

Wastewater analysis with High resolution accurate mass spectrometry generated forensic information:

amphetamine synthesis waste and its impact on a small sewage treatment plant

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BenzylMethylKetone (BMK) needed (Leuckart) (Pre)-precursors

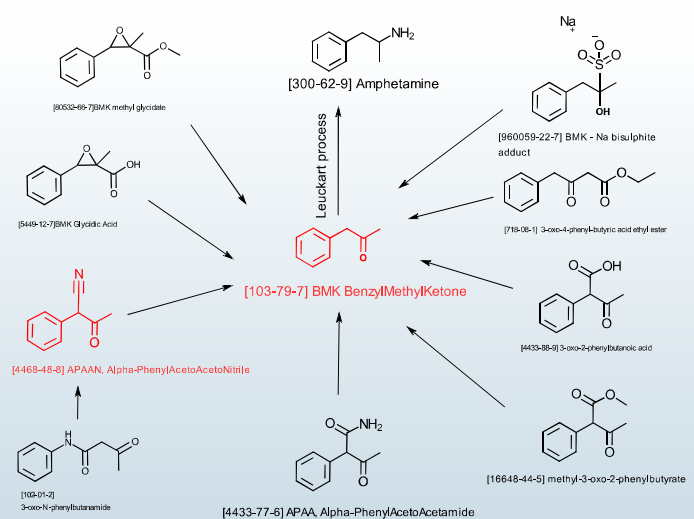
European Union drug precursor chemical regulation

- BMK since 2004
- APAAN amended end of 2013

Still a lot of creativity to circumvent the rules

Every step creates specific by-products and waste

20-30 kg per 1 kg amphetamine



Incidents at the WWTP Baarle-Nassau i.e. 15.000 I.E.

7 April 2016

Influent sample to KWR
Drugs analysis en non-target screening
(Orbitrap classic)



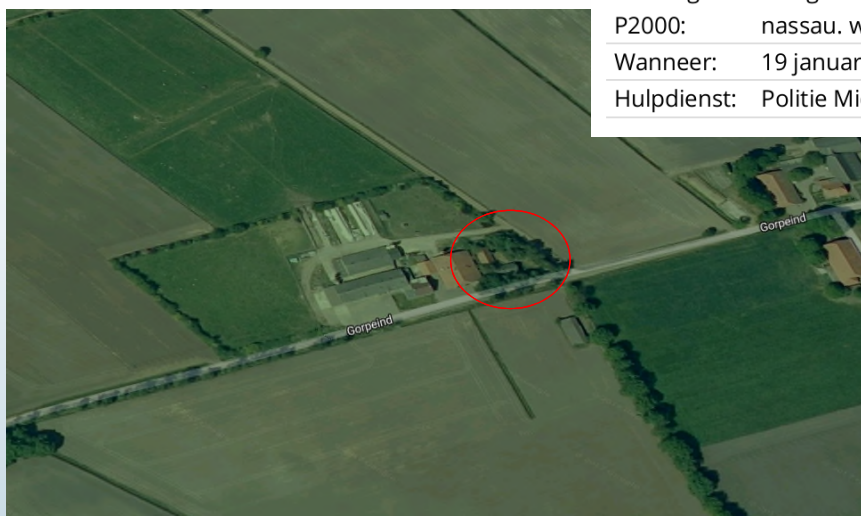
18 January 2017



Sample to KWR
Drugs analysis en non-target screening
(direct injection → Orbitrap-Fusion)



Production location



112-melding in Baarle-Nassau

Melding in P2000: 'Drugslab aangetroffen gorpeind baarle-nassau. woordvoerder t.p.'

Wanneer: 19 januari 2017 om 13:41

Hulpdienst: Politie Midden- en West-Brabant

Baarle-Nassau

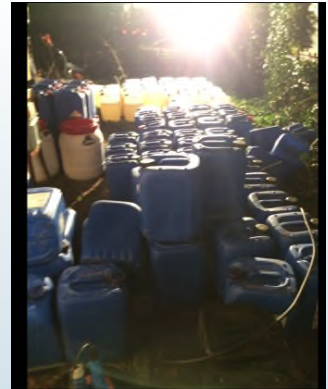
10.500 litres of waste and solid waste, possibly (pre-)precursors ?



