

PFAS – PRESENCE IN GROUNDWATER AND SOILS

Management Experiences in
Hamburg, Germany

Ministry of Environment, Climate, Energy
and Agriculture (BUKEA)

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AGENDA

- 01 Ministry of Environment, Climate, Energy and Agriculture (BUKEA)
- 02 A Difficult Start!
- 03 PFAS Processing in Hamburg – Priorities and Projects
- 04 Electroplating Plants and the Sites of Large Fires
- 05 What Comes Next? A To-Do-List

MINISTRY OF
ENVIRONMENT, CLIMATE,
ENERGY AND
AGRICULTURE (BUKEA)



Hamburg

BUKEA – MINISTRY AND ENFORCEMENT AUTHORITY

Funktion and Tasks of BUKEA in the Free and Hanseatic City of Hamburg (FHH)

Hamburg has

- The special status of a German city state (the same as Berlin and Bremen)!
- The same duties and tasks as big German states (e.g. Bavaria, Lower Saxony or North Rhine Westfalia).

The Ministry of Environment, Climate, Energy and Agriculture (BUKEA) is

- A Ministry and Enforcement Authority,
- Participating in making laws and executing them

Legal Basis for the Management of Contaminated Sites in Germany

- Federal Soil Protection Act (BBodSchG)
- Federal Soil Protection and Contaminated Sites Ordinance (BBodSchV)

DEPARTMENT FOR SOIL PROTECTION AND CONTAMINATED SITES

Facts and Figures

- Highest soil protection authority in Hamburg
- Four units with about 70 highly educated employees

Professional responsibility

- Preventive soil protection
- Post-cautionary soil and groundwater protection
- Remediation of contaminated sites owned by the City of Hamburg

Perspective of this presentation

- The focus of this speech is PFAS-contamination in the City of Hamburg, from the view of the Administration

CONTAMINATED SITES IN HAMBURG (STATISTICS)

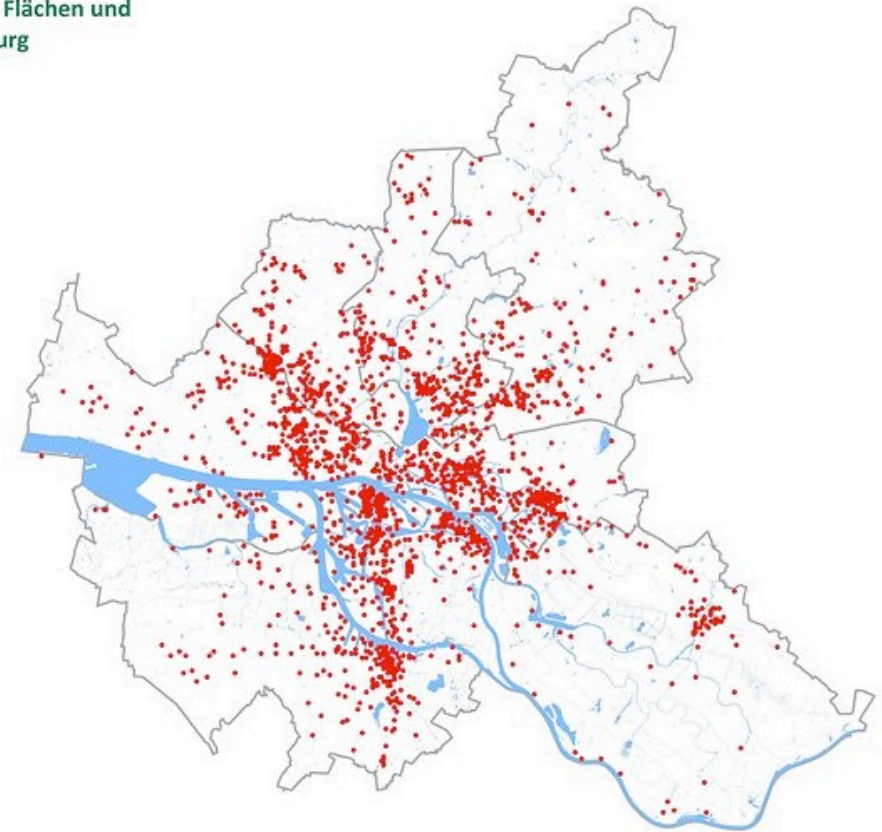
Contaminated sites were first recorded in 1979 in Hamburg.

