KEEPING IT CLEAN

A Guide to Reducing Risk from Pesticides* in Springfield's Drinking Water Protection Areas

**Pesticides include herbicides, insecticides, fungicides, and all other substances intended for preventing, destroying, repelling, or mitigating a pest.*

June 2018

PREPARED BY
Springfield Utility Board and Springfield Groundwater Guardians

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June 1, 2018

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Disclaimer:

The material provided herein is for informational purposes only. All efforts have been made to offer accurate and current information as of June 1, 2018, which is the date of publication. The provisions of this publication do not constitute an endorsement by the Springfield Utility Board of any particular product. Furthermore, Springfield Utility Board makes no guarantees as to the safety or efficacy of any product and assumes no responsibility or liability for any injury or damage that may result from using any product. The information presented in this publication does not in any way replace or supersede the information on the pesticide product labeling for any pesticide. Before use of a pesticide, refer to the product labeling for the intended pesticide and relevant regulatory authorities.

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INTRODUCTION

Why have we developed this guide?

Over the years many professionals and residents in the community have contacted the Springfield Utility Board (SUB) with questions about the risks to groundwater from specific pesticide products. We appreciate the community's concern for protecting our drinking water and, in response, have developed this resource guide. As you use and become more familiar with it, we welcome your feedback and your questions. Please contact the SUB Drinking Water Source Protection Coordinator at 541-744-3745 or visit our website at subutil.com.

Who can use this guide?

Whether you are a landscape professional, a certified pesticide applicator, an occasional user of pesticides, or someone who simply wants to learn more about protecting Springfield's drinking water, this guide will provide helpful information. The guide includes a step-by-step Pesticide Evaluation Tool that assumes a basic familiarity with pesticide safety and awareness; however, the guide also contains resources for people looking to minimize or eliminate their use of pesticides and anyone concerned about protecting Springfield's drinking water.

Where to use this guide:

Although the guide contains plenty of information that applies elsewhere, the geographic focus is the Wellhead Protection Areas (WHPAs) of Springfield, Oregon, which include most of Springfield and parts of Lane County and northeast Eugene. Refer to the map on page 4 for the boundaries of the WHPAs.

How to use this guide:

The Pesticide Evaluation Tool starting on page 6 provides a simple method for assessing the relative risk to Springfield's drinking water sources from a given pesticide used at a given location. We recommend that you read through the entire guide once before using the Pesticide Evaluation Tool and log sheets.

This guide focuses specifically on reducing risk to Springfield's drinking water. It is not a substitute for general pesticide safety education nor a tool for selecting the most effective pesticide. The Pesticide Evaluation Tool does not consider many of the factors included in more comprehensive pesticide ranking systems, such as toxicity or carcinogenicity. The guide does, however, provide Springfield-specific information and is a unique resource for this community. We offer it as a supplement to other pesticide safety and awareness resources.

PESTICIDES & GROUNDWATER: WHY DOES IT MATTER?

A pesticide is any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest. Although often misunderstood to refer only to insecticides, the term pesticide also applies to herbicides, fungicides, and various other substances used to control pests (the suffix "-cide" comes from the Latin word "to kill"). For example, herbicides kill or limit the growth of unwanted plants; fungicides control fungal problems like molds, mildew, and rust; insecticides control unwanted insects; etc.

