PROTECTING TEXAS HOMES AND WATER: POLICY BRIEF ON IMPACT OF HOUSEHOLD HAZARDOUS WASTE AND POLYCYCLIC AROMATIC HYDROCARBONS ON WATER QUALITY AND DERMATOLOGICAL HEALTH

Executive Summary

Every day, Texans unknowingly store and dispose of household products that pose silent dangers to their health and environment. From jugs of used motor oil to leftover paint cans and pesticides, the average Texas household generates over 20–30 pounds of hazardous waste annually ((Household Hazardous Waste (HHW) | US EPA, 2015)).

When improperly discarded waste is poured down drains, tossed in the trash, or dumped on the ground, these substances leach toxic chemicals into our waterways and soil. One family's convenience can become an entire community's poison.

In suburban Houston, for example, home dust samples in an environmental justice neighborhood revealed carcinogenic polycyclic aromatic hydrocarbons (PAHs) in 100% of houses tested, probably from nearby pollution (Sansom et al., 2018). Such findings have been found across Texas: hundreds of contaminated wells and water systems have been identified statewide, with hazardous chemicals like benzene, arsenic, and PAHs detected above health limits (Pskowski, 2024). Residents exposed to these pollutants face increased risks of cancers, organ damage, and serious skin disorders.

PAHs in particular, one of the common toxins shown in figures 1 and 2 oils, tar, and combustion, are known to cause dermatological damage and even skin cancer with chronic exposure (Leung et al., 2020).

To safeguard our water, I recommend the development of **A Texas Household Hazardous Waste Reduction Act.** This initiative would not only help in reducing harmful waste at its source but also promote community awareness and education on proper disposal methods. Additionally, it could encourage the use of eco-friendly products and provide incentives for households to minimize their hazardous waste, ultimately contributing to a cleaner and healthier environment for future generations.

Figure 1. NEDT Admin. (2024). Environmental and Health Risks From Hazardous Products - NEDT. NEDT. https://doi.org/1067683491/UdukCO68yqMZEKOdjv0D

Figure 2. Safely dispose of household hazardous waste this spring | MARC. (2024). Marc.org. https://www.marc.org/news/environment/safely-dispose-household-hazardous-waste-spring

Policy Crossroads

Figure 3: Forward Pathway. (2025, March 23). US Environmental Policy Crossroads: Historical Review, Future Prospects, and Stakeholder Dynamics - Forward Pathway. Forward Pathway. https://www.forwardpathway.us/us-environmental-policy-crossroads-historical-review-future-prospects-and-stakeholder-dynamics

Texas currently relies on scattered local drop-off events and minimal regulation, a patchwork approach unable to stem the rising tide of household hazardous waste (HHW) pollution.

Three policy approaches are considered:

- **A Texas PAH Monitoring & Public Reporting Program (Policy 1)**: To identify contamination and inform the public
- **A Texas Household Hazardous Waste Reduction Act (Policy 2):** To mandate proper HHW disposal and prevent contamination at the source
- **A Texas Residential Waste Disposal Incentive Program (Policy 3):** To encourage voluntary safe disposal through incentives.

After examining their objectives, implementation mechanisms, outcomes, and equity implications, **this policy brief concludes that a (Policy 2) legislative act provides the strongest protections for water quality and public health.** It will establish a statewide framework for reducing HHW pollution, enforced by environmental agencies with proper funding and public outreach, while incorporating monitoring (from Policy 1) and community incentives (from Policy 3).

As illustrated in Figure 3, if the current trajectory persists, we risk a future characterized solely by barren land. However, by enforcing **regulations** on the **safe disposal of household hazardous waste (HHW)** and investing in education and collection infrastructure, Texas can substantially reduce water pollution, **enhance dermatological health outcomes, and promote environmental justice.**

Background and Significance

Household hazardous waste refers to leftover or used products containing dangerous chemicals that can leach into the environment if not managed properly (Household Hazardous Waste: A Guide for Texans, n.d.). Common HHW items include corrosive cleaners, paints, pesticides, automotive fluids, batteries, and other toxic or flammable materials. When HHW is discarded improperly, for example, poured down drains or dumped on the ground, those chemicals can contaminate soil and water. In Texas, this is a pressing concern due to the fast-growing population and limited hazardous waste infrastructure in many areas.