Status of processing: 01.10.2022

- **Areas suspected of being contaminated: 1,542**
- **Contaminated sites: 575**
 - Under investigation: 56
 - In remediation: 65
- **Remediation completed: 708**

Altlastverdächtige Flächen und
Altlasten in Hamburg

Stand: 2021



Behörde für Umwelt, Klima, Energie und Agrarwirtschaft

1:210,000
0 2,5 5 10 15 Kilometer

A DIFFICULT START!

02



Hamburg

EXTINGUISHING FOAMS IN REMEDIATION

A foam that extinguishes toxicants (1996)

[Senator] Vahrenholt presents a new procedure for the remediation of contaminated sites.

The Procedure is innovative, environmentally-conscious and cheap.



Hamburger Abendblatt, 1996

Ein Schaum, der Gifte „löscht“



FIRST STEPS (2012-2014)

Starting in 2012

- Increased discussion and questions at meetings and congresses:
=> How is Hamburg dealing with PFAS?
- Until then, no analytical results were known and no experiences were made with the examination of PFAS

2013

- First examinations of the fire-fighting area of a company fire brigade (refinery)
- Evaluation of existing literature on PFAS
- Initial strategy for processing PFAS
=> concept for identification and registration of relevant sites and first official investigations of polluters

Summe PFT: 71 µg/l

	H5/1	A5/1
	k.A.	562347 *)
	k.A.	5926069 *)
[m u. GOK]	k.A.	k.A.
[m u. GOK]	k.A.	k.A.
	07.10.2013	07.10.2013
PFBA	< 0,2	4,6
PFPeA	< 0,2	25
PFHxA	< 0,2	16
PFHpA	< 0,2	2,9
PFOA	< 0,2	0,72
PFNA	< 0,2	0,17
PFDA	< 0,2	0,041
PFUnDA	< 0,2	< 0,01
PFDoDA	< 0,2	< 0,01
PFBS	< 0,2	0,24
PFHxS	< 0,2	0,46
PFOS	< 0,2	2,2
PFDS	< 0,2	< 0,01
PFOSA	< 0,2	0,61
6:2-FTS	< 0,2	18

PFAS PROCESSING IN HAMBURG – PRIORITIES AND PROJECTS



Hamburg

PRIORITIES AND PROJECTS

Focus on areas, where extinguishing foams had been used

- Companies with their own fire brigades
(5 known sites in Hamburg: refineries and airfields)
- Sites of large fires
- Fire stations and state fire brigade schools

Phases of investigation on refinery sites

- Research on instances of damage
- Analysis of groundwater in known contamination hotspots
- Expansion of investigation when necessary
- Checking extinguishing agent lines for leaks
- Feasibility studies and remediation preparations

EXAMPLE REFINERY 1

Intense research of a company fire brigade, together with a supervisor

=> 15 areas of suspicion!

- Fire extinguishing training areas
- Sites of fires
- Extinguishing foam tanks
- Storage spaces for fire-fighting foams
- Leaks in the pipe system

