PFAS: SLIPPERY SLOPE OR MANAGEABLE RISK FOR PROPERTY TRANSACTIONS AND REDEVELOPMENT?

OCTOBER 4, 2018
PFAS-IMPACTED SITES AND DETECTIONS

- USEPA drinking water study
- Six PFAS
- Elevated reporting levels

(Experimental and Investigative Group, 2018)
Widespread
Multiple sources
Omitted from prior due diligence and site investigations
Insurance exclusions
Limitations of remedial technologies
Significant regulatory uncertainty, regulatory re-opener
Rapidly increasing litigation
Resultant uncertainty in how to assess and manage risk
Added complexity and cost
Just the beginning - GenX
OUTLINE

- Introduction (Ed)
- Regulatory Landscape (Ginny)
- Insurance Perspective (Trisha)
- Tools to evaluate & address PFAS risks (Ed)
- Q & A
PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

- A class of man-made chemicals
- Chains of carbon and fluorine atoms
- Thousands of unique compounds
- Chemical stability
- Thermal stability
- Water, stain, and grease repellant

(USEPA, 2018)
USES AND ISSUES

- In use since 1940s
- Primary & Secondary Manufacturing
- Industrial Processes
- Consumer Products:
  - Grease-resistant paper
  - Fast food containers/wrappers (microwave popcorn bags, pizza boxes, candy wrappers)
  - Nonstick cookware
  - Stain resistant coatings used on carpets, upholstery, and other fabrics
  - Water resistant clothing
  - Cleaning products
  - Personal care products (shampoo, dental floss) and cosmetics (nail polish, eye makeup)
  - Paints, varnishes, and sealants
- Class B Firefighting foams

- Issues
  - Toxicity and bioaccumulation
  - Persistence and mobility
  - Not removed by conventional drinking water or wastewater treatment plants
PFAS SOURCES/PATHWAYS

Primary and Secondary Manufacturing
Industrial processes

Consumer products use/disposal
Landfills

Wastewater plants

Direct use in the environment

Groundwater

Surface Water

Air

Soil

(Adapted from USEPA, 2018)
PFAS SOURCES/PATHWAYS
AQUEOUS FILM-FORMING FOAM (AFFF) & INDUSTRIAL

(ITRC, 2017)
PFAS SOURCES/PATHWAYS
LANDFILLS & WASTEWATER TREATMENT PLANTS

(ITRC, 2017)
PFAS-containing AFFF used many times since ~1980
NY DEPARTMENT OF ENVIRONMENTAL CONSERVATION INVESTIGATES PFAS SOURCE

- NYDEC finds PFOS in
  - surface water up to **11,800 parts per trillion (ppt)**
  - airport soil up to **1,840,000 ppt**
  - groundwater up to **3,160 ppt**

- City of Newburgh files lawsuit against 23 defendants: Airport/Base owners, Airport/Base operators, and AFFF manufacturers, citing RCRA, CWA, CERCLA…

- Residents file lawsuit against City of Newburgh for personal injury and property damage
How to manage risk associated with redeveloping either (1) a potential PFAS source site or (2) a potentially impacted site?

Let’s consider the regulatory landscape and insurance perspectives, and then specific tools for identifying, assessing, and managing risk associated with PFAS.

(Cape May County Herald, 2018)
State and Federal Approaches to PFAS

Center for Creative Land Recycling
Webinar
October 4, 2018

Ginny Yingling | Hydrogeologist – Minnesota Dept. of Health
### “What’s So Special About PFAS?”

Table modified from Ducatman, 2018

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<th></th>
<th>PFAAs</th>
<th>Dioxins &amp; PCBs</th>
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<td><strong>Drinking water is major exposure route</strong></td>
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* True for PFAAs with 8 or more fluorinated carbons (PFOS, PFNA, and longer-chain)

- Complicates our understanding of bioaccumulation and toxicity
- ppt in water
- ppb in serum
UCMR3 – Inviting everybody to the PFAS party

• 2013-2015 list included 6 PFAAs (PFOS, PFOA, PFNA, PFHxS, PFHpA, PFBS)