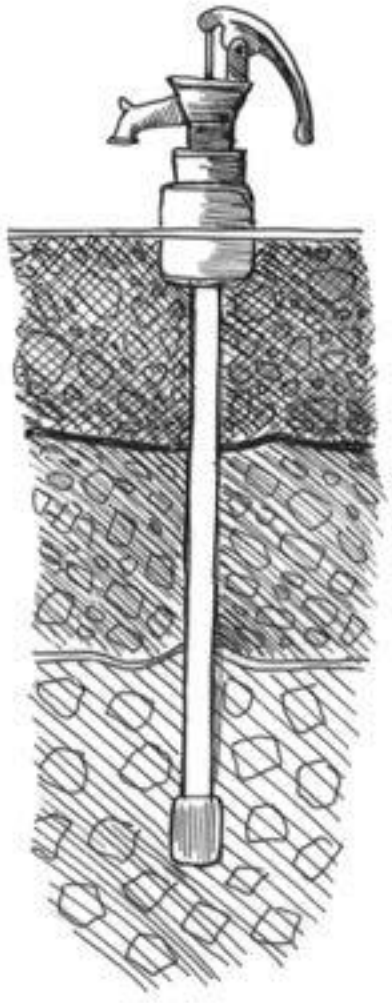
All pesticides are registered with the United States Environmental Protection Agency (EPA) before they are sold or distributed in the United States unless they qualify as "minimum-risk pesticides" (e.g., cedar oil, mint oil, egg solids). EPA classifies all pesticides as either "general-use" or "restricted-use." Only individuals with a pesticide applicator license or working under the supervision of someone who has one are permitted to apply restricted-use pesticides (RUPs), which pose special risks even when used according to the label.

Even when meant for outside use, pesticides can be a problem to groundwater. Pesticides applied to landscaping, crops, or anywhere outdoors may move down with rain or irrigation water and reach the aquifer. Pesticides can also reach the groundwater directly through misuse or overuse, improper disposal, accidental spills and leaks, improperly sealed wells or dry wells, or seepage of contaminated surface water.

The likelihood that any given applied pesticide will move from soil into groundwater depends on a variety of factors related to the:

- **chemical** (e.g., persistence, mobility, volatility)
- **soil** (e.g., texture, organic matter, pH)
- **site** (e.g., depth to water, climate/weather)
- **management practices** (e.g., application rates and methods)

Since it can be complicated for the everyday pesticide user to make sense of all these factors, this guide provides a simplified method for evaluating pesticide risk to groundwater in Springfield.



SPRINGFIELD'S DRINKING WATER SOURCES

When you sip a glass of tap water in Springfield, you are enjoying some of the highest quality drinking water in the world. Where does that water come from? The majority comes from SUB's and Rainbow Water District's 35 wells distributed throughout Springfield, and approximately ten percent is pumped directly from the Middle Fork Willamette River.

