STATE OF DELAWARE

Guidance for Evaluating and Sampling Private Water Supplies within the Division of Waste and Hazardous Substances

FINAL

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DEFINITIONS

The following are definitions of words or phrases used in this guidance:

"Conceptual Site Model" or "CSM" as defined in 7 DE Admin. Code 1351 Part A, Section 2.0, a graphical or written model describing what is known or hypothesized about the subject site.

"Contaminant of Potential Concern" as defined in 7 DE Admin. Code 1375 Section 2.1, are those hazardous substances identified during a remedy, which exceeds the HSCA screening level and contributes to the unacceptable risk.

"Domestic Well" as defined in 7 DE Admin. Code 7301 Section 2.0, a well that provides water to a private home.

"Exposure Pathway" is the route a chemical or a physical agent takes from a source area to an exposed organism or receptor.

"Facility or Site" as defined in 7 DE Admin. Code 1375 Section 2.1, is the location where the release occurred.

"Hazardous Substance" as defined in 7 DE Admin. Code 1375 Section 2.1, a contaminant which requires investigations completed under the environmental laws of Delaware.

"Health Advisory Level" or "HAL" as defined in 42 U.S.C. §300g(b)(1)(F), a value published by the United States Environmental Protection Agency in which a lifetime exposure may cause adverse health effects.

"Interim action" as defined in 7 DE Admin. Code 1375 Section 2.1, actions taken to mitigate threats to public health, welfare, or the environment which are immediate and temporary.

"Maximum Contaminant Level" or "MCL" as defined in 7 DE Admin. Code 1375 Section 2.1, the maximum permissible level of a contaminant in drinking water.

"Miscellaneous Public Water System" as defined in 7 DE Admin. Code 7301 Section 2.0, wells that do not meet the minimum requirements of a public water system and are not located at a private residence.

"Mitigating Party" is defined as any person or entity which has an interest in addressing contamination at a site. The term can include the following: a Potential Mitigating party under 7 DE Admin. Code 1375 Section 2.1, a Mitigating party under 7 DE Admin. Code 1351 Part A, Section 2.0, a HSCA Certified Consultant, an environmental consultant, or DNREC-WHS for State-led HSCA Investigations.

"Remedial Action" as defined in 7 DE Admin. Code 1351 Part A, Section 2.0, actions taken to protect human health and the environment completed under the Underground Storage Tank regulations and as defined in 7 DE Admin. Code 1375 Section 2.1, actions taken to protect human health and the environment under HSCA regulations.

"Remedy" as defined in 7 DE Admin. Code 1375 Section 2.1, all actions taken to evaluate and potentially remediate in order to protect human health and the environment under HSCA regulations.

"Threshold concentration" is the established concentration based on a MCL, HAL, or other risk-based value above which action is taken to prevent, minimize, or mitigate threats to the drinking water pathway at wells covered under this guidance. This concentration may or may not have a factor of safety.

ACRONYMS

The following are acronyms used in this guidance:

ATSDR	Agency for Toxic Substances and Disease Registry
COCR	Certification of Completion of Remedy
COPC	Contaminant of Potential Concern
CSM	Conceptual Site Model
DHSS	Department of Health and Social Services
DNREC	Department of Natural Resources and Environmental Control
DOW	Division of Water
DW	Domestic Well
FS	Feasibility Study
HAL	Health Advisory Level
HSCA	Hazardous Substances Cleanup Act
MCL	Maximum Contaminant Level
MPWS	Miscellaneous Public Water System
NFA	No Further Action
ODW	Office of Drinking Water
POET	Point of Entry Treatment
RAWP	Remedial Action Work Plan
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
USEPA	United States Environmental Protection Agency
WHS	Division of Waste and Hazardous Substances
WP	Work Plan

1.0 INTRODUCTION

The Department of Natural Resources and Environmental Control (DNREC) Division of Waste and Hazardous Substances (WHS) developed this guidance to outline the steps that should be followed to address contamination discovered at private wells, which include domestic wells (DW) and miscellaneous public water systems (MPWS). This guidance establishes procedures when detections of hazardous substances occur in these wells during environmental investigations conducted under programs administered by WHS and the appropriate steps to ensure human health, welfare, and the environment are protected.

