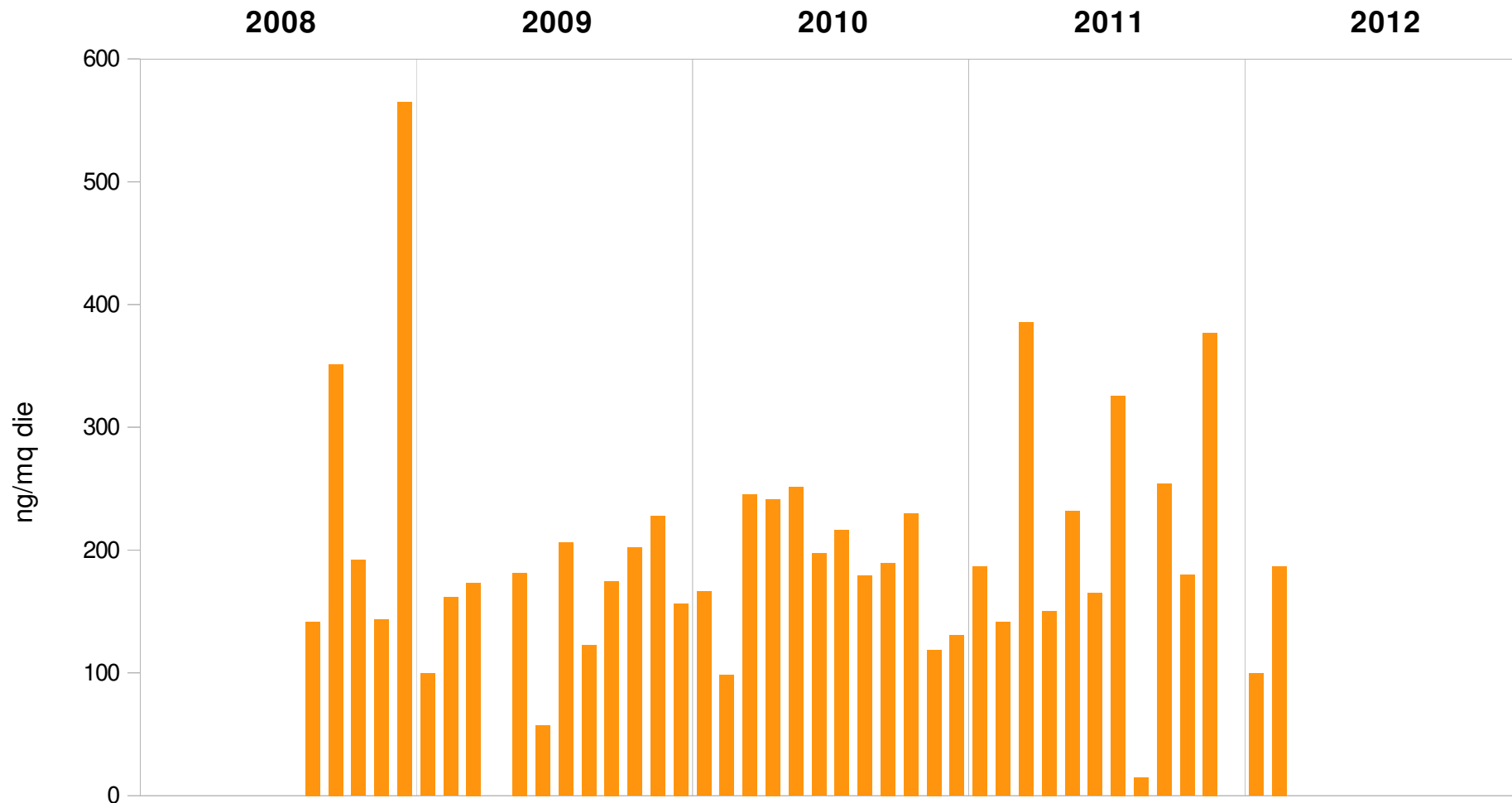
Monthly atmospheric bulk depositions (urban-industrial)