EXAMPLE REFINERY 2

Remediation Concept

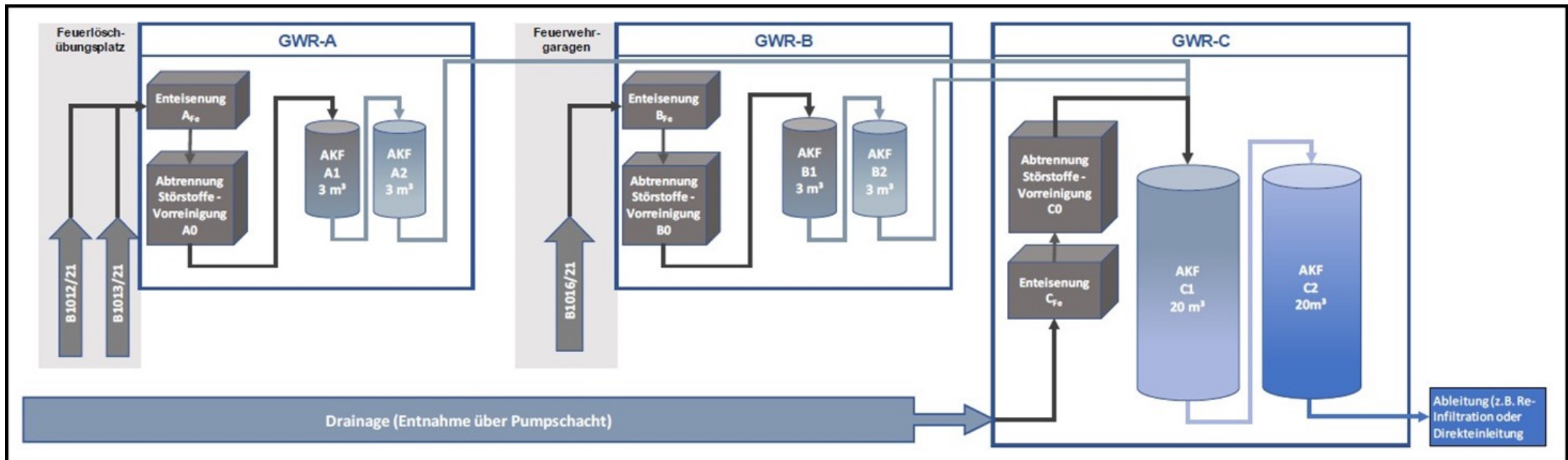
Feasibility study and remediation preparation

3 hotspots:

- Fire fighting training area (pink)
- Garage of fire engines (yellow)
- Drainage of backwater/surface water (green)

FLOW SCHEME OF THE PLANNED PURIFIER

(example refinery 2)