Figure 4: Stormwater Smart Outreach Tools | US EPA. (2022, October 17). US EPA. https://www.epa.gov/npdes/stormwater-smart-outreach-tools

As shown in Figure 4, hazardous substances originating from residential areas frequently find their way into storm drains or infiltrate groundwater, eventually impacting rivers, lakes, and municipal water supplies. The presence of contaminated irrigation and drinking water exposes residents to harmful chemicals, including arsenic, lead, mercury, solvents, and polycyclic aromatic hydrocarbons (PAHs). These substances can lead to acute skin irritation and may contribute to long-term health issues.

Polycyclic aromatic hydrocarbons (PAHs) are a group of dangerous chemicals, formed when carbon-based substances like oil, coal, or wood are not fully burned (Stogiannidis & Laane, 2014). Improper disposal or spillage of PAH-containing products (motor oils, fuels, asphalt, etc.) introduces these chemicals into local water sources (Polycyclic Aromatic Hydrocarbons (PAHs), 2025). For instance, Studies of PAH pollution in Houston's Manchester community, a neighborhood near oil refineries, emphasize the necessity of controlling and preventing PAHs in local waterways, given their link to inflammatory skin problems and skin cancer (Sansom et al., 2018).

Moreover, Texas now ranks first among the U.S. states for toxic industrial discharges into streams, rivers, and lakes, surpassing 16.7 million pounds per year (Baddour, 2022). Nitrates and heavy metals are major components, but persistent toxins like dioxins and mercury are also present (Baddour, 2022). These pollutants degrade water quality and can accumulate in the food chain, posing long-term health risks beyond dermatological issues (including cancers and irreversible organ damage).

Comparative Analysis of Policy Options

Policy Option 1: Enhanced Monitoring & Reporting

"What gets measured gets managed", underscores the importance of monitoring. This concept highlights that by identifying key metrics and consistently tracking them, organizations can gain valuable insights into their operations. Measurement allows for the identification of areas that require improvement and enables strategic decision-making based on concrete data.

Figure 5: Photo by Stockcake

As illustrated in Figure 5, water sources are often contaminated. The Texas PAH Monitoring and Public Reporting Program advocates for a regulatory framework at the state level, administered by the Texas Commission on Environmental Quality (TCEQ). This initiative aims to systematically track contaminants derived from household hazardous waste, with a particular focus on polycyclic aromatic hydrocarbons (PAHs) in both residential water supplies and surface waters.

Criteria	PAH Monitoring & Reporting
Policy Mechanism	Regulatory program (admin rule) for monitoring and transparency.
Primary Objective	• Regular surveys of households on HHW generation • Required reporting by municipal waste facilities of hazardous materials in their waste stream • Create an online HHW Pollution Dashboard show contamination cases, and HHW collection rates are publicly available
Equity Considerations	• **Data-Driven Justice:** Monitoring could identify environmental justice issues, e.g., if minority communities have disproportionate illegal dumping or waste site contamination, that data can drive equity-focused remedies. • **Service Trade-Offs:** Prioritizing funds for monitoring over direct services like collection events means there will be fewer resources to help all individuals dispose of hazardous waste safely and responsibly.
Systemic Bias	• **Interpretation Bias:** Monitoring focused on easily measured data risks overlooking crucial but complex impacts, like long-term health effects could lead to bias. Additionally, biased interpretation of data, without diverse perspectives, could minimize concerns relevant to marginalized groups. • **Reporting Bias:** If monitoring relies on resident self-reporting, data may be biased due to language barriers or communities with less trust in government.