• Municipal systems >10,000 and selected smaller systems

• Detected in ~4%, exceeded EPA LHAs in ~1.3%

• High RLs and sampled only at entry points, not wellheads

Did NOT test for PFBA or PFPeA
Source: ITRC (2017); image reprinted with permission of Jeff Hale, Kleinfelder.
Target analyte lists still evolving

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Federal PFAS Standards and Guidance

• Drinking Water:
  • No federal standards
  • Lifetime Health Advisories for PFOS and PFOA
  • Regional Screening Levels (RSLs)

• Soil:
  • Human health RSLs
  • Groundwater protection RSLs

• Analytical methods:
  • Method 537: 14 PFAS (mostly PFAAs)
  • Currently validating new method: 24 PFAS
    • adding shorter-chain PFCAs, longer-chain PFSAs, and FtS

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States are setting their own water and soil standards or guidance:

- Most have adopted EPA LHAs; some have set lower values (MN, NJ, VT)
- Driven by the PFAAs being found… and the target analyte list
- Handling mixtures differently
  - Ex: Minnesota has a TEQ-like process for PFOA, PFOS, PFBA, PFBS, and PFHxS.
- North Carolina has a non-promulgated value for GenX in drinking water

Other PFAS regulatory approaches:

- Product labeling and consumer product laws (ex: CA, WA)
- Chemical action plans (ex: WA)
- Designation as hazardous waste or substance (ex: CO, NY, VT)
- Effluent and surface water standards (CA, MI, MN, OR)
- Risk-based soil and groundwater cleanup values (TX)
# Groundwater / Drinking Water / Surface Water Values

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<th>Standard / Guideline</th>
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Table modified from ITRC (Sept 2018) Table 4-1: https://pfas-1.itrcweb.org/factsheets/
# Soil Guidance Values

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<th>Human Health Soil Screening Level (mg/kg)</th>
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Table modified from ITRC (Sept 2018) Table 4-2: https://pfas-1.itrcweb.org/factsheets/
Why are some states setting different / lower values?

• Longer chain PFAAs are highly bioaccumulative
  • Parts per trillion in drinking water = parts per billion in blood serum
  • Ongoing exposures = lifetime steady state concentrations

• Relative source contribution (RSC) > default 20%
  • MN RSC = 50%, based on recent biomonitoring data of drinking water exposed pops.

• Variable, age-based intake rates (IR) – much higher for infants

• Biological activity at very low exposures = lower “allowed” serum levels

• Significant potential exposure for babies born to exposed mothers
  • Placental transfer: PFOA ~60-200% of drinking water concentrations
  • Breastmilk: PFOA ~2.6-12% of maternal serum concentrations
Regulatory uncertainty

- Sources and new PFAS still being identified

- Cleanup goals:
  - Little or no information about fate & transport of many PFAS
  - Uncertainty regarding toxicity for most PFAS – but high concern
  - Objective – protect groundwater, surface water, fish, …???

- Precursors:
  - Little or no information about transformation products and rates

- Analytical methods and remedial technologies still emerging, many unproven

CONSERVATIVE RESPONSES
Trying to Bring Order from Chaos

• EPA PFAS Summit
  • Initiate steps to evaluate need for maximum contaminant levels (MCLs) for PFOS & PFOA
  • Initiating process to propose “hazardous substance” designation for PFOS & PFOA
  • Developing groundwater cleanup recommendations for contaminated sites (Fall 2018)
  • Developing toxicity values for GenX and PFBS

• Department of Defense: SERDP/ESTCP
  • >$40M AFFF-related research projects: eco-risk, analytical & sampling methods, CSMs, remediation, F-free foams, etc.
  • www.serdp-estcp.org/Featured-Initiatives/Per-and-Polyfluoroalkyl-Substances-PFASs)

• Interstate Technology & Regulatory Council (ERIS/ECOS)
  • Cross-sector PFAS information sharing, documents, and training (https://pfas-1.itrcweb.org/)
  • Monitoring development of new state & federal values and remedial technologies
On The Horizon?

• Expanded analyte lists and use of TOP, QTOF, and PIGE → find more PFAS… then what?

