

**Department of Environmental Conservation
Division of Environmental Health**

**Department of Natural Resources
Application for
Permit to Use Pesticide
For Control of Elodea
In the Fairbanks Area**

**Public Noticed
May 2 through June 2, 2016**

**RESPONSIVENESS SUMMARY
November 9, 2016**

INTRODUCTION

Project Description

On April 27, 2016, the Alaska Department of Natural Resources (DNR), Division of Agriculture submitted an application for a permit to apply herbicide to control invasive Elodea in Chena Lake, Chena Slough, and Totchaket Slough in the Fairbanks area.

Elodea is an invasive aquatic plant that has the potential to grow abundantly and compromise water quality, hinder boat and float plane traffic, reduce dissolved oxygen, and impact fisheries. Control of this invasive plant is necessary to prevent spread to other locations. Physical or mechanical controls are inappropriate, as these methods break the plant into fragments which can then reproduce.

The proposed products include:

- Sonar GENESIS, with EPA registration number 67690-54 and state of Alaska registration number AK-1600001;
- Sonar ONE, with EPA registration number 67690-45; and
- Sonar H4C, with EPA registration number 67690-61.

All products have the active ingredient fluridone. Treatment is proposed to occur between May and October throughout the duration of the permit.

Fluridone is a selective systemic herbicide labeled for use in controlling aquatic vegetation in a variety of aquatic sites. Fluridone kills target plants by inhibiting the formation of carotene. In the absence of carotene, chlorophyll is degraded by sunlight, preventing the plant from photosynthesizing.

Liquid product (Sonar Genesis) will be applied from motorboats using a weighted trailing hose to inject liquid herbicide into the lower portions of the water column (Chena Lake, Totchaket Slough) or via a continuous drip system (Chena Slough). Pelleted product (Sonar One, Sonar H4C) will be applied from motorboats using a forced air blower system, or applied by hand along shorelines.

Public Comment

Notice of the permit application was published in the Fairbanks Daily News-Miner on May 1 and 2, 2016. Notice included information about the opportunity to submit comments on the permit application. The Alaska Department of Environmental Conservation (DEC) also posted the public notice online at www.state.ak.us/dec/eh/pest and www.dec.state.ak.us/public_notices.htm.

The public comment period for the permit application began on May 2, 2016 and ended June 2, 2016. DEC received 25 written comments within the comment period.

Decision Process and Purpose of Responsiveness Summary

The purpose of this document is to respond to comments received during the public comment period. Information regarding DEC's evaluation of the permit application is included in a separate Decision Document. In its decision, DEC considers whether the proposed pesticide use complies with requirements of Title 18, Chapter 90 of the Alaska Administrative Code (18 AAC 90), and whether the proposed use could result in an unreasonable adverse effect, including an unreasonable

risk to human, animals, or the environment, taking into account the economic, social, and environmental costs and benefits of the use of a pesticide.

The following pages provide information about DEC's decision process, a summary of the comments that were submitted during the public comment period, and DEC's response to those comments.

Pesticide Product Registration Process

Before manufacturers can sell pesticides in the United States, the Environmental Protection Agency (EPA) evaluates the pesticides thoroughly to make sure they can be used without posing harm or "unreasonable adverse effects" to human health or the environment.

Pesticide products must undergo rigorous testing and evaluation prior to registration approval. EPA scientists and analysts carefully review data to determine whether to register a pesticide product, and whether specific restrictions are necessary. EPA uses internal and external reviews involving peers and the public through a comment process when conducting these evaluations.

The scientific data requirements for product registration are very detailed. Required data includes characterizations of the pesticide's chemistry and manufacturing process; mammalian and ecotoxicology; environmental fate; residues in or on human and livestock food or feed crops; applicator, occupational, and bystander exposures; product efficacy; and incident reports. Registrants can be required to conduct and submit up to 100 or more individual scientific studies for the registration of a new pesticide.

By definition, all pesticides are toxic to some degree. The level of risk from a pesticide depends on how toxic or harmful the substance is, and the likelihood of people or other non-target organisms coming into contact with it. Uncertainty factors are built into the risk assessment. These factors create an additional margin of safety for protecting people who may be exposed to the pesticides.

In order for a pesticide to be registered, the EPA must determine that the product can be used as labeled without causing unreasonable adverse effects to humans or the environment. If risks or concerns are identified, appropriate risk mitigation measures are required. These are implemented through product label requirements, which may include reductions in application rates, restrictions to approved sites or commodities, advisory statements, implementation of specific management practices, and other restrictions or limitations designed to mitigate risk.

The proposed product label must provide the active pesticide ingredients, application directions, use restrictions, and warnings. This label information is based on the underlying scientific data and conclusions about potential hazards, exposures, and risks from use according to the label.

EPA also conducts regular reassessments of currently registered pesticides. Through this re-registration program, EPA assesses new scientific studies and information about registered products. If there is new evidence documenting unreasonable risk to human health and the environment, the allowed usage is modified and the label changed. When EPA identifies data gaps, new studies are required and reviewed.

If new information or studies show that a pesticide represents an unreasonable risk even after a change of allowable usage, EPA has the authority to cancel registration of products containing that pesticide. Whenever EPA determines there are urgent human and environmental risks from pesticide exposures that require prompt attention, EPA will take appropriate regulatory action, regardless of the registration review status of that pesticide.

EPA's extensive analyses of each pesticide product, and incorporation of new scientific data regarding safety and use of existing products, is sufficient to protect human health and the environment from unreasonable adverse effects if used in accordance with the label.

DEC does a thorough review of the proposed application to ensure that it complies with label instructions. DEC also evaluates the proposed site and conditions to ensure there are no factors which might pose additional risk.

RESPONSE TO COMMENTS

1. Comment Summary

Concerns over health effects of fluridone:

- Fluridone is not safe for consumption
- The acceptable level for fluridone in drinking water wells is zero.
- We do not know what levels of this herbicide are safe for consumption.
- There are unknown side effects of fluridone.
- Fluridone is a carcinogen (page 61, Sonar ONE MSDS).

Response:

The health effects of the proposed pesticide have been extensively studied and are well understood. This pesticide has been registered since 1986 and has been widely used across the United States.