Although monitoring raises awareness and enhances data transparency, it remains reactive and does nothing to stop HHW from being released to the environment. It relies on sustained funding and active enforcement, both often missing due to local jurisdictions being under-resourced. Without any concurrent source-reduction or disposal programs, contamination has and will continue to occur and vulnerable communities continue to be at risk.

Policy Option 2: Texas Household Hazardous Waste Reduction Act

The HHW Reduction option is a proactive strategy that targets the problem at its origin, reducing the amount and toxicity of hazardous waste that households generate. In effect, the HHW Reduction policy is preventative. It addresses root causes: why do we have so many toxic products, and how can we stop it? It leverages regulation on industry and empowerment of consumers to shrink the hazardous footprint of our homes. Figure 6 depicts a community where children also actively participate in a community clean-up event, collecting litter and learning about recycling, symbolizing the policy's emphasis on education and community involvement.

Figure 6: Household Hazardous Waste: A Guide for Texans. (n.d.). Texas Commission on Environmental Quality. https://www.tceq.texas.gov/p2/hhw

Pros:

- Direct Pollution Prevention
- Long-Term Cost Savings
- Health Benefits
- Producer Innovation
- Public Support and Visibility

Cons:

- Industry Opposition and Political Hurdles
- Implementation Complexity
- Measuring Effectiveness

While the Act is intended as prevention, there are barriers to its implementation: new legislation can be held up by opposition from industry and politics; the costs are high upfront, and there may be complex coordination issues between state and local agencies. This can slow initial rollout, also without embedded equity measures, rural communities may not be equitably served, and ultimately will remain without accessible HHW services.

Criteria	PAH Monitoring & Reporting
Policy Mechanism	State legislation mandating HHW disposal and prevention measures.
Primary Objective	• Identify the most hazardous ingredients and products • Law requiring manufacturers of hazardous products to take responsibility for their safe disposal or recycling. • Education campaign to help residents “Use less, choose safer, dispose properly”
Equity Considerations	• **Broad Benefits & Equity Focus:** Source reduction lowers overall HHW pollution, preventing any community, especially low-income and minority neighborhoods becoming dumping grounds. • **Accessible Implementation:** Mandate grants or technical assistance for permanent HHW drop-off centers in rural areas, and deliver culturally relevant, multilingual education through trusted local leaders. • **Financial Safeguards:** Protect low-income families from bearing added costs by subsidizing disposal fees through targeted vouchers, and integrating HHW services into existing social-service programs.
Systemic Bias	• **Regulatory Capture Bias:** Powerful industries can use their influence to make sure rules about hazardous household waste favor them, even if it means truly dangerous products are not addressed. • **Scale Bias:** Regulations and fees aimed at reducing hazardous waste can be much harder for small businesses to handle than for big companies, because small businesses don't have the same financial advantages.

Policy Option 3: Texas Residential Waste Disposal Incentive Program

This option will establish a voluntary, incentive-based program to encourage residents to follow best practices for HHW disposal. The goal is to reduce water contamination through behavior change, using positive reinforcement rather than mandating rules. A relevant example, illustrated in Figure 7, is the “Pay-As-You-Throw + Rewards” program, where incentives will be given in the form of utility bill credits, gift cards, or tax deductions for proper disposal of HHW.

Figure 7: 14 Methods to Properly Dispose of Your Household Hazardous Waste. (2021, March 2). Www.actenviro.com. https://www.actenviro.com/best-method-of-disposing-of-household-hazardous-waste/

Pros:

- By collecting and properly treating HHW, this option immediately reduces the amount of hazardous material entering the environment
- Frequent collection events are community events where citizens engage
- Potential Economic Opportunities

Cons:

- Running collection programs requires continuous funding for staffing, equipment, and disposal fees
- Lack of permanent commitment
- Participation may remain low if incentives are insufficient or poorly advertised, limiting the overall impact