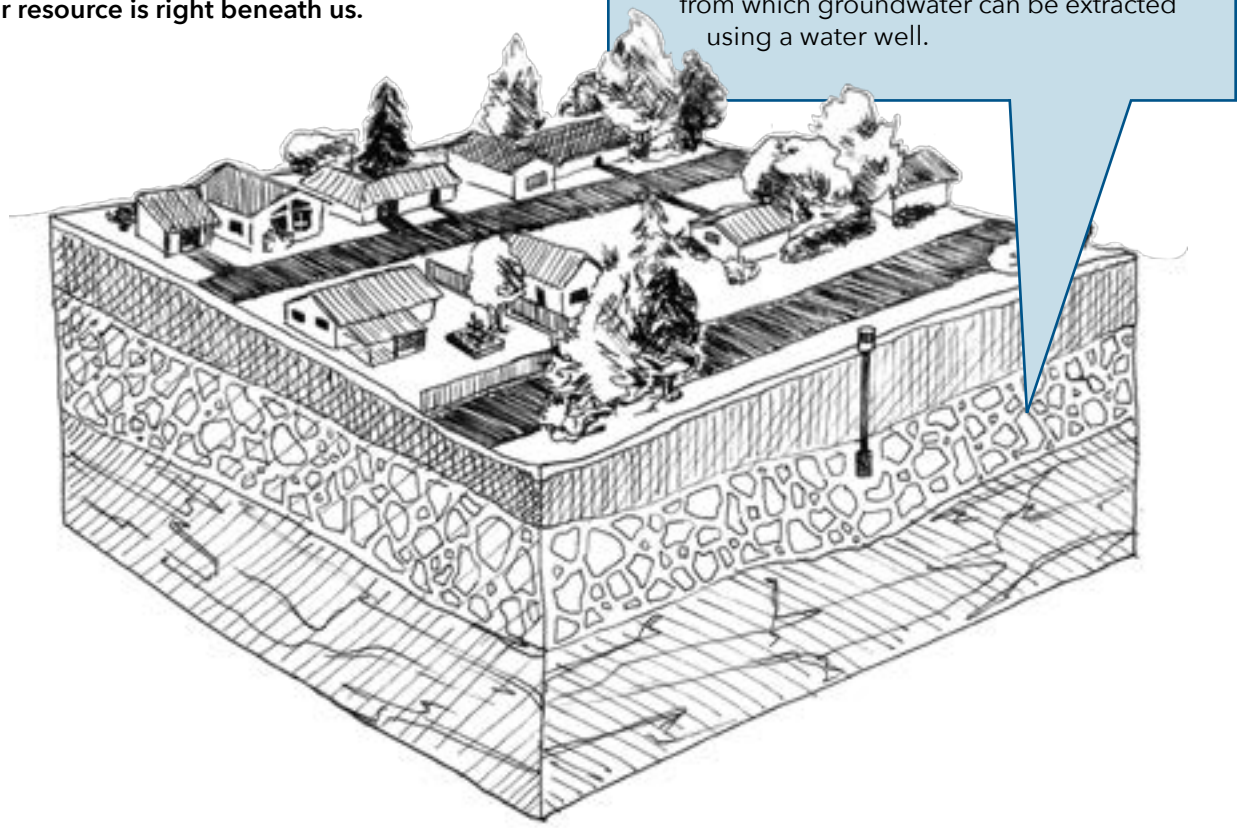
Springfield has access to such a high quality, plentiful water supply because it is located within two river valleys. The principal aquifers in the Springfield area occur in the valleys of the Willamette and McKenzie Rivers. Underneath the ground throughout these valleys, there are different sizes and types of geologic material, and the pore spaces between them are filled with groundwater.

Although most of us don't see it, this crucial drinking water resource is right beneath us.

