

Cefic workshop safe and sustainable chemical transport and logistic

RISK ASSESSMENT AND ACCEPTANCE QUO VADIS ?

Claude Pfauvadel

Chairman of the RID ADR Joint meeting

Ressources, territoires, habitats et logement
Énergie et climat
Prévention des risques
Développement durable
Infrastructures, transports et mer

Présent
pour
l'avenir



Ministère
de l'Écologie,
du Développement
durable
et de l'Énergie

Ministère de l'Écologie, du Développement durable et de l'Énergie

SUMMARY

- CURRENT PRINCIPLES FOR DEVELOPPING THE TDG REGULATION
- SPECIFIC POINTS WHERE RISK ASSESSMENT IS MENTIONED
- SOME ISSUES RELATED TO RISK ASSESSMENT METHODS
- AN EXAMPLE CONCERNING MARSHALLING YARDS IN FRANCE
- ITEM FOR FUTURE WORK – MISSING ELEMENTS
- ROADMAP

CURRENT PRINCIPLES FOR DEVELOPPING THE TDG REGULATION

PRINCIPLES UNDERLYING THE REGULATION OF THE TRANSPORT OF DANGEROUS GOODS

4. Transport of dangerous goods is regulated in order to prevent, as far as possible, accidents to persons or property and damage to the environment, the means of transport employed or to other goods. At the same time, regulations should be framed so as not to impede the movement of such goods, other than those too dangerous to be accepted for transport. With this exception, the aim of regulations is to make transport feasible by eliminating risks or reducing them to a minimum. It is a matter therefore of safety no less than one of facilitating transport.

- In relation to risk practically the TDG regulations are currently elaborated under what could be described as a « qualitative ALARP approach »
- Decisions are made on the basis of the deterministic analysis of events and a negotiation between interested parties.

SPECIFIC POINTS WHERE RISK ASSESSMENT IS MENTIONED

- Justification for national measures under 1.9 of RID/ADR and art 1.4 of TDG framework DIR 2008/68 must be justified by risk assessments
- Guidelines have been published to define the general frame and content of Risk assesment
 - http://www.otif.org/fileadmin/user_upload/otif_verlinkte_files/05_gef_guet/07_rid_verweis/RID_1_9_3_Leitfaden_E.pdf
- The guidelines do not contain precise methodology for calculation of probabilities and effects
- EU railways common safety methods regulation contains requirements to evaluate new measures before adoption according to risk assessements. It applies also to requirements for TDG on rail.

SOME RECENT EXAMPLES OF RISK ASSESSMENT RELATED TO REGULATION

- Assessment of the derailment detector as requirement to be included in RID
- Assessment of measures for reducing the risk of a BLEVE (thermal coating, safety valves, accident prevention measures, mitigation vs prevention...)
- Changes the fundamental philosophy of TDG regulations :
 - A measure may not be adopted although proven to be efficient because the related accident frequency is not big enough
 - On the contrary what would happen if according to risk assessment a transport would be deemed unacceptable and no related safety measures would be available to reduce the risk.

ISSUES RELATED TO RISK ASSESSMENT

- Assessment of the derailment detector as requirement to be included in RID
- Assessment of measures for reducing the risk of a BLEVE (thermal coating, safety valves, accident prevention measures, mitigation vs prevention,,,))
- Changes the fundamental philosophy of TDG regulations :
 - A measure may not be adopted although proven to be efficient because the related accident frequency is not big enough
 - On the contrary what would happen if according to risk assessment a transport would be deemed unacceptable and no related safety measure would be available to reduce the risk
- Some incoherent results appear between local acceptance and global acceptance