A complete human health risk assessment for fluridone was completed in support of the EPA's 2004 fluridone Tolerance Reassessment Eligibility Decision (TRED). This assessment found that the food, drinking water and recreational swimmer risks are not of concern separately or when aggregated.

One measure of risk that the EPA considers is the Residential Margin of Exposures (MOEs). MOEs greater than 100 are considered to be not of concern. The drinking water MOEs for fluridone and degradates are greater than 7,500. The recreational swimmer MOEs for fluridone and degradates are greater than 4,800. In the available toxicity studies, there was no indication that fluridone, is an endocrine disruptor, nor does it impair immune function.

Dietary risk assessment incorporates both exposure to, and toxicity of, a given pesticide. Dietary risk is expressed as a percentage of an identified level of concern. This level of concern is referred to as the population adjusted dose (PAD), and reflects an amount that is predicted to result in no unreasonable adverse health effects, including sensitive members such as children. Estimated risks that are less than 100% of the PAD are below EPA's level of concern. For fluridone, the acute dietary exposure estimates are less than 1% of the acute PAD. The chronic dietary exposure estimates ranged from 1% of the chronic PAD for the general U.S. population, to 3.6% of the chronic PAD for children ages 1-2.

The EPA has evaluated fluridone and has determined that it likely does not cause cancer. Fluridone is classified as a group E carcinogen, "evidence of non-carcinogenicity for humans." This classification is based on the lack of evidence of carcinogenicity in mice and rats.

The Material Safety Data Sheet (MSDS) for Sonar ONE which was included in the permit application dates from 2009. It does state that the product contains material which can cause cancer. However, the current 2015 Safety Data Sheet does not include this statement. According to manufacturer SePRO, the statement was related to a formulation additive, not the active ingredient fluridone. There is no evidence that the current formulation of Sonar ONE causes cancer.

There is some evidence that the degradation product N-methyl formamide (NMF), causes birth defects. However, since NMF has only been detected in the lab and not following actual fluridone treatments, EPA has indicated that fluridone use should not result in NMF concentrations that would adversely affect the health of water users. More discussion of degradates is found under **Comment 14**.

DEC is satisfied that the proposed project would not result in any unreasonable risks to human health.

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2. Comment Summary

Regarding geologic and hydrologic characteristics of the treatment area:

- There needs to be more research and investigation done about how fluridone moves through groundwater.
- A thorough ground hydrology study should be required.
- Not all parts of Chena Slough have fine grained organic rich sediment as stated on page 28 of the permit application.
- Many areas within the treatment area have a gravel bottom.
- The K_{oc} of fluridone will not apply to areas of the slough with a clean gravel bottom.
- Fluridone may travel only a few inches through soils rich in organics and clay, but some parts of Chena Slough are gravel.
- There is a shallow aquifer/groundwater in Chena Slough area.
- Chena Slough and the aquifer are interconnected/the same water body.
- Chena Slough is not a slough, it is a groundwater seepage system with a highly permeable substrate and unconfined aquifer.
- Ground water hydrology has not been adequately studied.
- The permit application's description of geological and hydrological characteristics of the slough is inadequate.

Response:

The geology and hydrology of Chena Slough and the rest of the proposed treatment area are well understood. A large number of studies have been conducted over the years to provide an extremely well documented, comprehensive hydrologic and geologic characterization of the area.

There is significant documentation that Chena Slough is underlain with organic rich, fine grained sediment. Several studies note that Chena Slough has extensive vegetative mats, rooted aquatic plant growth, and excessive accumulation of organic fines. A United States Geological Society study (Kennedy, 2009) concluded that, "organic rich fine-grained sediments accumulate in Chena Slough because of the road crossing impoundments and flow velocities that are not high enough to flush the fines downstream". Chena Slough has been included on Alaska's section 303(d) list of impaired waters under the Clean Water Act since 1994; it is listed due to excessive sediment loads.

The soil organic carbon partitioning coefficient, denoted as K_{oc} , is a measure of the tendency of a chemical to bind to soils. These values can vary substantially, depending on soil type, soil pH, the

properties of the pesticide, and the type of organic matter in the soil. The larger the K_{oc} value, the stronger the adsorption of the chemical to soil, leading to lower mobility.

In most situations, fluridone is characterized as binding quickly to suspended sediment soils and organic matter, resulting in moderate to low mobility in soil. Pesticides bind more readily to fine grained particles, due to the increased surface area to which the molecules can adhere. Due to chemical characteristics, fluridone also tends to bind more readily to organic sediments.

In areas with fine grained, organic rich soils, such as the Chena Slough, the K_{oc} of fluridone has been measured to be approximately 2,700, which indicates low mobility, or ability to travel through soils (Reinert 1989). It is possible (although no documentation has been provided) that some limited locations within the application area could be underlain with gravel. The K_{oc} in these immediate areas would be lower. However, fluridone would bind to other fine grained soils as it moves through the surrounding substrate.

DEC is satisfied that the hydrology and geology of the Chena Slough are adequately understood. DEC is also satisfied that conditions in the slough would prevent significant migration of fluridone into surrounding ground water.

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3. Comment Summary

Regarding concern over impacts to drinking water wells:

- There needs to be a guarantee that fluridone won't reach drinking water wells.
- Fluridone contamination in wells would require use of a water storage system which would be very expensive.
- The acceptable level for fluridone in drinking water wells is zero.

Response:

As discussed in detail in response to **Comment 2**, fluridone is not expected to migrate through ground water significantly, and will therefore not be expected to reach drinking water wells. The behavior of the proposed pesticide has been extensively studied and is well understood. Fluridone has a strong tendency to bind to soil particles, which means it is unlikely to migrate through the ground into nearby drinking water wells.

In accordance with label instructions, low concentrations of fluridone are allowable even when applied directly to potable water sources, a reflection of the low risk to human health from this product. The target concentration for fluridone for this project is 8 ppb, well below the allowable level of fluridone in drinking water sources.

DEC is satisfied that any potential impacts to drinking water wells would not represent an unreasonable risk to human health.