1.1 STATEMENT OF PURPOSE

This guidance presents a process for evaluating groundwater resources and responding to detections of hazardous substances in DWs and MPWS as defined by the Division of Water (DOW). This guidance can be applied across all programs administered by DNREC-WHS. The goal of this guidance is to help ensure the following:

- Establishment of procedures to identify, sample, and restore affected private water supplies,
- Establishment of threshold concentrations of hazardous substances above which actions should be taken to mitigate or eliminate threats to the drinking water pathway, and
- Evaluate other potential risks associated with affected groundwater at DWs and MPWS.

1.2 AUTHORITY

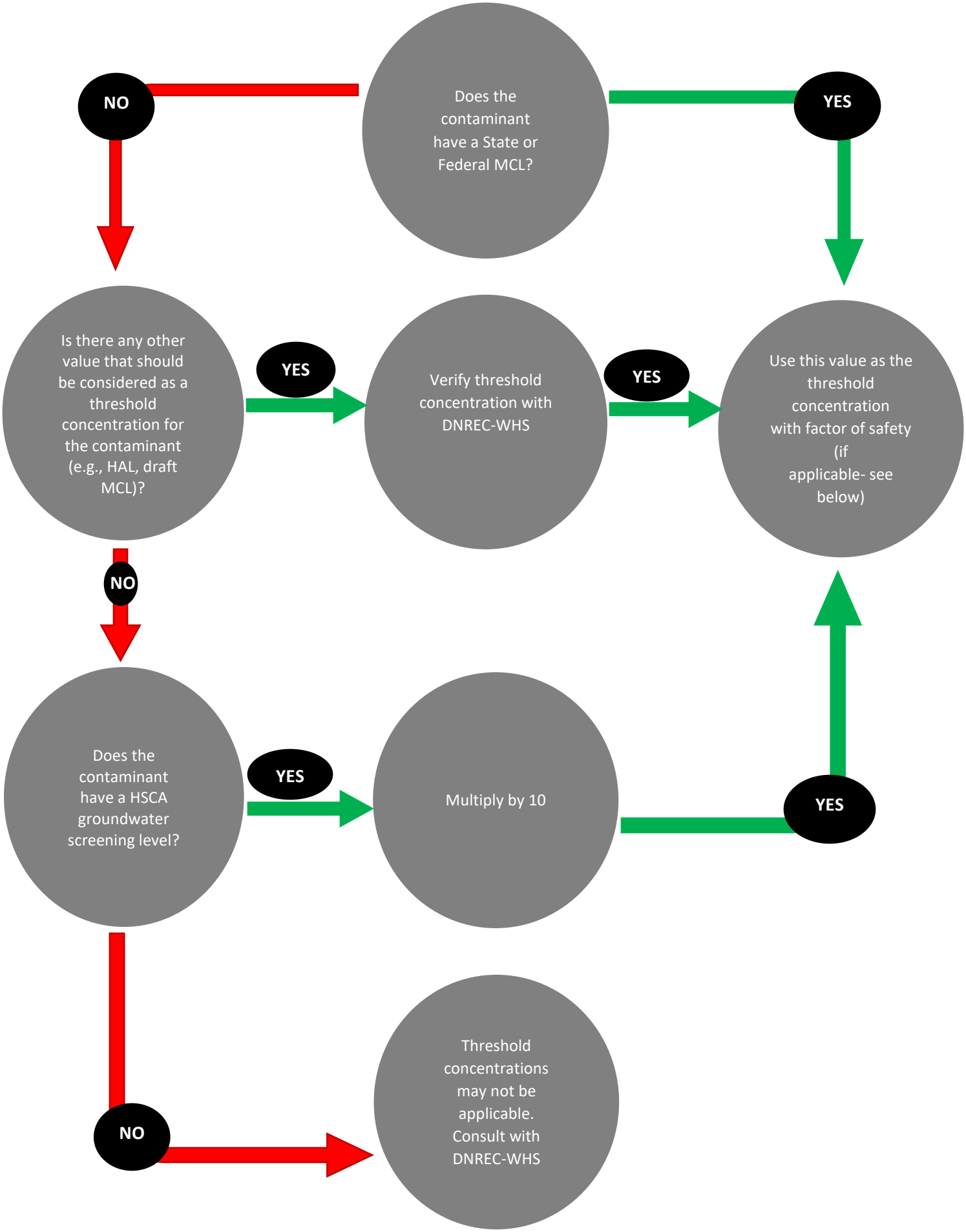
The evaluation or restoration of private water sources is considered a remedy. For sites addressed under the Hazardous Substances Cleanup Act (HSCA), 7 DE Admin. Code 1375 Sections 9.1.4.4, 9.2.6.5, and 9.4.7.2 authorizes appropriate action to be taken based on information obtained during a HSCA investigation. For sites addressed under the Delaware Underground Storage Tank Act, 7 DE Admin. Code 1351, Part E Section 4.1.2 authorizes a hydrogeologic investigation which include the "evaluation of drinking waters." Once data from a DW or MPWS is obtained indicating the presence of a hazardous substance(s), the responsible parties completing the work will track the data and consult DNREC-WHS to see if there is any recommended further action.