• EPA plans to evaluate PFAS “as a group”
  • High through-put bioassay?
  • No details yet on list of PFAS – rumors of 70+
  • Will we end up with a TEQ-like process?

• In the meantime:
  • Do we expand our analyte lists to include even more PFAS for which we have no toxicity data or guidance values? → How do we communicate risk?
  • How do we establish cleanup goals without human and ecological tox data?
  • If we don’t, how much are we missing that we’ll have to go back and re-test?
Aon Environmental Services Group

Trisha Blau
Managing Director
415-486-6936
trisha.blau@aon.com
Discussion Agenda

Overview of Primary Environmental Insurance Products
Transactional and Redevelopment Risk Options
PFAS Environmental Insurance Underwriting
Environmental Insurance Products

Primary Products

- Pollution/Site Legal Liability (Site Owner / Seller/Buyer) – Most common product used for transactional and redevelopment risk.

- Combined General Liability and Pollution including Products (Site / Company Owner) - Products pollution liability often on an occurrence basis (vs. claims-made).

- Contractor's Pollution Liability (Contractor / Project Owner) – May also be used with a site liability policy to provide construction pollution risk protection
Environmental “Transactional Risk” Contrasted

- **“Transactional Risk”** – Environmental risks associated with “deals”.
  - Arise out of pre-existing conditions in soil and groundwater unrelated to current or planned operations of the purchaser
  - Typically involve allocations of risks for environmental conditions between the parties
  - Cannot be addressed by risk control or management
  - Environmental matters may not be addressed by Reps & Warranties Insurance

- **“Passive Risk”** – Environmental risks that are present in all activities regardless of operations or activities of an organization
  - Example: Smog in LA, Water Pollution in Mississippi River, Climate Change, etc.

- **“Operational Risk”** – Environmental risks associated with operations and activities of an organization that could result in an environmental release
  - Factors to Consider:
    - Third-party claims alleging bodily injury or property damage
    - Requirement for cleanup of buildings, soil and groundwater to meet requirements of environmental laws
    - Regulatory orders regarding operations
    - Fines and penalties for violations of environmental laws
    - Legacy product liability
The strategic use of Environmental Insurance can help buyers and sellers reach their goals.
Redevelopment Environmental Coverage – Pollution Legal Liability

Onsite cleanup costs, bodily injury and property damage on, under or migrating from

Offsite Cleanup costs, bodily injury and property damage

Transportation and Offsite Disposal Liability

Unknown and Pre-existing Pollution Conditions

Policy Inception

Timeline of Coverage

New Pollution Conditions
Site Pollution Liability as a Redevelopment Tool

- Site Pollution Liability
  - Purchased for a specific covered location or locations
  - Operational exposure or redevelopment
  - Multi-Year Terms
  - Underwrite to exposure – no standard policy form PFAS exclusion
    - Consult with counsel regarding specific PFAS due diligence for higher risk transactions
      - Identify current or former uses that likely involved PFAS such as major fires, known regional concerns, proximity to military bases or known PFAS manufacturing facilities
      - Limited product review, including review of MSDS
      - If PFAS was used in the manufacturing process, identify the disposal practices (landfill, impoundments, etc.)
      - May require soil/groundwater sampling via a Phase II
Are you redeveloping one of these?

- You may choose to address PFAS in your due diligence if you are redeveloping any of the following:
  - Industrial facilities that manufactured PFAS or used PFAS in their production chain
  - Industrial facilities that have older wastewater impoundments or landfills
  - Airports, Ports and other locations that use/used foam for fire fighting
  - Former Department of Defense sites
  - Municipal or industrial landfills
  - Sites in areas with PFAS “regional issues”

**NOTE:** There is no ASTM requirement to include PFAS as part of a Phase I. Be sure to consult with your legal counsel, environmental consultant and insurance professional to determine if PFAS due diligence is recommended.
Underwriting Pollution Insurance – What is required?