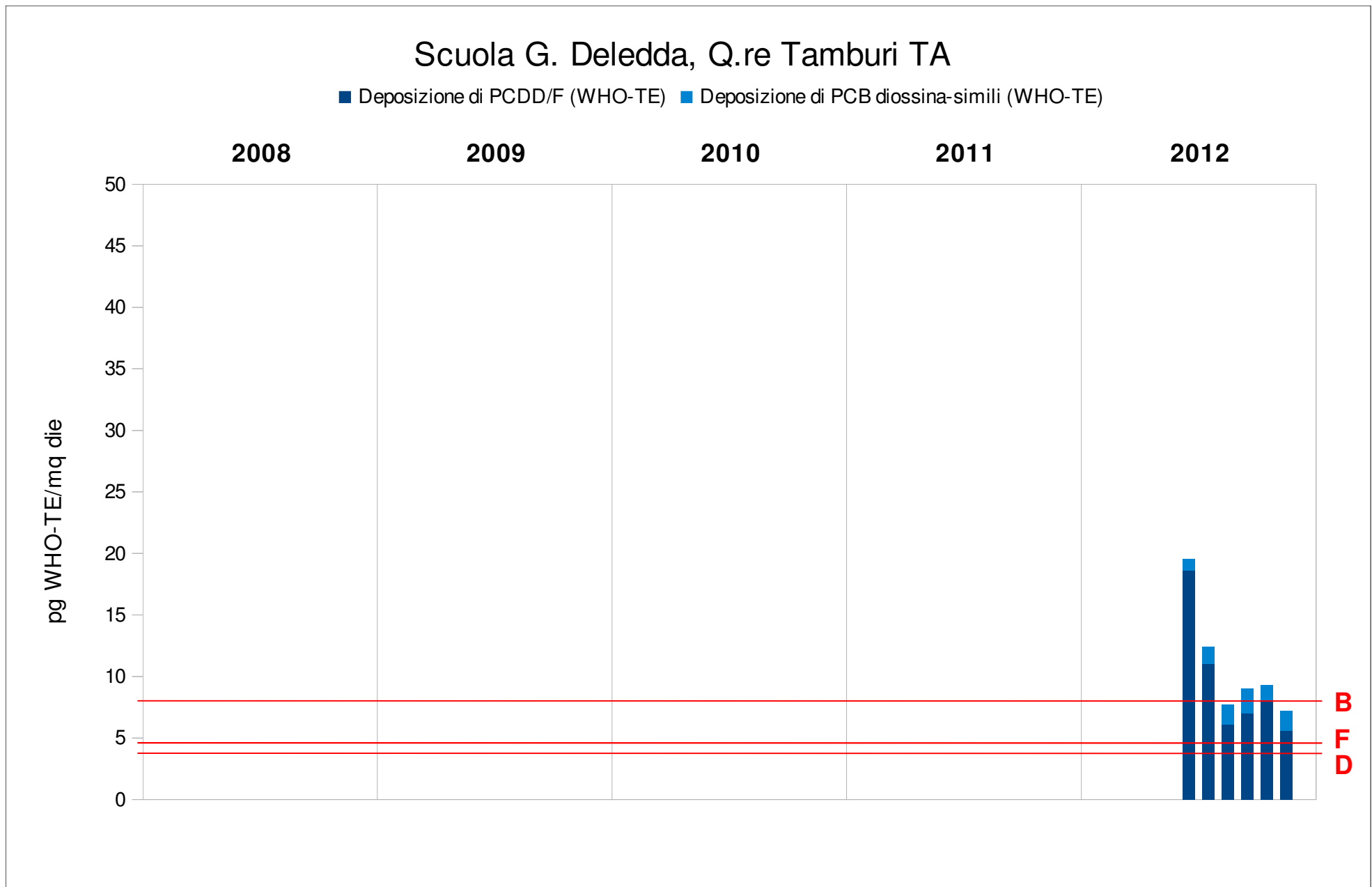
Monthly atmospheric bulk depositions (urban-industrial)