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4. Comment Summary

Regarding label restrictions near potable water intakes:

- The labels state that you may not apply the products within ¼ mile of any functioning potable water intake at application rates greater than 20 ppb.
- Drinking water wells may not technically meet the definition of a potable water intake, but Chena Slough should still be considered a source of potable water because it is actually a groundwater seepage system and the substrate is highly permeable.

Response:

There are no potable water intakes identified in any of the proposed treatment areas. The fluridone label prohibits application exceeding 20 ppb within ¼ mile of potable water intakes. The target concentration for fluridone for this project is 8 ppb, well below the allowable level of fluridone in drinking water sources.

Drinking water wells are separated from the surface water by soils which present a barrier to movement of pesticide. Drinking water wells are therefore not considered potable water intakes as defined by the label.

The behavior of the proposed pesticide has been extensively studied and is well understood. Fluridone has a strong tendency to bind to soil particles, which means it is unlikely to migrate through the ground into nearby drinking water wells.

As discussed in **Comment 2 and 3**, fluridone is unlikely to migrate to drinking water wells, and DEC is satisfied that any impacts to drinking water would not represent an unreasonable risk to human health.

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5. Comment Summary

Concern over effects of high water events or floods:

- Water from the slough discharges to the surrounding groundwater during high flow events such as storms and breakup.
- There should be daily inspections of each culvert, and of water levels, to ensure that correct discharge and flow information is available.
- Beaver dams have changed water levels drastically in the past. A dam could limit water flow and increase fluridone concentration.
- Chena and Totchaket Sloughs flood frequently.
- If treated waters flow onto private property, it would affect lawns, vegetation, and gardens.
- A large volume of rainfall in could raise water levels and contaminate wells.

Response:

Flooding events that impact drinking water wells can result in contamination from numerous sources, including sewer/septic systems and other types of contamination. Wells that have been impacted from flooding should always be cleaned and disinfected prior to use, to ensure water is safe to drink. The target concentration for fluridone for this project is 8 ppb, well below the allowable level of fluridone in drinking water sources.

During high water flow events, such as storms and break up, the additional water flow would further dilute the concentration of fluridone. Terrestrial plants have less water permeable surfaces, and so are not as susceptible to the effects of fluridone as aquatic vegetation. In addition, fluridone must be in continuous contact with vegetation for extended periods in order to be effective (treatment levels must be maintained for 45-90 days for elodea). As a result, impacts to terrestrial vegetation due to flooding would not be expected.

There are no restrictions for irrigation with treated water for trees, turf, or established plants when levels of fluridone are less than 10 ppb. Plants such as tomatoes, peppers, or newly seeded crops can be more sensitive to treated water; the pesticide labels limit irrigation for these plants if concentrations are greater than 5 ppb. The increased water flow during a flooding event would dilute the concentration of fluridone to less than 5 ppb, so damage to terrestrial plants from fluridone would not be expected. Many plants would be expected to drown during a flooding event in any case.

A dam or blockage could result in elevated levels of water with treatment concentration of fluridone. As a precaution, the permit will include a stipulation that requires the permit holder to monitor visually for dams or blockages weekly, as well as investigate any unexpected changes in stream flow indicated on stream flow gauges. The permit will also include a stipulation that additional fluridone may not be applied during flooding events or if damming or blockage is present.

As explained in **Comment 2**, fluridone binds readily to suspended sediment soils and organic matter. Fluridone is not expected to migrate through ground water to impact drinking water wells, even if water levels rise as a result of increased flow, flooding, or damming.

DEC is satisfied that changes to stream flow or flood events will not result in an unreasonable risk to human health or the environment.

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6. Comment Summary

Who would be liable for damage to private property if wells were contaminated, treated waters flowed onto property, or other damage occurred?

Response:

No unreasonable adverse effects are expected as a result of the proposed project. However, as a state agency, DNR is self-insured through the state. As the permittee, DNR is responsible for ensuring that all pesticide regulations and the terms of the Pesticide Use Permit are complied with.

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7. Comment Summary

There are many areas already contaminated with sulfolane that leaked accidentally. We do not wish to deal with the possibility of two contaminants in this area.

Response:

We understand and appreciate the concern about groundwater contamination in the North Pole area, particularly with the sulfolane contamination in nearby areas. In the case of the proposed fluridone application to Chena Slough, we do not believe there will be any concerns with impact to groundwater near the treatment area. Fluridone has an estimated half-life in water of only 20 days (EPA, 1986), so it will not be present beyond a limited time. See **Comment 2** for further discussion of impacts to ground water.

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8. Comment Summary

Regarding identification of drinking water wells:

- There are many drinking water wells within 200 feet of Chena Slough.
- There are nearly 1000 drinking wells within ½ mile of the treatment area.
- DNR did not do an acceptable job in identifying drinking water wells in the current permit application.
- The lack of research shows negligence for safety.

Response:

As stated in the permit application, DNR obtained drinking water well information from the DEC Safe Drinking Water Information System as well as Fairbanks North Star Borough databases listing improved parcels. DEC believes that DNR made a reasonable effort to identify drinking water wells for this permit application. Because of the characteristics of fluridone, there are no expected impacts to drinking water near the treatment area. See **Comments 2 and 3** for further discussion of impacts to drinking water wells.

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9. Comment Summary

There are several ponds and gravel pits within 200 feet of Chena Slough.

Response:

As explained in **Comment 2**, fluridone binds readily to suspended sediment soils and organic matter. Fluridone is not expected to migrate through ground water to impact nearby ponds or gravel pits. In the case of a flooding or high water event that flowed into nearby ponds, the additional water flow would dilute the concentration of fluridone to levels that would not result in impacts to the ponds.

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10. Comment Summary

The label states that the hydrology must be thoroughly evaluated when used in moving water. This has not been done.

Response:

The labeled application rate is dependent on the average flow rate in moving water. Other than that, the labels for all three products do not require a thorough evaluation of hydrology.

The geology and hydrology of Chena Slough and the rest of the proposed treatment area are well understood. A large number of studies have been conducted over the years to provide an extremely well documented, comprehensive hydrologic and geologic characterization of the area. More discussion of hydrology of the treatment area is found under **Comment 2**.