Politie Breda en (Politie, Breda - Jan 19)
Baarle-Nassau: 10.500 liter afval en vast afval, mogelijk (pre-)precursoren



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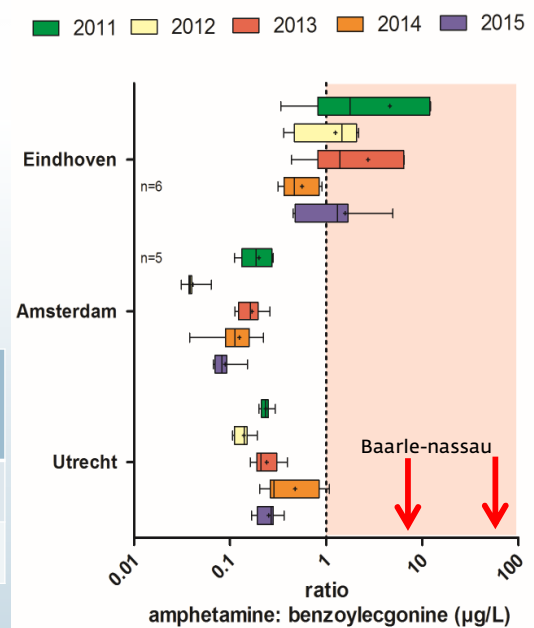