RELIABILITY ISSUES - ASSURANCE PROJECT – May 2002

<http://www.risoe.dk/rispubl/sys/syspdf/ris-r-1344.pdf>

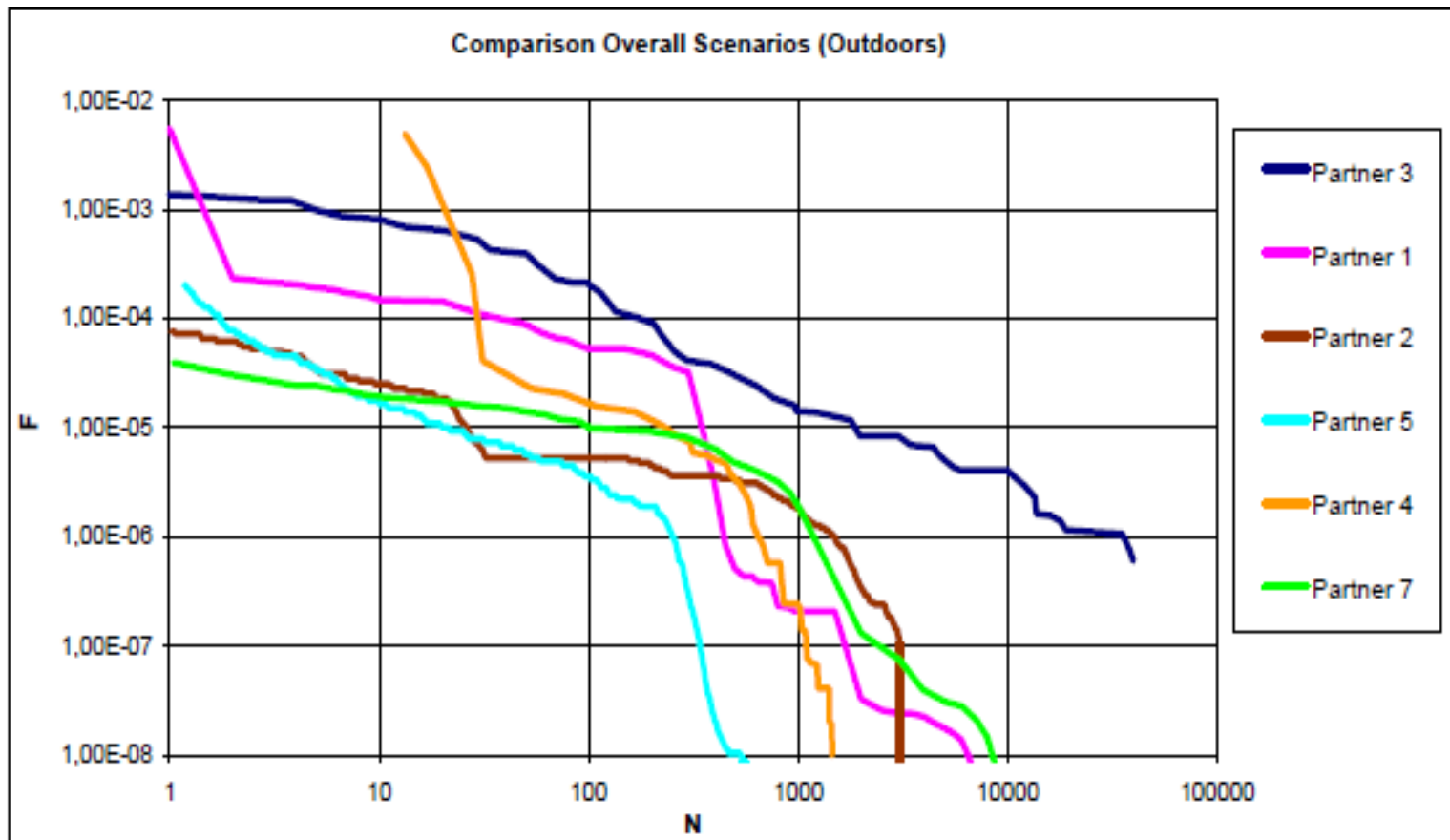
Frequencies of the top events of the common scenarios used by the partners (events per year)