DEC is satisfied that the applicant has sufficient information on the hydrology of the proposed treatment areas in order to correctly determine application rates.

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11. Comment Summary

Comments related to testing for contamination:

- There needs to be a specific plan regarding testing drinking water wells for presence of fluridone and its degradates.
- The permit should prohibit further application of fluridone if it is detected in any drinking water wells.
- Random testing of wells should be required.

Response:

As discussed in **Comment 2**, fluridone is not expected to migrate through ground water or reach drinking water wells. However, as a precaution, the permit will stipulate a specific schedule for testing for the presence of fluridone in drinking water wells. If fluridone in excess of 20 ppb (label limit for application within ¼ mile of potable water intakes) is detected, additional fluridone application will be prohibited until specifically authorized by DEC. This is considered to be highly unlikely, as the target concentration is 8 ppb.

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12. Comment Summary

Concern related to total amounts of pesticide to be applied:

- The permit application states that additional fluridone will be added to maintain the required concentration in the treatment area.
- There should be an upper limit for the total amount that can be applied.
- Some of the calculations given in the permit are very close to 150 ppb label limit.
- The permit should specify the maximum total amount that can be applied.
- If all listed products are applied, the combined total will exceed 150 ppb.
- If the concentration is lower than expected due to streamflow, they will need to add more pesticide and it could exceed the 150 ppb limit.

Response:

The pesticide product labels provide specific limits on the amount of each product that can be applied each year. All of the targeted application rates listed in this permit application are well below the label limits.

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13. Comment Summary

The plan underestimates the amount of chemical needed due to streamflow in Chena Slough.

Response:

Hydrology and stream flow of Chena Slough is well documented in a number of studies (see **Comment 2**). Additional stream flow studies have been conducted by the applicants in recent months to ensure accurate data. In addition, two stream gauges will be installed and monitored as part of the proposed project.

The permit application allows for additional product to be added to maintain required concentrations. However, amounts exceeding 150 ppb in one year are not permitted.

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14. Comment Summary

Concern over degradates of fluridone (compounds that form as the fluridone breaks down or degrades):

- Degradates of fluridone are a health hazard (Sonar ONE MSDS Hazard Identification).
- N-methyl formamide (NMF), a degradate of fluridone, travels in water.
- NMF is classified as a chemical that can damage fertility, can harm an unborn child, can cause liver damage, and can cause respiratory damage. (pubchem database)
- 3-trifluoromethyl benzoic acid is a degradate of fluridone.
- How long will degradates persist in water?
- What are the effects of degradates?

Response:

As part of its evaluation of pesticides, EPA assesses potential impacts from degradates. There are two major compounds that may result when fluridone degrades; 3-trifluoromethyl benzoic acid and NMF.

There is some evidence that the degradation product NMF may cause birth defects or other damage to fetuses and may cause damage to liver or other cells. However, NMF has only been detected in the lab and has never been observed as a breakdown product following actual fluridone treatments in natural conditions.

The State of Washington performed calculations to examine potential human health effects of NMF (WSDOE, 2000). They found that the safety factors for NMF exposure through drinking water and through skin absorption are very high. “Under worst case conditions, a person would need to drink 15,852 gallons of treated drinking water per day to reach the No-Observed-Effect Level (NOEL) or greater than 78,077 gallons per day under realistic case conditions. For incidental ingestion, a person would have to swim in fluridone treated water for 1,014 years under worst case conditions and for >5,070 years under realistic case conditions in order to be exposed to equal the NOEL” (WSDOE, 2000).

Since NMF has never been observed in natural conditions following fluridone treatments, EPA has indicated that fluridone use should not result in NMF concentrations that would adversely affect the health of water users (EPA, 2004).

The other primary degradate of fluridone is 3-trifluoromethyl benzoic acid. There is no documentation indicating health risks associated with this degradate.

DEC is satisfied that degradates of fluridone resulting from this project are not likely to result in an unreasonable adverse effect.

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15. Comment Summary

Concern over property values:

- Any detection of chemical in wells will make it impossible for homeowners to sell their homes.
- No amount of fluridone is acceptable in wells.

Response:

DEC considers the social and economic costs and benefits in determining whether a proposed pesticide application poses an unreasonable adverse effect. In general, this evaluation considers both the costs and benefits of applying pesticides, and the costs and benefits of not applying pesticides (effectively, costs and benefits of not treating the pest). The risk of not controlling Elodea and allowing it to spread across the state is considered to be significant.

The proposed herbicide is not expected to impact drinking water wells (see **Comments 2 and 3**). Herbicides and other pesticides are routinely used by homeowners, and this use has not been shown to adversely affect property values.

Water quality in Chena Slough is already significantly compromised. Nearby areas are known to have some contamination from sulfolane. Chena Slough has been included on Alaska’s section 303(d) list of impaired waters since 1994 due to excessive sediment loads. Recent studies also found a number of semi-volatile organic compounds, PCBs, and historical DDT in its sediments, as well as elevated levels of phosphorous, sulfate, and chlorides (Kennedy, 2009).

DEC does not believe that short term addition of fluridone will change the perception or cause any significant additional concern regarding the water quality in Chena Slough. DEC does not believe that there will be any significant negative impact to property values as a result of the project.

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16. Comment Summary

Fluridone is banned in Europe and Japan.

Response:

This information is incorrect. Due to lack of demand and economic benefit, the manufacturer generally did not register Sonar products for sale in Europe or Japan. Sonar has never been registered for sale in Japan. Of European countries, the only country Sonar was previously registered in was France.

The manufacturer voluntarily withdrew the registration in France when the expense of new data requirements to maintain registration exceeded the market opportunity (personal communication,

SePRO). Once a product is removed from the market in the European Union, it is considered banned and cannot be sold; however, it is important to understand that this ban is not based on environmental or toxicological reasons.

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17. Comment Summary

Regarding need to control Elodea:

- More research is needed on Elodea.
- Decisions over whether to eradicate Elodea should involve hydrologists, geologists, chemists, environmental consultants, etc.
- Elodea needs to be eradicated, not just controlled, or it could spread to other areas.