2.0 THRESHOLD CONCENTRATIONS

The following section provides a discussion of groundwater concentrations above which responsible parties should act to restore private water resources of affected DWs or MPWS. The steps presented in this section should be followed to make decisions about providing alternative water supplies and/or treatment to the affected wells. The following is an approach for determining threshold concentrations for hazardous substances detected during investigations under the jurisdiction of DNREC-WHS. Threshold concentrations are used to protect the citizens of Delaware from risks associated from contaminated groundwater. Analytical data from any DW or MPWS sampled under this guidance should be compared to both Federal and State Maximum Contaminant Levels (MCLs).

For compounds that do not have a MCL, a Health Advisory Level (HAL) or draft MCL established by the USEPA or Department of Health and Social Services (DHSS) is considered the threshold concentration. If no HAL or draft MCL exists, a risk-based concentration may be used to evaluate the risk to this pathway. The analytical value should be compared to *10 times*

the groundwater screening level value from the HSCA screening level table or the United States Environmental Protection Agency (USEPA) regional screening level table. A DNREC approved alternative calculation may be used for determining Threshold concentrations. See **Figure 1** below for a flow diagram for establishing threshold concentrations.


Does the contaminant have a State or Federal MCL?
NO
YES
Is there any other value that should be considered as a threshold concentration for the contaminant (e.g., HAL, draft MCL)?
YES
Verify threshold concentration with DNREC-WHS
YES
Use this value as the threshold concentration with factor of safety (if applicable- see below)
NO
Does the contaminant have a HSCA groundwater screening level?
YES
Multiply by 10
YES
NO
Threshold concentrations may not be applicable. Consult with DNREC-WHS

2.1 FACTOR OF SAFETY

Based on contaminant or site-specific considerations, a factor of safety may be applied to certain threshold concentrations. The regular sampling of DW and MPWS may preclude responsible parties from having a factor of safety applied. The factor of safety adjustment accounts for any potential seasonal variation, the limited number of data points, and other hydrogeologic factors that cannot be ascertained at the time of sampling, or contaminant-specific properties that can affect groundwater concentrations and risks to human health. The factor of safety should be 75% of the threshold concentration and will apply at the discretion of DNREC-WHS.

> *For example: The Threshold concentration for Benzene is 5 µg/L. A factor safety would be 75% of that value or 5 µg/L x 0.75 = 3.75 µg/L.*

3.0 MITIGATING ACTIONS

The sampling of private wells completed under DNREC's oversight should follow the regulations established for the respective program (HSCA or Corrective Action). The Sampling and Analysis Plan (SAP) or Work Plan (WP) should document the appropriate actions covered in this section. Any action completed outside of DNREC's oversight or during a DNREC-led investigation can also use these mitigating actions to be protective of human health.

If an exceedance of a threshold concentration is established, the mitigating party should intervene through an interim action by providing the affected party or parties of the well(s) an alternate water supply as soon as practicable. The affected parties should also be notified (via telephone or electronic communication) and provided documentation (via a letter with sample results) by the sampler of the exceedance and the selected mitigating response actions. Alternative water supplies may include the following:

- Bottled water;
- Communal water tank;
- Point of use filtration; or
- A combination thereof.