- Site Pollution Liability Coverage
  - Schedule of locations with occupancy information
  - Description of operations/hazardous materials
  - Environmental management protocols
  - Any available environmental reports, Phase I/Phase II or equivalent
  - Claims/litigation history
  - Draft copy of PSA, including any indemnities, if available

- What happens if PFAS is suspected or known?
  - For some insurers, any detection is a deal killer. Full exclusion for PFAS.
  - Other insurers will underwrite based on the current local regulatory environment and accepted local thresholds and health advisories – some coverage available.
  - Is there a responsible party already on the hook? Underwriters can craft coverage around agreements/indemnities in place.
  - Historical insurance archeology – Commercial general liability insurance without a pollution exclusion (pre-1985) may be a viable solution for industrial targets/responsible parties
Environmental Insurance Market – PFAS Summary

- No standard policy form PFAS exclusion for site pollution policies for redevelopment. Insurers will underwrite to the risk.

- Restrictions on products pollution liability for combined general liability/pollution policies. Products pollution liability may be excluded for certain classes of industry or moved to a claims-made versus occurrence trigger.

- PFAS restrictions or exclusions at environmental insurance renewal for some operations—airports, landfills, public entities, certain manufacturing operations

- Potential for general liability policies to exclude PFAS similar to asbestos and silica exclusion. Is PFAS the new asbestos?
TOOLS TO EVALUATE AND ADDRESS RISKS

- Consult with counsel
- Deal structure
- Incorporate PFAS into due diligence
  - Phase I Environmental Site Assessment
  - Phase II Sampling
- Evaluate potential for liability protection (federal/state)
- Assess regulatory landscape and direction
- Availability of insurance
  - New and Historical insurance archeology
- Remediation
- Consider risk tolerance
DEAL STRUCTURE

- Advice from counsel
- Seller indemnity, lower risk to buyer
  - Future discovery could still be an issue post-development
- As-is sale
  - Evaluate historical uses
  - Consider whether or not it is better to know up front
  - Risk of putting your head in the sand
INTEGRATE PFAS INTO DUE DILIGENCE

- Assess site history
  - Potential to be a source site
  - Potential to be impacted by PFAS released elsewhere
- Prior Phase I’s typically don’t cover PFAS
- PFAS contamination not included in government databases
### SITES WITH RISK OF PFAS RELEASES

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<th>Risk Score</th>
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<td>Paper</td>
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<td>Fabricated metal</td>
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</table>

(Guelfo et al, 2018)
PHASE II SAMPLING

- Will seller allow testing?
- Which PFAS to test for?
  - Replacement chemicals? PFBS, GenX?
- Are there approved methods by state?
- Challenges with sampling
PFAS-SPECIFIC SAMPLE COLLECTION ISSUES

- PFAS are ubiquitous
  - Bailers, bladder pumps, and other equipment with Teflon
  - Laboratory equipment
  - Paper products, sticky notes, plastic clipboards, aluminum foil
  - Sunscreen, waterproof clothing

- PFAS can absorb to laboratory equipment

- Influence of these potential sources unclear at present

- Use extra care

(DoD Environmental Data Quality Workgroup, 2017)  
(NAVFAC, 2017)  
(Department of Environment Regulation, 2017)  
(USEPA, 2018)
EVALUATE POTENTIAL FOR LIABILITY PROTECTION (FEDERAL/STATE)

- To qualify for the statutory defenses to CERCLA liability, a Phase I must comply with EPA’s Final Rule for All Appropriate Inquiries
- ASTM E1527-13 standard satisfies the requirements
- PFAS currently not CERCLA hazardous, but USEPA evaluating inclusion of PFOS & PFOA
- PFAS considered a hazardous substance in some states
- State protections vary, comfort letter, covenant-not-to-sue,
  - e.g., California Land Reuse and Revitalization Act
- Third party claims
- Consult with counsel
ASSESS REGULATORY LANDSCAPE AND DIRECTION

- Will seller allow contact with regulatory agency?
- Anonymous inquiry to agency to understand local perspective
- Which PFAS are of concern?
- Applicable screening levels or remediation goals?
- Anticipated future regulatory actions?
- State and federal
AVAILABILITY OF INSURANCE

- Insurers are evaluating each individual site
- High likelihood of PFAS → sampling
- Potential PFAS exclusion if detected
- Regulatory re-openers—coverage uncertain
- Historical insurance archaeology
REMEDIATION