Response:

Control of invasive species is a priority for environmental management agencies and groups across the state. The need for control of Elodea is well documented in the Justification portion of the Pesticide Use Permit application.

Elodea is included on UAA’s Alaska Exotic Plants Information Clearinghouse (AKEPIC) list of Non-Native Plant Species, developed in coordination with the U.S. Forest Service, National Park Service, Bureau of Land Management, U.S. Fish and Wildlife Service, Department of Natural Resources Plant Material Center, and Alaska Natural Heritage Program. There is evidence to show that Elodea poses a threat to natural habitats.

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18. Comment Summary

Comments regarding efficacy of project:

- It will not be possible to treat all areas of Chena Slough to eradicate all Elodea.
- Chena Slough is the perfect habitat for Elodea, so even if it is eradicated it will return.
- There is Elodea in the Chena River. It will allow Elodea to return to treated areas.

Response:

Fluridone has been used extensively for aquatic vegetation control for many years. Characteristics and behavior of fluridone products have been widely studied and are well understood. Fluridone has been successfully used to control Elodea in numerous locations in Alaska in recent years. There is no evidence that the proposed treatment areas under this permit are significantly different such that use of fluridone would be ineffective.

While it is possible for Elodea to repopulate a treated area, the goal for Elodea in Alaska is eradication. Downstream areas, such as the Chena River, are unlikely to provide a reservoir for repopulation unless the Elodea is moved by mechanical means.

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19. Comment Summary

Concerns regarding efficacy of products:

- There is no evidence that use of fluridone will be successful.

- The product label states that Elodea is often tolerant to fluridone.
- The type of Elodea found in the proposed treatment area is not listed on the product label.

Response:

Fluridone has been used extensively for aquatic vegetation control for many years. Characteristics and behavior of fluridone products have been widely studied and are well understood. Fluridone has been successfully used to control Elodea in Alaska in numerous lakes in recent years.

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20. Comment Summary

SePRO is too involved in promoting this project. It stands to profit from use of its products.

Response:

It is unlikely that the small quantities of product proposed for this project represent a significant profit for the manufacturers.

Regardless of who is funding the project or who may stand to profit, DEC’s role in this process is to determine whether or not the proposed project is likely to result in unreasonable adverse effects, and then issue or deny the permit based on that evaluation.

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21. Comment Summary

Four to five years is too long a time to have a chemical continuously applied to the water.

Response:

As stated in the permit application, the goal is to maintain treatment levels for 45-90 days per season. After the second season, the need for additional applications will be evaluated.

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22. Comment Summary

Fluridone will move with the current to other areas, and impact other residents.

Response:

Chena Lake is a closed water system. Totchaket Slough and Chena Slough are both recharged primarily by upwelling groundwater, and have limited outflow. Totchaket Slough streamflow was measured in 2015 with an average 8.5 cubic feet per second. Chena Slough streamflow was measured in 2015 with an average 52.0 cubic feet per second.

The label for fluridone allows for application to flowing water areas. While some pesticide will flow downstream of the sloughs, the relatively low streamflow is not expected to result in rapid dispersal. Within the sloughs, additional pesticide will need to be added to maintain required concentration. Proposed additional amounts are well within label limits.

Pesticide concentrations are expected to drop downstream due to degradation, dilution, binding to sediment and soil, and pesticide uptake by plants. The levels that would be present downstream would be less than normal treatment concentrations, and therefore well under the levels of concern. As a

precaution, the permit will stipulate that downstream areas must be monitored for impacts to vegetation.

Concentrations of fluridone downstream are expected to be negligible. No herbicidal effects are anticipated to occur downstream of treatment areas. DEC is satisfied that there will be no unreasonable adverse effects to areas downstream of treatment areas.

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23. Comment Summary

Concern over impacts to non-target vegetation:

- Fluridone is non-selective and will kill native plants, including trees and willows.
- Native vegetation may not be able to re-establish themselves.
- The 2011 document “Control Options for Elodea spp. In the Chena Slough” states that fluridone has a potential to kill desirable aquatic vegetation and could impact other non-target organisms.

Response:

Fluridone has been used extensively for aquatic vegetation control for many years. Characteristics and behavior of fluridone products have been widely studied and are well understood.

As the permit application acknowledges, some non-target plants will be affected by the proposed pesticide use. In practical application, however, Elodea has been found to be more susceptible to the effects of fluridone than many native plants, so effects to non-target plants are expected to be limited. Elodea reproduces by fragmentation and maintains an extensive root system. Many native aquatic plants are seed producers, and seeds will not be affected by the fluridone treatment. Studies of other lakes in Alaska treated to control aquatic invasive plants have shown that native plants usually recover within a short period of time. Negative impacts to native plant communities are expected to be minor and short term in nature; overall the project is expected to restore native plant communities.

Fluridone is not expected to have any short or long-term effects on invertebrates, fish, or other animals that are exposed to normal treatment concentrations. As described above, impacts to non-target plant communities are expected to be minor and short term in nature. As a result, no negative impacts to invertebrate, fish, or other animal populations are expected.

Effects on water quality parameters such as clarity, dissolved oxygen, and nutrient levels, which may be impacted by decaying plant matter, are expected to return to normal over a short period of time.

There is no evidence that the proposed use would result in an unreasonable adverse effect, including an unreasonable risk to animals or the environment.

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24. Comment Summary

Concern over impacts to animals:

- Insects and microorganisms have increased mortality rates due to fluridone.

- Cumulative exposure to low levels of fluridone over several years could have a detrimental effect on fish and bird populations.
- The 2011 document “Control Options for Elodea spp. In the Chena Slough” states that fluridone has a potential to impact non-target organisms.
- Moose that are harvested downstream of the slough could be impacted.

Response:

Within treatment areas, impacts to non-target organisms are not expected to be significant. Fluridone has been used a number of times in recent years in Alaskan lakes with no unreasonable adverse effects identified. Fluridone has also been extensively used in similar applications in other states, with no significant impacts to non-target organisms.

Fluridone does not appear to have any apparent short-term or long-term effects on fish at normal application rates (Washington DNR, 2012). When used at label rates, there are no anticipated impacts to birds or mammals from fluridone. Fluridone shows moderate toxicity to aquatic invertebrates. Invertebrates that are affected would be expected to repopulate treated areas once treatment was completed.