The type of mitigating action will be dependent on site-specific considerations, well owner preferences, and availability of filtration, or water supply options. The mitigating party should work with individual well owners to be protective of the identified exposure pathway(s). A mitigating party should work with the owner of the well and property rather than a tenant or renter. In addition to these actions, behavioral mitigation methods can also be implemented. Behavioral mitigation includes actions such as reducing water usage or limiting bathing/dermal contact with their well water. These methods are typically employed to reduce exposure in ways other than drinking the water. Again, the use of these mitigation measures is dependent on the contaminant type(s) detected within their well. The behavioral mitigations can be lifted once a more permanent remedial action is implemented.

Additionally, affected citizens may ask for additional information about the risks of the contaminants found in their drinking water. The mitigating party can provide contact information for the DNREC project officer and a general contact for the DHSS. The Agency for Toxic Substances and Disease Registry (ATSDR) also maintains fact sheets for individual environmental contaminants known as ToxFAQs™. These fact sheets are maintained on their

website[1] and can be printed for distribution to the affected citizens to assist in risk communication.

For MPWS, the water from the well may not be used for potable purposes or may not be an unacceptable risk to human health. Mitigating parties should work with their DNREC-WHS Project Officer to ensure the unacceptable risks posed by the water from a MPWS are identified and mitigated through DHSS- Office of Drinking Water (ODW).

4.0 FACILITY EVALUATION

During a Facility Evaluation conducted under HSCA, the evaluation of groundwater resources should consider the proximity of DWs and MPWS to the facility. The conceptual site model (CSM) should identify areas not serviced by a public water system that may rely on groundwater for its potable water supply. A mitigating party should take steps to protect those water resources. For information regarding MPWS, please coordinate with the assigned DNREC-WHS Project Officer for the facility.

4.1 PROTECTION OF DRINKING WATER RESOURCES

The primary exposure pathway of concern for some hazardous substances is drinking water ingestion. Samplers should determine if the groundwater at the facility currently being investigated is utilized for drinking water in the project area. The determination can be made using site-specific data collected at the facility or at neighboring facilities. A stepped approach focused on potentially affected neighborhoods and preferential pathways should be used to determine potential affected areas rather than a radial search. The determination should be based upon multiple lines of evidence to decide whether or not properties are served by public water. Regional data that is publicly accessible through DNREC's Delaware Environmental Navigator[2] and Delaware Open Data – Well Permits Database[3] should also be consulted. Additional research to be completed may include:

1. Contacting the local water provider to inquire about current service connections,
2. Conducting field reconnaissance to locate evidence of water connections (fire hydrants, water meters, and other water system infrastructure),
3. A door-to-door survey to ask individual property owners and/or occupants about water service.

After this assessment, responsible parties can reasonably ascertain if the area is served by public water or relies on groundwater for water supply. When a determination is made that an area is served by private wells for drinking water, a sample area of private wells should be created within the project area (as determined by the CSM), and a plan to sample the wells identified in the sample area should be documented in a DNREC-approved SAP or WP. This is commonly referred to as a "drinking water receptor analysis". The data collected during the initial sampling effort should be used to make future determinations of which wells will be sampled in subsequent sampling events. Samplers are encouraged to contact their DNREC-WHS Project

[1] https://wwwn.cdc.gov/TSP/ToxFAQs/ToxFAQsLanding.aspx
[2] https://den.dnrec.delaware.gov/
[3] https://data.delaware.gov/Energy-and-Environment/Well-Permits/2655-qn8j/data

Officer for the facility to assist with determining the sampling area and development of the sampling plan of the private drinking water wells based upon site-specific conditions.

4.2 OTHER PATHWAYS OF CONCERN

While the drinking water pathway may be the primary exposure route, other pathways including inhalation or dermal contact may also present an unacceptable human health risk. Responsible parties should consider these exposure pathways when determining the COCs to include in the evaluation. These exposure pathways will also factor into the remedial measures covered of **Section 5.0** of this guidance.

Other wells permitted by the DOW may also need to be evaluated for their respective exposure pathways. Depending on a well's use, sampling may be required and/or an evaluation of the potential exposure pathways.

4.3 CONTAMINANTS OF POTENTIAL CONCERN

The CSM will identify the contaminants of potential concern (COPCs) in the facility evaluation the mitigating party should sample in wells covered in this guidance. The DNREC-WHS Project Officer should be consulted about the contaminants included on the list, and the COPCs identified should be included in any SAP or WP for the facility. Also, contaminant specific information (for example, mobility) can be a factor in determining which COPCs to consider for the analytical list included in the SAP or WP. The information about which COPCs will be evaluated during this receptor analysis should be included in the SAP and discussed in a Remedial Investigation.