Politie Breda en (Politie, Breda - Jan 19)
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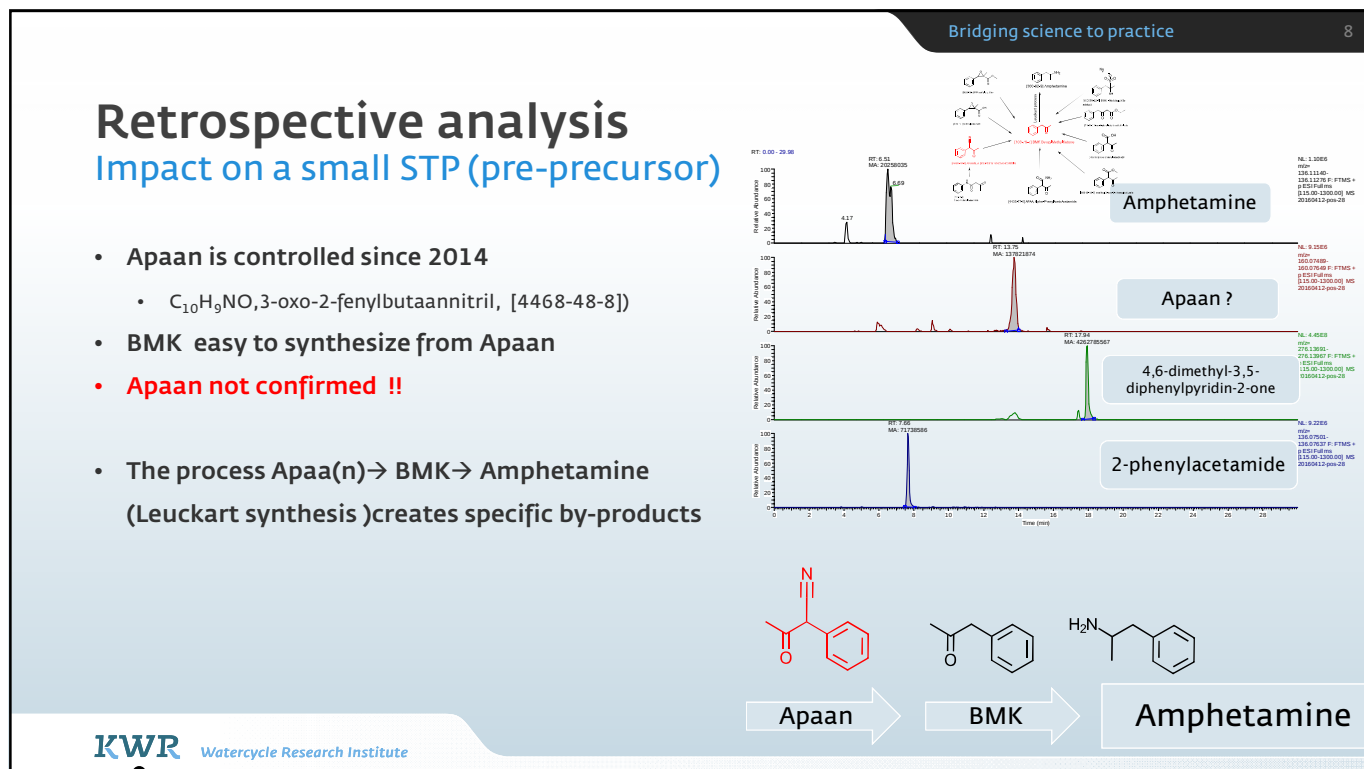
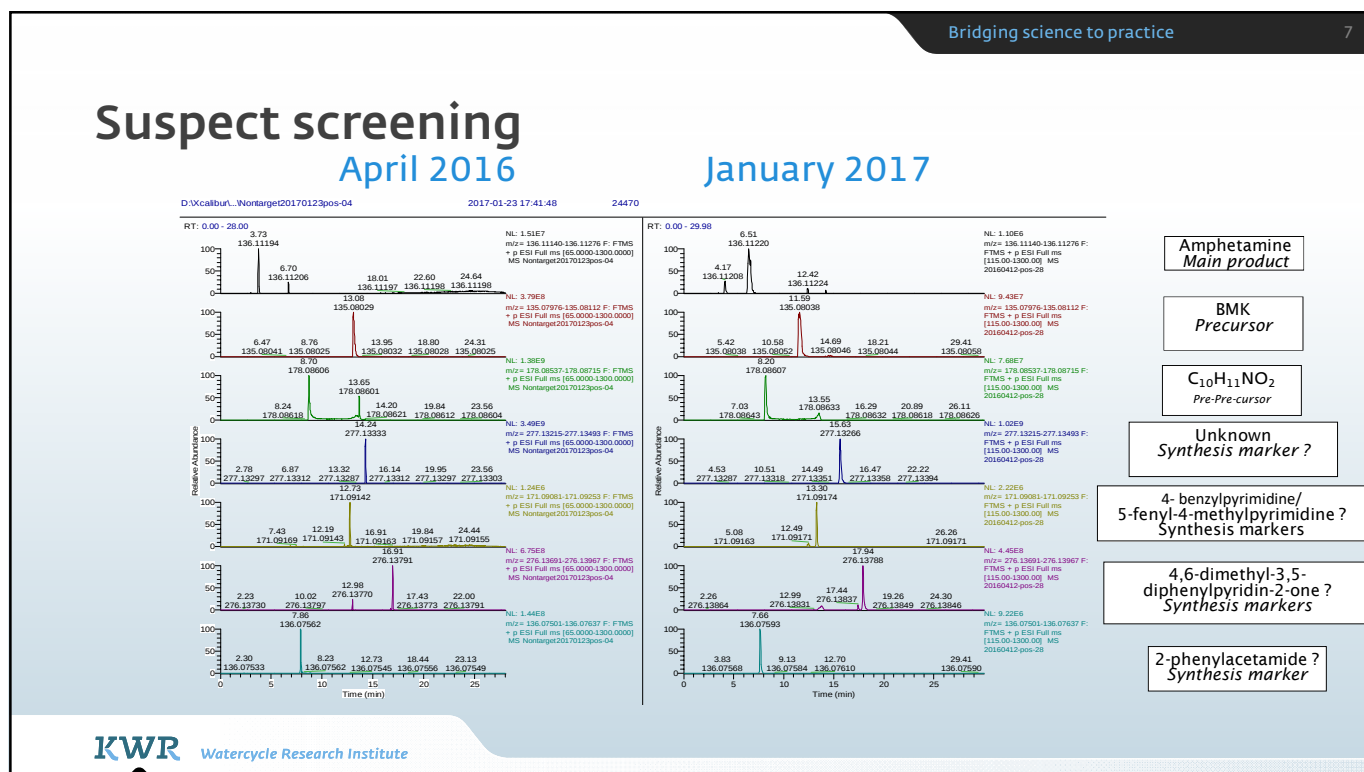
Analysis