Chiesa S. Francesco, Q.re Tamburi TA

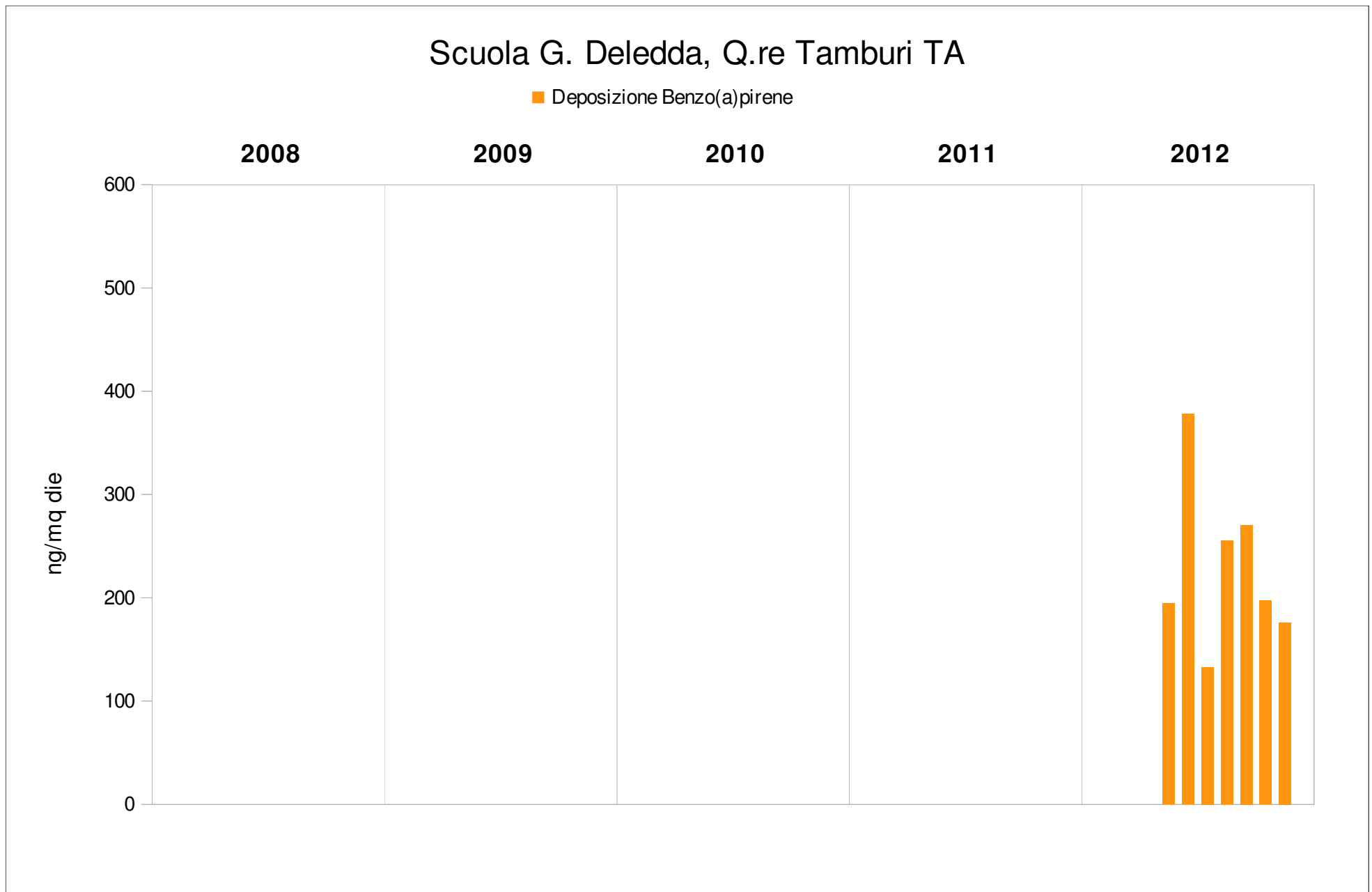
Deposizione Benzo(a)pirene