#	Top Event [†]	Partner number							Range of deviation
		3	4	1	5	7	2	6	
1	Major ammonia leak from 8" feeding pipe	2.1 10 ⁻⁴	5.0 10 ⁻⁶	9.5 10 ⁻⁵	1.6 10 ⁻⁵	2.0 10 ⁻⁵	7.7 10 ⁻⁶	3	5.0 10 ⁻⁶ - 2.1 10 ⁻⁴
2	Breakage of 4" pipe 241P-067-P1349	3.9 10 ⁻⁴	1.0 10 ⁻⁴	2.0 10 ⁻⁴	5.9 10 ⁻⁵	7.3 10 ⁻⁴	4.5 10 ⁻⁴	2	5.9 10 ⁻⁵ - 7.3 10 ⁻⁴
4	Rupture or disconnection between ammonia ship and unloading arm 241-ME1	5.8 10 ⁻³	5.0 10 ⁻³	4.8 10 ⁻⁴	4.1 10 ⁻⁶	1.0 10 ⁻⁵	4.8 10 ⁻⁴	4	4.1 10 ⁻⁶ - 5.8 10 ⁻³
7	Rupture of 10" pipe 241P-089-P1283	4.0 10 ⁻⁴	2.0 10 ⁻⁸	3.9 10 ⁻⁸	7.0 10 ⁻⁵	1.7 10 ⁻⁴	-----	2	2.0 10 ⁻⁸ - 4.0 10 ⁻⁴
7*	Rupture of a ship tank	5.7 10 ⁻⁵	-----	2.3 10 ⁻⁷	2.3 10 ⁻⁶	4.9 10 ⁻⁶	2.3 10 ⁻⁷	-----	2.3 10 ⁻⁷ - 5.7 10 ⁻⁵
9	Rupture of cryogenic tank 241-S1	Contained leak: 1.0 10 ⁻⁶ Uncontain leak: 4.0 10 ⁻⁸	-----	5.0 10 ⁻⁷	5.0 10 ⁻⁸	5.0 10 ⁻⁷	1.0 10 ⁻⁸	4	1.0 10 ⁻⁸ - 1.0 10 ⁻⁶
10	Rupture of 20" pipe 241P-015-P1284	9.0 10 ⁻⁵	1.0 10 ⁻⁶	7.6 10 ⁻⁶	8.8 10 ⁻⁷	9.7 10 ⁻⁷	1.0 10 ⁻⁶	2	8.7 10 ⁻⁷ - 9.0 10 ⁻⁵
14	Rupture of one of the ten pressurised tanks	2.5 10 ⁻⁶	5.0 10 ⁻⁷	1.6 10 ⁻⁶	1.3 10 ⁻⁵	2.0 10 ⁻⁶	5.0 10 ⁻⁷	3	5.0 10 ⁻⁷ - 1.3 10 ⁻⁵
15	Rupture of 4" pipe on the distribution line of tank 241-V1	2.3 10 ⁻⁴	2.0 10 ⁻⁵	6.0 10 ⁻⁵	1.1 10 ⁻⁵	4.9 10 ⁻⁷	3.4 10 ⁻⁸	2	3.4 10 ⁻⁸ - 2.3 10 ⁻⁴
17	Rupture or disconnection between ammonia truck and unloading arm	3.7 10 ⁻³	6.0 10 ⁻⁵	4.7 10 ⁻⁶	6.8 10 ⁻⁵	1.0 10 ⁻⁶	1.5 10 ⁻⁷	1	1.5 10 ⁻⁷ - 3.7 10 ⁻³
18	Catastrophic rupture of a truck tank	2.3 10 ⁻⁷	1.2 10 ⁻⁷	1.1 10 ⁻⁸	7.4 10 ⁻⁹	2.7 10 ⁻⁸	1.5 10 ⁻⁹	1-2	1.5 10 ⁻⁹ - 2.3 10 ⁻⁷

- Grey tanned cells contain the lower assessments. Black tanned cells contain the upper assessments