Quelle: TAUW: Entwurf Sanierungsplan

OFFICIAL INVESTIGATION PROJECTS

Activities of the Department for Soil Protection and Contaminated Sites

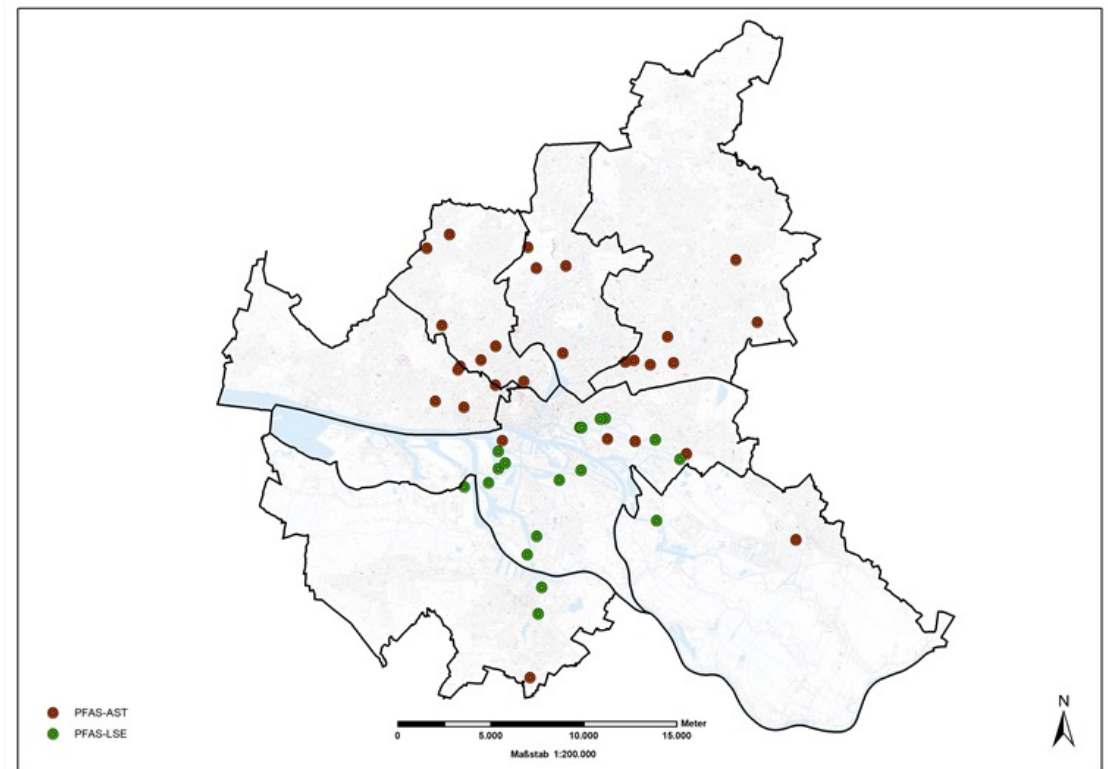
- Research on sites of the latest large fires
- Contact with state fire brigade schools
- Research on electroplating facilities and the development of a strategy
- Research on old landfills (from the 1960s on)
- Sampling campaign of existing groundwater wells
- Focus on analytical methods (e.g. TOP-Assay and Capstones)
- Extension of the register of contaminated sites

REGISTER OF CONTAMINATED SITES (STATISTICS)

In total, 46 sites with PFAS-contamination have been detected so far

**Extention of the register
by 2 additional categories:**

- PFAS-contaminated industrial sites (AST)
28 sites
- PFAS-fire extinguishing agent sites (LSE)
18 sites



ELECTROPLATING PLANTS AND THE SITES OF LARGE FIRES



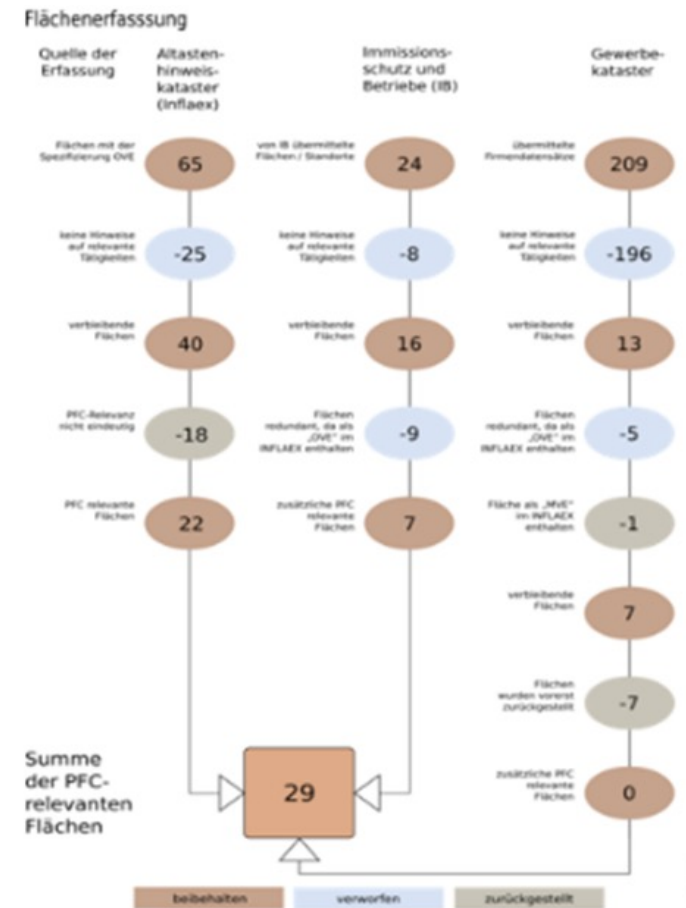
Hamburg

IDENTIFICATION OF RELEVANT SITES – ELECTROPLATING PLANTS

Statistical and technical evaluation of three cadastres as part of a bachelor's thesis