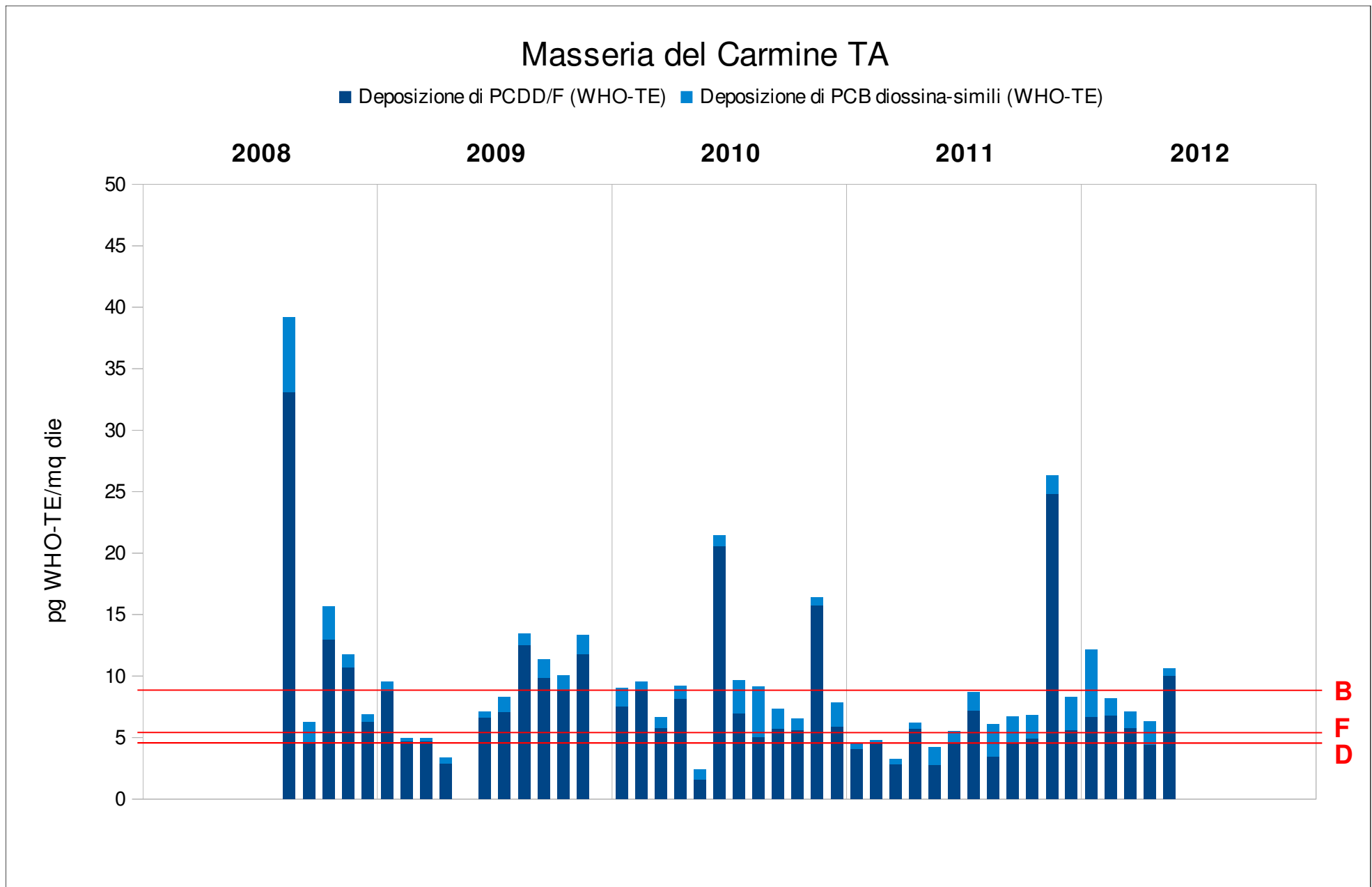
Monthly atmospheric bulk depositions (urban-industrial, school!)