ASSURANCE PROJECT – May 2002

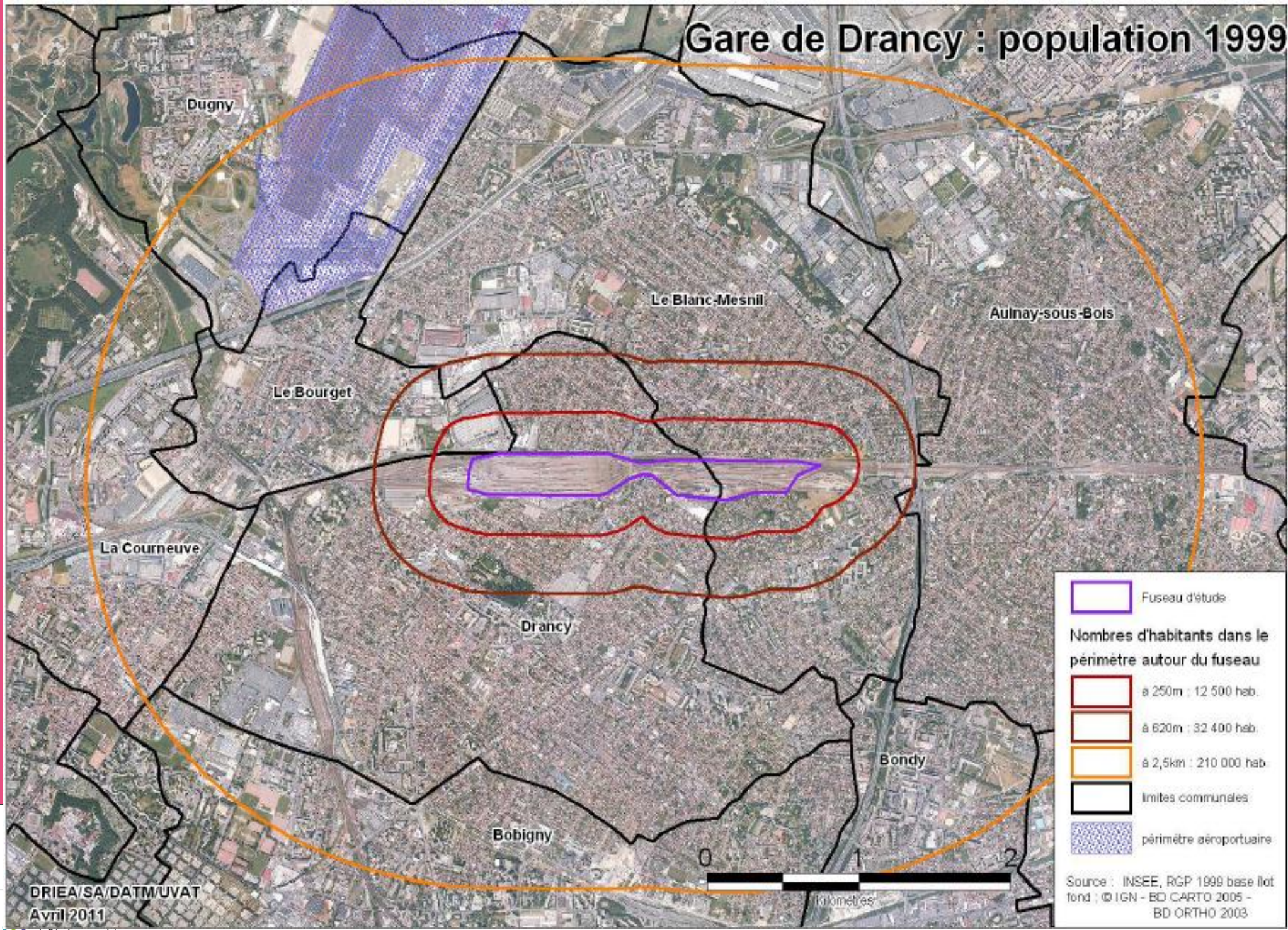
Discrepancy in societal risk calculations (based on fictitious population data)



APPLICATION TO MARSHALLING YARDS IN FRANCE HAS CREATED MAJOR ACCEPTANCE ISSUES

- A first calculation showed extended perimeter of lethal effects with not so low probabilities
- Improved calculation allowed to reduce these perimeters
- But where is the truth?

Gare de Drancy : population 1999



Fuseau d'étude

Nombres d'habitants dans le périmètre autour du fuseau

- à 250m : 12 500 hab.
- à 620m : 32 400 hab.
- à 2,5km : 210 000 hab.