Criteria	PAH Monitoring & Reporting
Policy Mechanism	State legislation mandating HHW disposal and prevention measures.
Primary Objective	• Expand the number and frequency of drop-off events • Curbside HHW Pickup Programs • Rewards or discounts for people who dispose properly • Discourage illegal dumping by penalties
Equity Considerations	• **Reach Everyone:** Place permanent sites and mobile pickups in low-income and rural areas, offer weekend/evening hours, and provide multilingual outreach so no one is left without safe disposal. • **Incentives and not Penalties:** Give coupons or credits that matter to low-income households and avoid fines for those who genuinely lack easy access
Systemic Bias	• **Reduced urgency:** There's a risk that successful clean-up events could make policymakers and the public think the hazardous waste problem is under control, which might slow down efforts to pass laws that prevent waste from being generated in the first place. • **Technology bias:** Some solutions might favor incineration of collected waste which can have its own emissions, leading to pollution.

The policy provides incentives to encourage Household Hazardous Waste (HHW) disposal. However, the policy being voluntary may reduce participation by leaving some key polluters untouched. Offering small incentives raises the potential to create low uptake if outreach doesn't target underserved areas. Overall, realizing the target of including known institutional pollution, while the program will create better awareness, it may struggle to create long-term pollution reduction in a meaningful way.

Policy Recommendation

After taking the three options into consideration, the Texas HHW Reduction Act is the most effective solution to address systemic inequities while stopping hazardous waste contamination of water supplies. Unlike reactive measures, this policy prevents pollution at its source by mandating statewide HHW collection systems, following lessons from California's success in cutting landfill hazardous waste by 80% (Lewis, 2023). It prioritizes underserved communities like Houston's marginalized neighborhoods, where illegal dumping has spiked PAH levels in groundwater (Chakraborty et al., 2019).

Practical Implementation Steps:

Collaboration between stakeholders:

After taking the three options into consideration, the Texas HHW Reduction Act is the most effective solution to address systemic inequities while stopping hazardous waste contamination of water supplies. Unlike reactive measures, this policy prevents pollution at its source by mandating statewide HHW collection systems, following lessons from California's success in cutting landfill hazardous waste by 80% (Lewis, 2023). It prioritizes underserved communities like Houston's marginalized neighborhoods, where illegal dumping has spiked PAH levels in groundwater (Chakraborty et al., 2019).

Build Equitable HHW Infrastructure:

A few years down the lane, construction of permanent drop-off sites in all counties and mobile units for rural areas while prioritizing low-income urban neighborhoods and colonies lacking waste services, as 68% of Hispanic-majority communities in Texas report no HHW disposal access (Mohai & Saha, 2015). Also, offer services like free curbside pickup for elderly/disabled residents to ensure inclusivity.

Launch Multilingual Outreach Campaigns:

Forming an alliance with schools, clinics, and nonprofits to educate households in Spanish, Vietnamese, and other locally prevalent languages. Studies show such methods increase compliance (Ferrell, 2023).

Monitor and Adapt:

Reporting annual TCEQ reports publicly to maintain accountability, which track PAH levels in residential water and HHW collection rates by ZIP code. If rural participation lags after 1 Year, expand mobile unit schedules, a tactic proven to boost engagement in remote areas.

Enforce Fairly Reward Progress:

Impose fines for illegal dumping but also enforce this act with incentives, where communities achieving 90% HHW compliance could receive grants for parks or solar projects. This "carrot and stick" approach reduced violations by 45% in pilot programs (Fiorillo & Merkaj, 2024).

Summary:

Texas cannot afford half-measures as over 1.2 million residents lack safe water infrastructure, and pediatric asthma rates near HHW dump sites are 2.1 times higher than state averages (Salhotra, 2023). The HHW Reduction Act ensures no one drinks polluted water while others profit from neglect. By learning from California's success and Houston's failures, we can build a legacy of health equity.

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