- Register of contaminated sites: **65 Areas**
- Immission Control (BlmSch): **24 Areas**
- Register of industrial companies: **209 Areas**

Number of significant sites
as possible PFAS polluters: **29 Areas**



Quelle: Bachelorarbeit Christian Weiß

IDENTIFICATION OF RELEVANT SITES – THE SITES OF LARGE FIRES

2014

- **The Fire Department addresses 9 major fire-fighting actions (1981 – 2012)**

2019

- **New request to the Fire Department for more information – without success**

2020

- **Research of the newspaper archives for major fire-fighting actions (following the example of the German state, Baden Wurttemberg)**
- **It was possible to identify around 130 sites that need to be examined**
- **New attempt to balance/coordinate the results with the Fire Department: without success: it is not possible discuss fires that took place before 2010!**

WHAT COMES NEXT? A TO-DO-LIST



Hamburg

INTERDISCIPLINARY EXCHANGE WITHIN BUKEA

Interdisciplinary Group of different departments:

- **Soil Protection and Contaminated Sites**
- **Immission Control**
- **Waste Management**
- **Water Management (Ground and Surface Water)**
- **Wastewater Management**
- **Hygenic Institute (Laboratory)**

The group meets regularly every three months

Benefit:

=> A holistic view and evaluation/judgement of these often complex situations!

WHAT COMES NEXT? TO-DO-LIST

- **More official orientating examinations on PFAS in groundwater**
- **Systematic research at fire stations and the state fire brigade school**
- **Initiate conversations and educational work with companies and state fire brigade**
- **Intensify investigation into old landfills**
- **Trace the current/recent developments in the analytics of PFAS**
- **Construction of an ArcGIS-Project for PFAS-contaminated sites**
- **Continuation of the interdisciplinary exchange within BUKEA**
- **Motivate new colleagues to join the group and intensify the investigation**
- **More local and international research / stay in contact, and keep informed**

USEFUL LINKS AND LITERATURE FROM GERMANY

- Guidelines for PFAS assessment (2022); BMUV;
https://www.bmuv.de/fileadmin/Daten_BMU/Download_PDF/Bodenschutz/pfas_leitfaden_2022_en_bf.pdf
- Leitfaden zur PFAS-Bewertung (2022); BMUV;
https://www.bmuv.de/fileadmin/Daten_BMU/Download_PDF/Bodenschutz/pfas_leitfaden_bf.pdf
- PFAS. Came to stay (2020); German Environment Agency;
https://www.umweltbundesamt.de/sites/default/files/medien/2546/publikationen/200922_uba_sp_1-2020_eng-web_0.pdf
- Ableitung von Geringfügigkeitsschwellenwerten (GFS) für das Grundwasser – Per- und polyfluorierte Chemikalien (2017); Bund/Länder-Arbeitsgemeinschaft Wasser (LAWA);
https://www.lawa.de/documents/03_anlage_3_bericht_gfs_fuer_pfc_endfassung_22_11_2017_2_1552302208.pdf
- Boden- und Grundwasserkontaminationen mit PFC (2015); LFP Projekt B 4.14;
https://www.hlnug.de/fileadmin/dokumente/altlasten/PFC/LABO-B-4-14-PFC_Handbuch.pdf
- LANUV-Fachbericht 34: Verbreitung von PFT in der Umwelt (2011); www.lanuv.nrw.de;
https://www.lanuv.nrw.de/fileadmin/lanuvpubl/3_fachberichte/30034.pdf



THANK YOU FOR YOUR ATTENTION!

THANKS TO IRMGARD VON KALBEN!

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