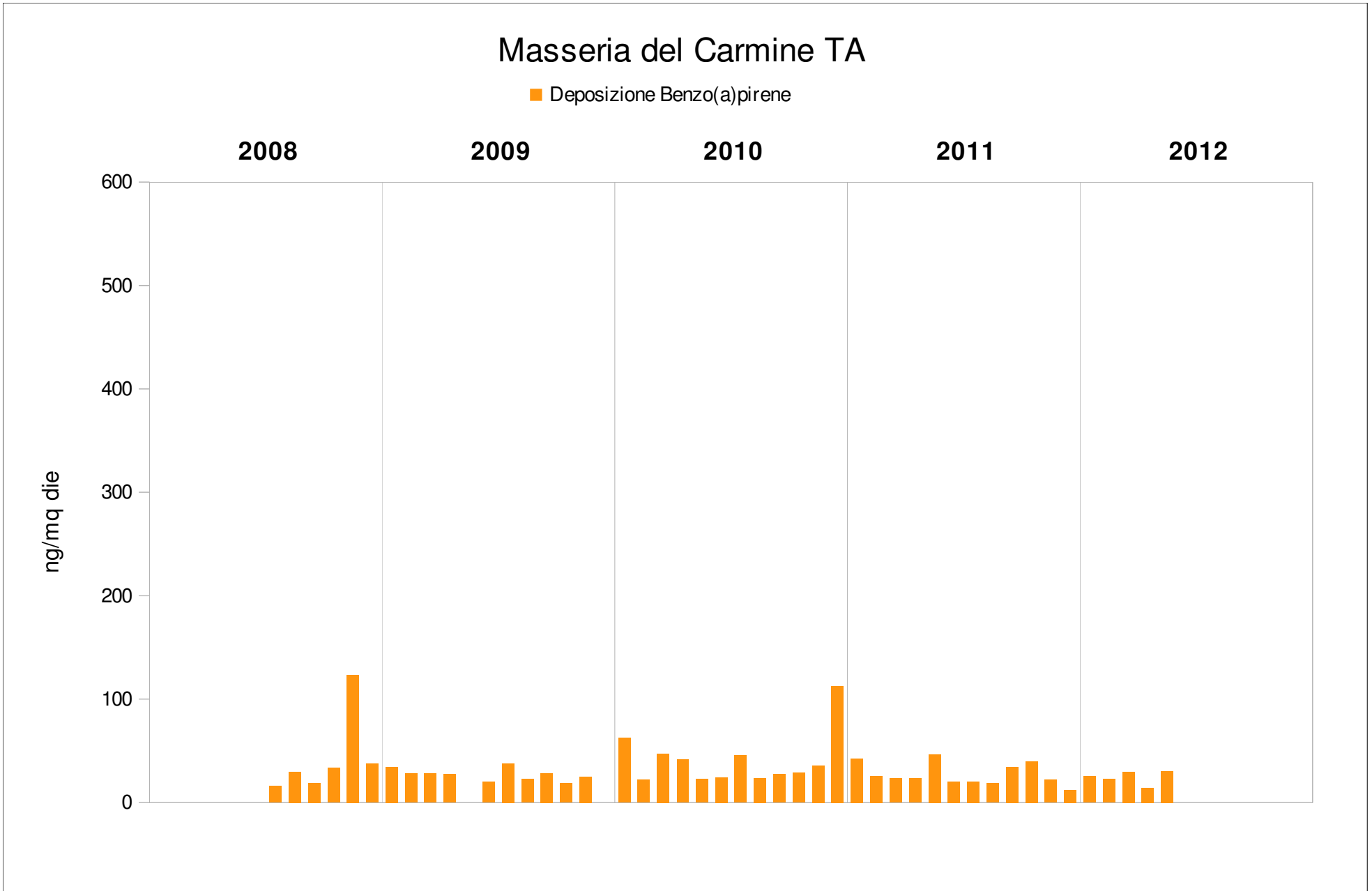
Monthly atmospheric bulk depositions (urban-industrial, school!)