- Remediation goals?
  - State standards and guidance
  - State or Federal human health screening levels
  - Regulatory uncertainty
- Dig and haul practical approach for redevelopment
- Research and development of new technologies by academia, government, and industry ongoing
TOOLS TO EVALUATE AND ADDRESS RISKS

- Consult with counsel
- Deal structure
- Incorporate PFAS into due diligence
  - Phase I Environmental Site Assessment
  - Phase II Sampling
- Evaluate potential for liability protection (federal/state)
- Assess regulatory landscape and direction
- Availability of insurance
  - New and Historical insurance archeology
- Remediation
- Consider risk tolerance
1990s Dying cows spur Parkersburg, W. Virginia farmer to sue DuPont
2001 Drinking water class-action >60,000 consumers
2004 DuPont settlement requires water treatment and epidemiological study
2011 Epidemiological study concludes probable links to 6 diseases
2015 Chemours spun off from DuPont
2017 $670 million settlement of 3,550 claims
2018 USEPA asks Chemours to sample for GenX
Future regulations??

(Shapira & Zingales, 2017)
(Lerner, The Intercept, 2015, 2016)
(C8 Science Panel, 2011)
(Nair, Reuters, 2017)
(USEPA, 2018)
GENX IN RAINWATER AROUND CHEMOURS, NORTH CAROLINA

(North Carolina Department of Environmental Quality, 2018)
EXPOSURE

From: Oliaei, et al., 2013
AQUEOUS FILM-FORMING FOAM (AFFF)

(USEPA, 2018)
PFAS CHARACTERISTICS

**Mobility and Treatment**
- Very mobile in the environment
- Persistent and do not degrade
- Not removed by conventional treatment

**Bioaccumulative and Toxic**
- Aquatic toxicity and terrestrial ecotoxicity
- Endocrine disruption
- Immunotoxicity
- Neurotoxicity
- Developmental toxicity
- Cancer (testicular and kidney)
- Organ toxicity
RELEVANT FEDERAL LAWS

- Safe Drinking Water Act (SDWA)
  - USEPA Lifetime Health Advisory
  - Unregulated Contaminants – found nation-wide
  - NJ has an MCL – other states are also developing MCLs
  - USEPA considering developing MCL
  - USEPA health advisory is being treated as a MCL in California

- Toxic Substances Control Act (TSCA) - Addresses manufacturing and uses

- Future Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)?
### GROUNDWATER DATA FOR PFAS RELEASE SITES

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<th>PFAS Source</th>
<th>Upper [GW] Magnitude (ug/L)</th>
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<tr>
<td>Chemical manufacturing</td>
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<td>Landfills</td>
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<tr>
<td>Fabricated metal</td>
<td>Data gap</td>
<td>11</td>
</tr>
</tbody>
</table>

(Guelfo et al, 2018)
EXAMPLES OF PFAS-SPECIFIC SAMPLE COLLECTION PROTOCOL

- Equipment: free of Teflon and other fluoropolymers
- Sample bottles: provided by laboratory performing analysis
- Ultra-pure PFAS-free water: final rinsing of equipment
- No use of filters
- Collect equipment rinsate blanks

(DoD Environmental Data Quality Workgroup, 2017)
(NAVFAC, 2017)
(Department of Environment Regulation, 2017)
(USEPA, 2018)
REMEDIATION OF SOIL

- Soil remediation goals?
  - State standards and guidance
  - State or Federal human health screening levels (e.g., EPA RSLs at 1.3 ppm)
  - Calculated leaching from soil to groundwater (EPA RSLs at 0.17 – 0.38 ppb levels)
  - Site-specific partitioning measurements?
  - Regulatory uncertainty

- Dig and haul practical approach for redevelopment

- Research and development by academia, government, and industry ongoing
REMEDIATION OF GROUNDWATER

- Groundwater remediation goals?
  - State standards and guidance
  - State or Federal human health screening levels
  - Health advisory levels
  - Regulatory uncertainty

- Pump & treat

- In-situ containment technologies – contain and wait?

- Research and development by academia, government, and industry ongoing
PFOA & PFOS ARRIVED; MORE EMERGING