Negative impacts to native plant communities are expected to be minor and short term in nature (see **Comment 23**); overall the project is expected to restore native plant communities and benefit fish habitat. As a result, no negative impacts to fish or their habitat are expected from the proposed pesticide.

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25. Comment Summary

The population density in the area warrants additional concern.

Response:

DEC’s role in this process is to determine whether or not the proposed project is likely to result in unreasonable adverse effects, and then issue or deny the permit based on that evaluation. The number of people in an area would not change that evaluation.

There have been a number of fluridone permits issued in highly populated areas, including Sand Lake, Lake Hood, and other water bodies within Anchorage. No negative impacts have been identified as a result of these permits.

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26. Comment Summary

Concern over use of slough water for irrigation:

- Irrigation from fluridone treated water may cause injury to gardens, crops, and other vegetation.
- Many people use Chena Slough to water their gardens.
- EPA restricts irrigation using fluridone treated water for 14 days.

Response:

Terrestrial plants are not as susceptible to the effects of fluridone as aquatic vegetation. However, the product labels do establish some restrictions on use of treated water for irrigation. In accordance with the label for Sonar Genesis, there are no restrictions for irrigation to established turf and lawns, established crops, ornamental plants, and most other types of vegetation. The labels for Sonar One and Sonar H4C caution against using treated water to irrigate established crops, turf, plants, or trees for seven days after treatment. None of the labels restrict irrigation restriction for a period of 14 days.

All three product labels note that damage may occur to seedlings or plants in the nightshade family (tomatoes, peppers, potatoes, tobacco, etc.), at concentrations of 5 ppb or above.

Under Alaska Statute 46.15, residents must obtain a water rights permit from the Department of Natural Resources prior to diverting or withdrawing significant quantities of water (greater than 500 gallons per day for ten or more days), including waters from Chena Slough. As of July, 2016, DNR Water Resources has not issued any permits for this activity.

There may be a number of users who withdraw smaller quantities of water from Chena Slough to irrigate gardens or landscaping. These individuals may need to use an alternative source of water during the treatment period, such as well water. Any residents who use water from Chena Slough to irrigate will be cautioned to use an alternative irrigation source for the week immediately following treatments.

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27. Comment Summary

Fluridone treated water may be dangerous to recreational water users.

Response:

The labels for the proposed pesticides specify that there is no water use restriction following application for fishing or swimming at the proposed concentration. No quarantine is required after application. There is no evidence that the proposed use would result in an unreasonable adverse effect, including an unreasonable risk to humans.

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28. Comment Summary

Comments related to use of fluridone to treat Elodea in other lakes:

- Fluridone has been successfully used to treat Elodea in Beck, Daniels, and Stormy Lakes in Kenai, and should also be successful for this project.
- Successful use of fluridone in other areas is not an indication that it would work in Badger Slough. Badger Slough is unique, so using fluridone in that location would be experimental.

Response:

Results from the Kenai area lakes Elodea eradication show good results, with significant reductions in most test areas. In addition, results from the Kenai area lakes do not indicate any problems with the use of these products in typical Alaska lakes. There is no evidence that the proposed treatment areas under this permit are significantly different such that use of fluridone would result in

significantly different results. There is no evidence that the proposed treatment would result in an unreasonable adverse effect, including an unreasonable risk to human, animals, or the environment.
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29. Comment Summary

This project is too expensive.

Response:

State agency budgets are reviewed and approved through the state budgeting process. Costs associated with this project are funded by the applicant.

DEC’s role in this process is to issue the permit allowing the activity, if it is determined that no unreasonable adverse effect is expected as a result. Expense of the project is not a consideration in determining if unreasonable adverse effects might occur.
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30. Comment Summary

We were led to believe that Elodea was a threat to grayling spawning, but the environmental assessment for the Alexander Lake Elodea eradication project states that Elodea provides an excellent nursery habitat for northern pike.

Response:

Elodea has the potential to grow abundantly and crowd out native plant species. It simplifies aquatic habitat by displacing native vegetation, alters nutrient availability, and reduces dissolved oxygen. Its growth can decrease stream flow and increase sedimentation, which can degrade spawning habitat. While invasive northern Pike may benefit from these changes, native salmonid species, including grayling, are negatively impacted by Elodea.
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31. Comment Summary

Regarding threat from Elodea/spread of Elodea:

- Waiting to address this problem could lead to Elodea spreading to other lakes and streams, with possibly disastrous consequences, including safety risk to boats and float planes, degradation of aquatic habitat, loss of salmon habitat and serious impacts downstream in the Yukon River drainage.
- Elodea is a serious threat to freshwater ecosystems in Alaska. It will spread and cause permanent damage to lakes, rivers, and fisheries.
- Elodea does not impact local homeowners.
- Elodea has been present in Chena Slough much longer than the ten years stated in the permit application. It is likely not as easily spread as indicated in the application.
- There is Elodea in the Chena River.

Response:

Control of invasive species is a priority for environmental management agencies and groups across the state. The need for control of Elodea is well documented in the Justification portion of the Pesticide Use Permit application.

Elodea is included on UAA’s Alaska Exotic Plants Information Clearinghouse (AKEPIC) list of Non-Native Plant Species, developed in coordination with the U.S. Forest Service, National Park Service, Bureau of Land Management, U.S. Fish and Wildlife Service, Department of Natural Resources Plant Material Center, and Alaska Natural Heritage Program. There is evidence to show that Elodea poses a threat to natural habitats. Allowing Elodea to remain in some areas could result in spread to other areas across the state. It is common for plant fragments to adhere to boats, planes, and other equipment, and therefore be transported to other locations.

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32. Comment Summary

Based on information from an integrated pest management plan for the Kenai Peninsula, Elodea growth levels out after several years. Application of chemicals may not be necessary.

Response:

Control of invasive species is a priority for environmental management agencies and groups across the state. The need for control of Elodea is well documented in the Justification portion of the Pesticide Use Permit application.