4.4 SAMPLING

The sampling of DWs and MPWS should adhere to the Standard Operating Procedures (SOPs) for Monitoring Well Sampling and Faucet Delivery[4], specifically the faucet delivery section. These data collected during any drinking water survey should be used by the mitigating party to amend or refine the CSM. If concentrations of contaminants are found to be above threshold concentrations, responsible parties should take action to protect all exposure pathways identified and reduce the risk posed by the COCs.

5.0 RESPONSE ACTIONS

After the collection of samples in accordance with the SAP, the reported analytical values will be compared to the threshold concentrations (with the factor of safety, if applicable) to determine if pathway mitigation is necessary. The exceedance of a threshold concentration may indicate an unacceptable risk to human health via the drinking water pathway. However, based upon the COPC, other exposure pathways of concern, such as inhalation or dermal contact of the water may also be considered when responding to an exceedance of the threshold concentration. For MPWS, please coordinate with the DNREC-WHS Project Officer for an individual assessment of each well in concert with personnel from ODW.

5.1 REMEDY

Depending on the scope of the project, the affected DWs and MPWS and associated potential sources may require a remedial action and should follow the HSCA process starting with the creation of a site. However, the mitigation efforts with continue as the site is moving through the

[4] https://dnrec.alpha.delaware.gov/waste-hazardous/remediation/laws-regs-guidance/

HSCA process. The HSCA process will require a Feasibility Study (FS) to select remedies and a Remedial Action Work Plan (RAWP) that will outline how affected private water supplies will be restored when identified under this guidance. The final remedies for the drinking water pathway could include one or a combination of the following remedies:

- Point of use filtration with periodic monitoring and filter maintenance,
- Point of entry treatment (POET) with periodic monitoring and maintenance,
- Installation of a new or deeper supply well,
- Connection of the affected properties to public water service
    - This may include the extension of an existing water main to the project area.

Bottled water or a communal water tank are only temporary (interim) measures and do not provide permanent pathway elimination nor do they eliminate other exposure risks posed by the contamination. These measures are discouraged from being included in any required feasibility study or be proposed as a final remedy. Certain conditions may apply and the DNREC-WHS Project Officer for the site should be consulted to assist in determining the most appropriate remedy.

The remedy, or remedies selected as part of the HSCA process shall consider:

- Protection of public health, welfare, and the environment,
- Compliance with applicable, relevant, and appropriate requirements (local, state, and federal),
- Consideration of surrounding properties,
- Any public comments regarding the remedy,
- A site-specific human health risk assessment, and
- A cost evaluation of the selected remedy or remedies.

6.0 MAINTENANCE AND MONITORING

The approved RAWP will detail any timelines, maintenance responsibilities of the selected remedy, and monitoring requirements, if necessary. Failure to perform these functions may jeopardize the Certification or Completion of Remedy (COCR) or No Further Action (NFA) determination for the facility. For facilities with DNREC supplied filters, sampling and monitoring of those filters will be performed for up to two (2) years after which the maintenance requirements of the filters will fall to the owners of the private DW or MPWS.

7.0 CONCLUSIONS AND RECOMMENDATIONS

This guidance will assist responsible parties in determining the best course of action for their facilities based upon site-specific conditions. Threshold concentrations are presented here to communicate to all stakeholders the standards at which actions to protect human health should be taken in accordance with 7 DE Admin. Code 1375 and 7 DE Admin. Code 1351.

Responsible parties are encouraged to contact the respective DNREC-WHS Project Officer for additional guidance and recommendations for protecting private groundwater resources of Delaware.

8.0 REFERENCES

DNREC, (2023). Guidance for Feasibility Studies (FS) under the Hazardous Substance Cleanup Act (HSCA).

DNREC. Regulations Governing the Construction and Use of Wells. 7 DE Admin. Code 7301.

DNREC. Regulations Governing Hazardous Substance Cleanup. 7 DE Admin. Code 1375

DNREC. Regulations Governing Underground Storage Tank Systems. 7 DE Admin. Code 1351.

U.S. Code § 300g–1 - National drinking water regulations