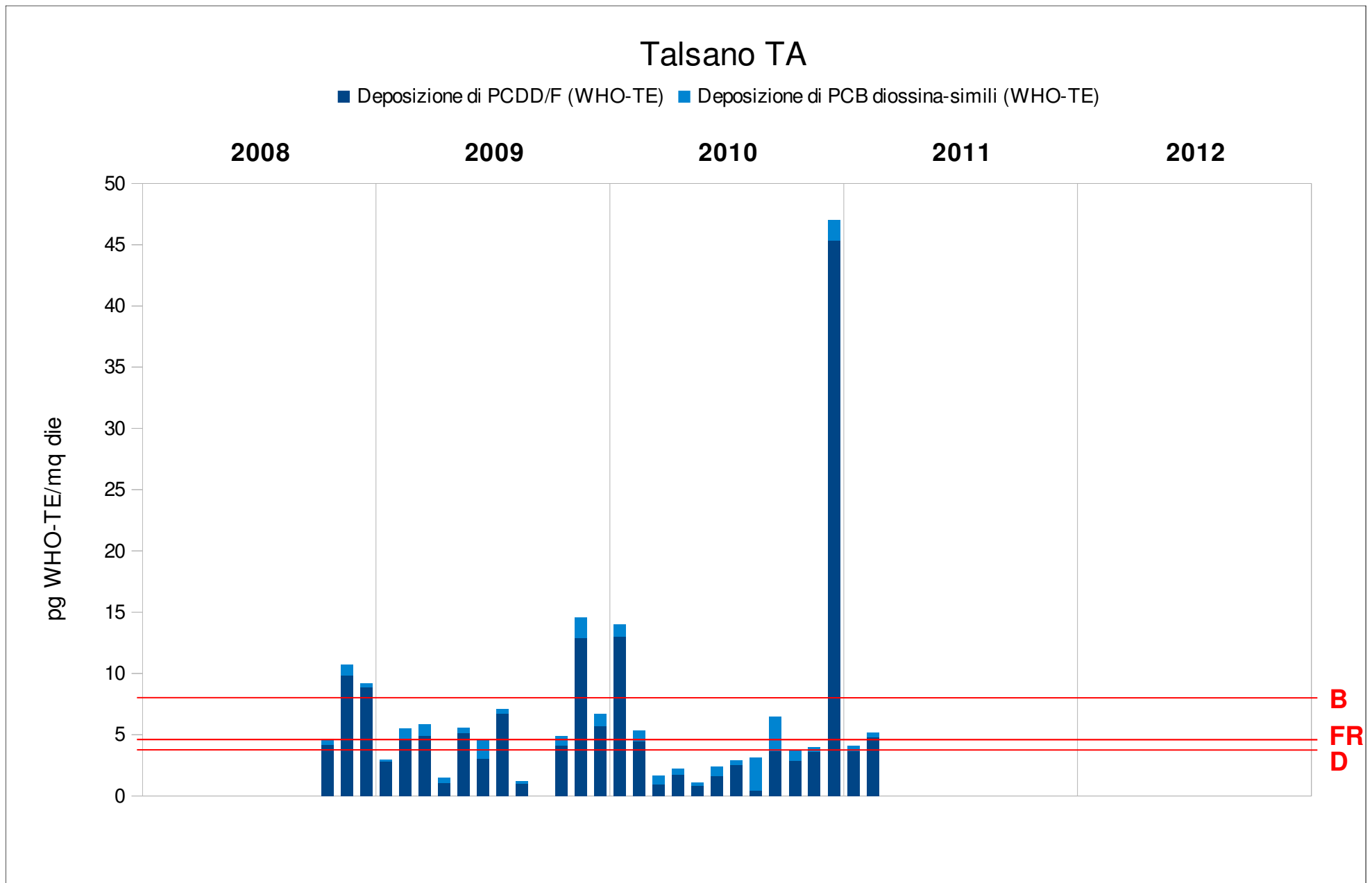
Monthly atmospheric bulk depositions (rural)



Monthly atmospheric bulk depositions (rural)



Monthly atmospheric bulk depositions (urban-background)



Monthly atmospheric bulk depositions (urban-background)