Elodea is included on UAA’s Alaska Exotic Plants Information Clearinghouse (AKEPIC) list of Non-Native Plant Species, developed in coordination with the U.S. Forest Service, National Park Service, Bureau of Land Management, U.S. Fish and Wildlife Service, Department of Natural Resources Plant Material Center, and Alaska Natural Heritage Program. There is evidence to show that Elodea poses a threat to natural habitats. Allowing Elodea to remain in some areas could result in spread to other areas across the state.

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33. Comment Summary

Concerns over whether this permit follows label requirements:

- This permit was not prepared according to the product label.
- The manufacturers recommended use (for Sonar products) does not apply.

Response:

In its evaluation, DEC reviews the pesticide product labels and compares them to the proposed project. No conflicts were identified; the proposed project complies with label requirements.

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34. Comment Summary

Alternative controls should be used.

- Mechanical methods of control are proven successful.
- Increasing water flow could control Elodea, since it grown in still or slow-moving water (Integrated Pest Management Plan for Eradicating Elodea from the Kenai Peninsula).

Response:

Control options for Elodea have been well researched in Alaska and other locations. It is common knowledge that Elodea is very difficult to control. Because it can reproduce and spread from small

plant fragments, most mechanical methods actually result in further spreading of the pest. Water draw downs, increasing stream flows, and other alternatives have significant impacts and associated challenges.

DEC’s decision on whether to issue a permit is based on whether or not the proposed use could result in an unreasonable adverse effect. It is not dependent on other potential control methods.

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35. Comment Summary

Regarding risk from use of fluridone:

- The risk from use of fluridone is low to non-existent.
- The primary impact to local residents will be inability to use slough water to irrigate gardens.
- The risk from pesticide use is not founded, while the risk from spread of Elodea is large.

Response:

The need for control of Elodea is well documented (see **Comment 31**). Fluridone has been used extensively for aquatic vegetation control for many years. Characteristics and behavior of fluridone products have been widely studied and are well understood. There is no evidence that the proposed use would result in an unreasonable adverse effect, including an unreasonable risk to animals or the environment.

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36. Comment Summary

Spreading pellets with a calibrated spreader is “impractical.”

Response:

The permit application states fluridone pellets will be applied using a calibrated forced air blower mounted on a motor boat. This method has been successfully used for several other Alaska fluridone projects. There is no indication that circumstances are significantly different for this project.

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37. Comment Summary

The permit application states that liquid application will be conducted by an automatic drip system, which will be controlled based on current discharge readings. There are no discharge meters installed in Chena Slough.

Response:

Two stream gauges will be installed and monitored as part of the proposed project. This requirement will be stipulated in the permit.

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38. Comment Summary

The testing schedule for fluridone concentration allows for up to 4 weeks between sampling. This would allow incorrect concentrations to persist for too long. Testing should be required each week.

Response:

The permit application states that water samples will be taken at approximately 2, 4, 8, 12, and 16 weeks intervals.

Over time, concentrations are expected to diminish, due to degradation, adsorption to sediments, and dilution from incoming water. Although fluridone must be maintained at the correct concentration for 6.5 – 13 week to be effective, there is no requirement or concern from an environmental or health perspective if levels diminish below the effective concentration.

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39. Comment Summary

The permit should require sediment sampling.

Response:

As explained in **Comment 2**, fluridone binds readily to suspended sediment soils and organic matter. Once it adheres to soil particles, fluridone is unavailable to disperse or to continue to act as an herbicide. It degrades over time in the sediment, with a hydrosol half-life of approximately 17 weeks (NCBI, 2005). As a result, fluridone remains present in the environment for only a limited time.

It would be expected that fluridone would be present in sediment samples in the treated area for a period of time after application, and that levels would decrease to an undetectable level over several months. Testing for the present of fluridone in sediment is not necessary, as it is already understood that the product will be present.

However, the applicant has stated that they do intend to conduct sediment profile sampling for the purposes of determining the depth that fluridone penetrates into the sediment.

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40. Comment Summary

Regarding concerns over the drip station for Chena Slough:

- The remote control drip station is too risky.
- What happens if there is a leak or changes to water flows?

Response:

The drip station controls will be located in a secure box which will be locked to prevent any tampering. The box would contain any leaks which might occur at the distribution site. The applicant intends to check the drip station weekly to ensure proper functioning. These requirements will be stipulated in the permit.

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41. Comment Summary

The 2011 document “Control Options for Elodea spp. In the Chena Slough” states that water flow rates in Chena Slough might make use of fluridone ineffective.

Response:

Additional evaluation of streamflow has been conducted since the cited document was produced. Proper metering and dosing have been calculated based on updated streamflow data.

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42. Comment Summary

The 2011 document “Control Options for Elodea spp. In the Chena Slough states that fluridone could impact other non-target organisms through changes in dissolved oxygen and nutrients.

Response:

Fluridone has been used extensively for aquatic vegetation control for many years. Characteristics and behavior of fluridone products have been widely studied and are well understood.

As the permit application acknowledges, some non-target plants will be affected by the proposed pesticide use. In practical application, Elodea has been found to be more susceptible to the effects of fluridone than many native plants, so effects to non-target plants are expected to be limited. Elodea reproduces by fragmentation and maintains an extensive root system. Many native aquatic plants are seed producers, and seeds will not be affected by the fluridone treatment. Studies of other lakes in Alaska treated to control aquatic invasive plants have shown that native plants usually recover within a short period of time. Negative impacts to native plant communities are expected to be minor and short term in nature; overall the project is expected to restore native plant communities and benefit fish habitat.

Fluridone is not expected to have any short or long-term effects on invertebrates, fish, or other animals that are exposed to normal treatment concentrations. As described above, impacts to plant communities are expected to be minor and short term in nature. As a result, no negative impacts to invertebrate, fish, or other animal populations are expected.

Effects on water quality parameters such as clarity, dissolved oxygen, and nutrient levels, which may be impacted by decaying plant matter, are expected to return to normal over a short period of time. Problems with decreased dissolved oxygen levels are not expected with fluridone because it is a very slow-acting herbicide with effects occurring over a long period of time. As a precaution, the permit will stipulate that baseline measurements must be made prior to treatment.

There is no evidence that the proposed use would result in an unreasonable adverse effect, including an unreasonable risk to animals or the environment.