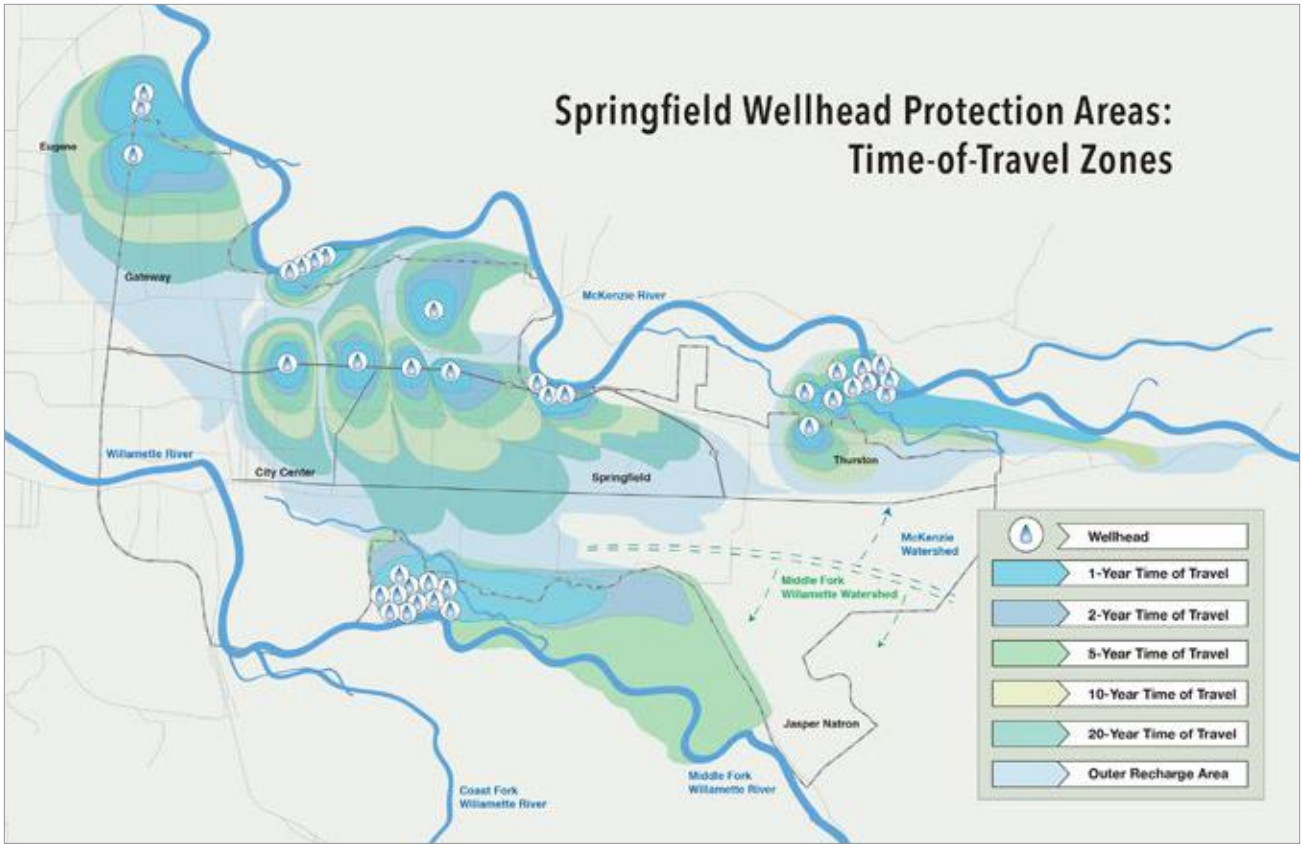
As water moves through the aquifer, the geology's natural filtration process purifies it, giving us high quality water that requires minimal additional treatment. Nevertheless, the aquifer's ability to provide natural filtration can become overwhelmed if contaminants make their way to groundwater. For this reason, we must protect our drinking water sources by preventing harmful chemicals from entering the ground.

AQUIFER:

An underground layer of water-bearing permeable rock, rock fractures, or unconsolidated materials (gravel, sand, or silt) from which groundwater can be extracted using a water well.



The Springfield Wellhead Protection Areas (WHPAs) map below illustrates the sensitivities of Springfield's drinking water supply. The map highlights the total area on the ground surface that overlies that part of the aquifer(s) that supplies Springfield's wells. These WHPAs are divided into different "time-of-travel" zones. The time-of-travel zones refer to the amount of time it takes for groundwater to move from that zone to the pumping well. For example, within a one-year zone, groundwater is expected to reach a well in less than a year's time, and in some cases it could take only a few days. In a more distant zone, groundwater may not reach a well for 20 years, or even 99 years.



It is within these WHPAs that the actions we take above ground can affect the quality of Springfield's drinking water sources below ground. Contaminants released within the WHPAs can migrate down to the aquifer and travel to a well. The time-of-travel zones indicate how much time it would take a contaminant to potentially reach the well. Whether or not any given contaminant ultimately reaches the well depends on a variety of factors such as contaminant chemistry, soil makeup, depth to groundwater, and natural breakdown. Without the ability to consider all of these factors at all times, we use the zones as a general guide for how to strategically and most effectively protect our drinking water sources. The shorter the time of travel, the more likely a contaminant will reach a well. The greatest caution is necessary in the most sensitive areas; however, the entire WHPAs warrant protection because many chemicals, such as chlorinated solvents, have the ability to persist for decades. (Appendix A provides a description of how Springfield's time-of-travel zones were determined.)