limites communales

périmètre aéroportuaire

Source : INSEE, RGP 1999 base Ilot fond : © IGN - BD CARTO 2005 - BD ORTHO 2003

DRIEA/SA/DATM/UVAT
Avril 2011

du Développement durable et de l'énergie

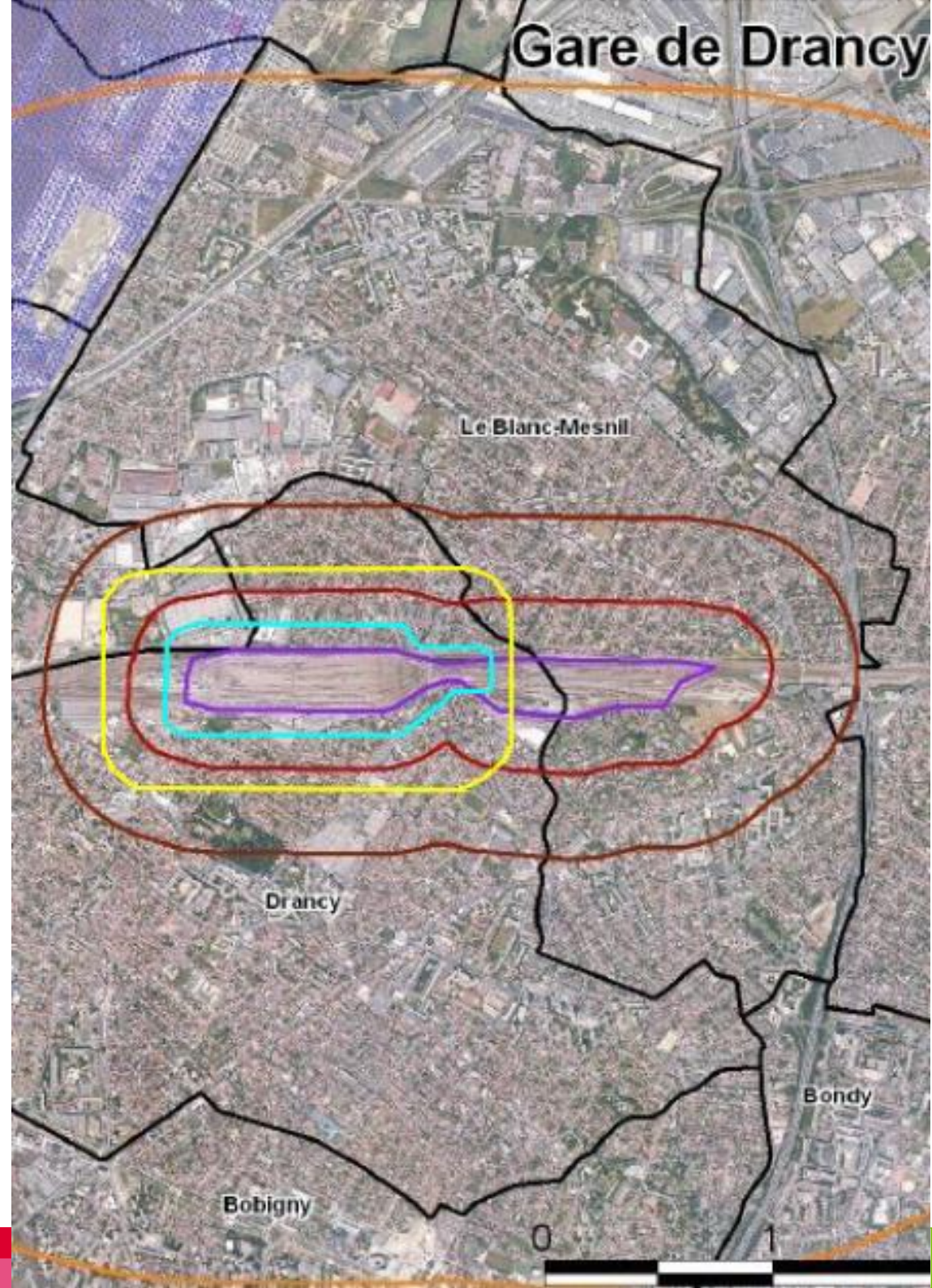
New building restrictions

Yellow Prob. (between 10-5 and 10-6)

Limitation on building open to public only

Blue Prob. Under 10-5

No new buildings except limited extensions



OTHER ISSUES

- 1) Harmonized and non biased representative accident database. Ideally it should contain data about accidents with DG consequence as well as events considered as precursors
- 2) Traffic data coherent with the accident data
- 3) A harmonized way to calculate accident frequencies and probabilities
- 4) A harmonized way to calculate effects of accidents (agree on adequate models)
- 5) A harmonized way of defining risk acceptance
- 6) Harmonize “local” and “global” acceptance

Points 1 to 4 are of a technical nature

Point 5 and 6 are more political

ROADMAP 2014-2017

<http://www.unece.org/fileadmin/DAM/trans/doc/2014/dgwp15ac1/ECE-TRANS-WP15-AC1-2014-GE-INF16e.pdf>

- 1) 11 Workshops hosted by EA from 2014 to 2017 to provide proposals to different expert committees in order to:
 - harmonize the approach to data used in risk evaluation and assessment,
 - harmonize the practices, models and tools used for risk evaluations,
 - harmonize the risk management processes, decision methods and criteria.
- 2) An experiment is launched to establish an international database for TDG accidents hosted by UNECE
- 3) The Joint meeting is considering improving the accident reporting under 1.8.5. to allow better use for risk assessment (a specific WG may be created at the next session to produce proposals)

**THANK YOU FOR YOUR
ATTENTION**



Ministère
de l'Écologie,
du Développement
durable
et de l'Énergie