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43. Comment Summary

The permit application does not address overall eradication of Elodea.

Response:

DNR, in association with other groups, does have a statewide plan for management of Elodea. However, pesticide use permits are issued for specific projects; in this case Elodea in some areas near Fairbanks.

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44. Comment Summary

Regarding the experience and knowledge of applicants:

- The people who completed the permit application are not familiar with the proposed treatment area and are not experts in this field.
- The applicants have experience over several years in applying aquatic herbicides in Alaska to control Elodea.

Response:

DEC does a thorough review of the proposed application to ensure that it complies with label instructions. DEC also evaluates the proposed site and conditions to ensure there are no factors which might pose additional risk.

Pesticide application under a Pesticide Use Permit must be conducted or directly overseen by a certified pesticide applicator. DNR listed several qualified individuals in their permit application.

In addition, the applicants have experience with numerous previous aquatic pest control operations in Alaska and elsewhere.

DEC is satisfied that the permit application contains sufficient information to allow for an adequate evaluation of site and conditions. DEC is further satisfied that the permit applicants have the knowledge, training, and experience to comply with regulations and requirements.

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45. Comment Summary

The public comment period was too short.

Response:

As is standard, a 30 day public comment period was provided to allow the public to prepare and submit comments. DEC did not receive any requests to extend the comment period. DEC is satisfied that all affected parties had sufficient opportunity to become informed about the proposed permit and provide comments to DEC.

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46. Comment Summary

DNR did not do an acceptable job in identifying drinking water wells in the original permit application.

Response:

DNR did submit a previous pesticide use permit application for this project; that permit application was withdrawn to allow for additional information to be gathered.

The current permit application under consideration in this Responsiveness Summary included adequate identification of drinking water wells. See **Comment 8** for additional discussion of identification of drinking water wells.

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47. Comment Summary

The environmental assessment for the Alexander Lake project states that application rates greater than 20 ppb within ¼ miles of potable water intake are restricted.

Response:

DEC conducts an individual evaluation for each pesticide use permit. This includes a thorough review of the proposed application to ensure that it complies with label instructions. DEC also evaluates the proposed site and conditions to ensure there are no factors which might pose additional risk.

In April 2016, DNR received a pesticide use permit to apply fluridone to control elodea in Alexander Lake. However, comparison to previous permits is not relevant to the evaluation for this permit.

The product approved under a pesticide use permit for Alexander Lake is Sonar ONE, one of the products proposed under the Fairbanks Elodea Control permit. The label for this product (which is identical for both the Fairbanks and Alexander Lakes projects) prohibits application exceeding 20 ppb within ¼ mile of potable water intakes.

There are no potable water intakes in the proposed treatment areas of either project. Drinking water wells are not considered potable water intakes, as they are separated by soil or other substrate which inhibit movement of the pesticide. See **Comments 2 and 3** for further discussion of impacts to drinking water wells.

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48. Comment Summary

The environmental assessment for the Alexander Lake project states that there are no commercial agricultural uses, human exposure though livestock is unlikely, and there are no private wells within 200 feet. Chena Slough has drinking water wells, and residents have gardens.

Response:

DEC conducts an individual evaluation for each pesticide use permit. This includes a thorough review of the proposed application to ensure that it complies with label instructions. DEC also evaluates the proposed site and conditions to ensure there are no factors which might pose additional risk. Comparison to previous permits is not relevant to the evaluation for this permit.

Concerns related to drinking water wells and impacts of irrigation or damage to gardens are addressed in **Comments 2, 3, 5, and 26**.

Citations:

Bureau of Land Management. November, 2005. *Fluridone Ecological Risk Assessment Final Report*.

EPA. March 31, 1986. Chemical Fact Sheet For Fluridone. Fact Sheet Number: 81.

EPA. April 1, 2004. Memorandum: Fluridone and its major degradate, N-methyl formamide B Drinking Water Assessment for the Health Effects Division (HED) Reregistration Eligibility Decision Document.

EPA. September, 2004. *Report of the Food Quality Protection Act (FQPA) Tolerance Reassessment Progress and Risk Management Decision (TRED) for Fluridone*.

EPA. September, 2009. *Fluridone Summary Document Registration Review: Initial Docket*. EPA-HQ- OPP-2009-0160.

EPA/DEC. November, 2011. Watershed Characterization for the Chena River Watershed, Alaska.

Hydraulic Mapping and Modeling. February 2013. *Chena Slough Hydrologic and Hydraulic Analysis for Existing Conditions and Channel Modifications Final Report* <http://www.fairbanksweeds.org/user-files/Final-Chena%20Slough%20H&H%20Report%20Existing%20Conditions%20and%20Proposed%20Channel%20Modifications.pdf>

Kennedy, B. W., Hall, C. C. 2009. Occurrence of Selected Nutrients, Trace Elements, and Organic Compounds in Streambed Sediment in the Lower Chena River Watershed near Fairbanks, Alaska, 2002-03. USGS Scientific Investigation Report 2009-5067.

NCBI. National Center for Biotechnical Information. PubChem Open Chemistry Database. Fluridone. March 27, 2005. <https://pubchem.ncbi.nlm.nih.gov/compound/fluridone#section=Top> (accessed October 20, 2016).

Reinert, K.H. 1989. Environmental Behavior of Aquatic Herbicides in Sediments. Chapter 13 In Reactions and Movements of Organic Chemicals in Soils. Soil Science Society of American and American Society of Agronomy. Special Publication No. 22. Madison, Wisconsin.

Sonar ONE Aquatic Herbicide Safety Data Sheet. SePRO Corporation, September 15, 2015, https://sepro.com/documents/SonarONE_MSDS.pdf, (accessed June 12, 2016).

USDA/Forest Service. 2008. *Fluridone Human Health and Ecological Risk Assessment Final Report*. November 25, 2008.

WSDOE, 2000. Draft supplemental environmental impact statement: assessments of aquatic herbicides. Olympia, WA. <http://www.ecy.wa.gov/pubs/0010040.pdf>

WDNR. 2012. *Fluridone chemical fact sheet*. DNR PUB-WT-972. January.