Impact on a small STP

- Levels of amphetamine are very high 18µg/l
- Normally Amphetamine vs Benzoyllecgonine (metab. Cocaine) ratio Less than 1 (typical 0.2-1)

Sampling Baarle-Nassau	Amphetamine vs Benzoyllecgonine ratio
April 2016	9
January 2017	80





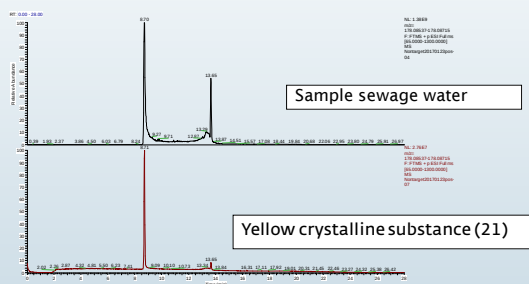
Solid waste

Three different containers

Yellow crystalline substance

Retention time confirmed and fragmentation spectra

Same profile



Appearance in samples



APAA RIC

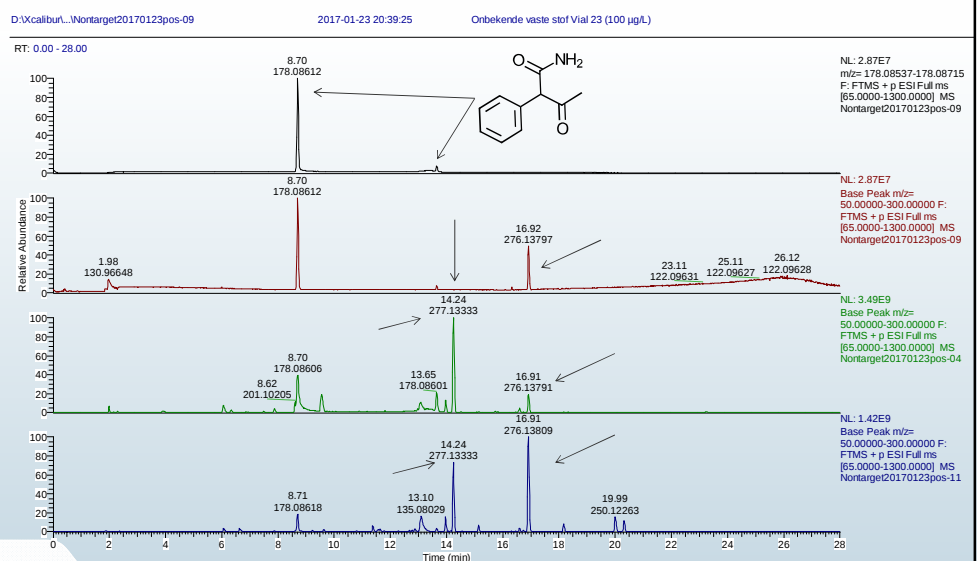


STD Full scan



Sewage water FS

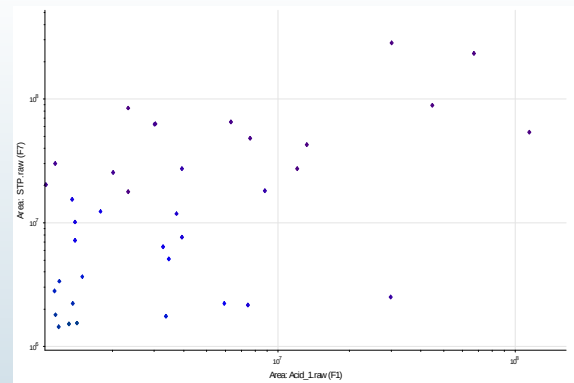
Acid waste full scan (100 v/v)



Baarle-Nassau

Conclusions

- Sewage water was contaminated with waste originating from an amphetamine synthesis
- The pre-precursor APAA was used in this process
- Highly likely that the dump was done at the location in Baarle-Nassau
- By chemical non-target profile analysis of waste water and chemical waste illegal manufacturing site can be tracked.
- WBE can be used for forensic purposes



> 50 compounds with high abundance share abundancies in acid waste at the manufacturing location and sewage water at the time of malfunctioning of the WWTP