The best way to protect Springfield's WHPAs from contamination is through the careful management of hazardous materials and other harmful chemicals. Examples include close monitoring of large chemical storage tanks, use of secondary containment, elimination of chlorinated solvents, proper disposal of commercial and household hazardous waste, prevention of spills into the stormwater system, and careful and judicious use of pesticides and fertilizers. While there are so many ways that each of us can help protect Springfield's drinking water sources, this guidebook focuses specifically on the last item: careful and judicious use of pesticides.

INTEGRATED PEST MANAGEMENT

Anyone choosing to apply a pesticide takes on a responsibility to make careful decisions about what, when, where, and how to apply. Before heading out with the bottle or sprayer, be sure you need it!

STOP and ask some important questions:

1. What am I trying to achieve? Is the pest causing lasting damage or posing a real problem?
2. Is a pest really the cause of my problem?
3. Are there enough pests to justify using a chemical?
4. Can I change the conditions that have caused the pest to become a problem?
5. Other than a pesticide, what else might work?

Through an approach called **Integrated Pest Management** (IPM), you can combine non-chemical or least-toxic chemical forms of control. IPM minimizes the use of chemical controls by relying on a comprehensive combination of pest management methods and uses chemical control as the last resort. A combination of different measures provides the most effective long-term pest control. Below are a few examples:

Cultural Control

Examples: Using a fertilizing & watering regime that maintains a healthy lawn; spot spraying individual weeds instead of applying an herbicide to an entire lawn or shrub bed selecting pest-resistant varieties or species.

Physical Control

Examples: Leaving leaves on the ground; using mulches and/or landscape fabric to keep weeds from growing; using solarization for soilborne pathogens or weed seeds.

Mechanical Control

Examples: Hoeing or digging weeds; cutting vines (like ivy & blackberries) to the ground and then digging or pulling out root crowns; burning weeds with a torch or boiling water; spraying leaves forcefully with water to remove insects; using traps or creating barriers to exclude pests.

Biological Control

Examples: Planting groundcover to reduce the area where weeds can grow; using beneficial organisms such as insects that eat or parasitize other insects.

Replanting

In extreme cases, where a plant requires regular pesticide treatment, consider replanting with a more pest-resistant species or variety.

One of the most straightforward ways to protect our drinking water sources from pesticide overuse or misapplication is simply to use less pesticide. Oregon State University Extension Service (extension.oregonstate.edu) and the Northwest Center for Alternatives to Pesticides (pesticide.org/pests_and_alternatives) provide a tremendous amount of information online about IPM and non-chemical pest management. The lists above offer a few examples, but don't stop there. **Find more resources and achieve your own pesticide alternatives success story!**

PESTICIDE EVALUATION TOOL: FIVE STEPS

If–after considering non-chemical approaches–you find that a pesticide is necessary, use this tool to evaluate the potential risk your chosen pesticide poses to Springfield's drinking water and to identify low risk products.

The evaluation tool will take you through five steps. To help keep track of the different products you evaluate, you can make notes **on one of the log sheets found at the end of this guide.**

STEP 1: READ THE LABEL!

The label is the law! Labels are legal documents providing directions on how to mix, apply, store, and dispose of a pesticide. Labels also contain information on potential hazards associated with the product, including impact to groundwater, and instructions to follow in the event of a poisoning or spill. Following label instructions allows you to minimize the risks and maximize the benefits.

Although this evaluation tool focuses on impact to groundwater, continue to follow all requirements associated with using a pesticide product, including being aware of the specific hazards. Always read the label carefully before you buy a product and make sure it is intended for your specific use.

READ THE PRODUCT LABEL

BEFORE PURCHASING
BEFORE USING
BEFORE STORING
BEFORE DISPOSING

STEP 2: FIND THE GROUNDWATER UBIQUITY SCORE (GUS)

The **Groundwater Ubiquity Score**, known as GUS, is a calculated value that ranks pesticides for their potential to move toward groundwater. A higher GUS means greater potential to leach into groundwater (see Appendix B for a description of how the GUS is derived).

To determine the GUS for your chosen product:

➔ **Find your product's active ingredient(s) on the product label and record on your log sheet**. See example below.

PESTICIDE EVALUATION LOG

DATE & ADDRESS OF APPLICATION:	NOTES FROM LABEL:	GUS NUMERICAL VALUE:	PEST MANAGEMENT APPROACH/NOTES:
5/1/20 123 Green Street			
PRODUCT NAME: No-name Brand Weed and Grass Killer	SIGNAL WORD:	GUS RANKING (circle one): Low Moderate High	
ACTIVE INGREDIENT(S): Dicamba, Dimethylamine Salt Diquat dibromide Fluazifop-p-butyl	PRECAUTIONS:	RELATIVE RISK TO SPRINGFIELD'S DRINKING WATER (circle one): Low Moderate High Very High Outside Wellhead Protection Area	

➔ **Now find your product's active ingredient(s) in the lists that start on the next page.**

➔ **On your log sheet, write down the numerical GUS value(s) and circle the GUS ranking (low, moderate, or high).** If the product has more than one active ingredient, circle the ranking for the highest applicable GUS. See example below.

PESTICIDE EVALUATION LOG

DATE & ADDRESS OF APPLICATION:	NOTES FROM LABEL:	GUS NUMERICAL VALUE:	PEST MANAGEMENT APPROACH/NOTES:
5/1/20 123 Green Street		-6.00, 4.24, 0.29	
PRODUCT NAME: No-name Brand Weed and Grass Killer	SIGNAL WORD:	GUS RANKING (circle one): Low Moderate (High)	
ACTIVE INGREDIENT(S): Dicamba, Dimethylamine Salt	PRECAUTIONS:	RELATIVE RISK TO SPRI…KING WATER (circle one): …igh Very High …otection Area	

BREAKDOWN OF GUS VALUES

Higher value means greater potential to leach into groundwater

Numerical Score	Risk Ranking
<2	Low
2-3	Moderate
>3	High

FUNGICIDES

ACTIVE INGREDIENT	GUS	GUS RANK
AZADIRACHTIN	3.80	High
AZOXYSTROBIN	2.78	Mod
BOSCALID	2.10	Mod
CAPTAN	0.81	Low
CHLOROTHALONIL	1.27	Low
CINNAMALDEHYDE	0.49	Low
COPPER OCTANOATE	3.70	High
COPPER SULFATE PENTAHYDRATE	0.07	Low
COPPER SULFATE, pH 5	3.08	High
COPPER SULFATE, pH 7	-0.75	Low
DIFENOCONAZOLE	0.86	Low
KAOLIN	0.49	Low
MINERAL OIL/PETROLEUM DISTILLATE	1.00	Low
MYCLOBUTANIL	2.37	Mod
OIL, CANOLA	0.00	Low
OIL, NEEM (CLARIFIED HYDROPHOBIC EXTRACT)	0.00	Low
OIL, NEEM (COLD-PRESSED)	1.69	Low
PCNB	0.40	Low
PHOSPHOROUS ACID, MONO- AND DI-POTASSIUM SALTS OF	2.91	Mod
POTASSIUM BICARBONATE	2.91	Mod
POTASSIUM LAURATE	0.00	Low
PROPICONAZOLE	2.04	Mod
PYRACLOSTROBIN	-0.06	Low
SODIUM LAURYL SULFATE	1.08	Low
STREPTOMYCIN SULFATE	3.97	High
SULFUR	3.18	High
TEBUCONAZOLE	1.86	Low
THIABENDAZOLE	1.57	Low
THIOPHANATE-METHYL	0.74	Low
TRITICONAZOLE	3.54	High

HERBICIDES

ACTIVE INGREDIENT	GUS	GUS RANK
2 4-D	2.70	Mod
2 4-D, DIMETHYLAMINE SALT	2.70	Mod
2 4-D, ETHYLHEXYL ESTER	3.58	High
2 4-DP, DIMETHYLAMINE SALT	2.59	Mod
2 4-DP-P	3.01	High
2 4-DP-P, DIMETHYLAMINE SALT	2.59	Mod
ACETIC ACID	3.90	High
AMINOPYRALID, TRIISOPROPANOLAMINE SALT	4.46	High
AMINOPYRALID, POTASSIUM SALT	4.46	High
AMMONIUM SALTS OF FATTY ACIDS	0.00	Low
BENEFIN (BENFLURALIN)	0.07	Low
BROMOXYNIL	1.37	Low
BROMOXYNIL, HEPTANOATE	0.72	Low
BROMOXYNIL, OCTANOIC ACID ESTER [Octanoate]	0.00	Low
CARFENTRAZONE-ETHYL	0.64	Low

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HERBICIDES CONT.

ACTIVE INGREDIENT	GUS	GUS RANK
CLETHODIM	2.98	Mod
CLOPYRALID	4.88	High
CLOPYRALID, MONOETHANOLAMINE SALT	5.16	High
CLOPYRALID, TRIETHANOLAMINE SALT	3.68	High
DCPA (CHLORTHAL-DIMETHYL)	0.60	Low
DICAMBA	3.78	High
DICAMBA, DIMETHYLAMINE SALT	4.24	High
DICAMBA, POTASSIUM SALT	4.24	High
DICHLOBENIL	2.49	Mod
DIQUAT DIBROMIDE	-6.00	Low
DITHIOPYR	1.74	Low
DIURON	2.58	Mod
FENOXAPROP-P-ETHYL	0.00	Low
FLUAZIFOP-P-BUTYL	0.29	Low
FLURIDONE	1.32	Low
FLUROXYPYR, 1-METHYLHEPTYL ESTER	-0.61	Low
GLYPHOSATE	1.17	Low
GLYPHOSATE, ISOPROPYLAMINE SALT	-0.64	Low
HALOSULFURON-METHYL	2.80	Mod
IMAZAPIC, AMMONIUM SALT	6.44	High
IMAZAPYR, ISOPROPYLAMINE SALT	3.91	High
INDAZIFLAM	2.30	Mod
IRON HEDTA -FEHEDTA-	2.24	Mod
ISOXABEN	1.71	Low
LIMONENE	0.62	Low
MCPA, 2-ETHYLHEXYL ESTER	3.12	High
MCPA, DIMETHYLAMINE SALT, pH 7	3.77	High
MCPP, DIMETHYLAMINE	2.88	Mod
MCPP (MECOPROP)	3.08	High
MCPP-P	3.87	High

ACTIVE INGREDIENT	GUS	GUS RANK
MCPP-P, DMA SALT	2.88	Mod
MCPP-P, POTASSIUM SALT (MECOPROP-P)	3.87	High
MESOTRIONE, pH 4.5	1.77	Low
MESOTRIONE, pH 7.7	3.48	High
METOLACHLOR (ACETAMIDE)	3.32	High
METSULFURON-METHYL	5.11	High
ORYZALIN	1.59	Low
OXADIAZON	0.88	Low
OXYFLUORFEN	-1.54	Low
PELARGONIC ACID (NONANOIC ACID)	0.91	Low
PENDIMETHALIN	0.59	Low
PENOXSULAM	2.38	Mod
PICLORAM	5.64	High
PICLORAM, POTASSIUM SALT	5.46	High
PICLORAM, TRIISOPROPANOLAMINE	5.46	High
POTASSIUM LAURATE	0.00	Low
PRODIAMINE	-0.24	Low
PROMETON	4.92	High
PRONAMIDE (PROPYZAMIDE)	3.02	High
QUINCLORAC	6.11	High
SETHOXYDIM	1.40	Low
SIDURON (TUPERSAN)	2.69	Mod
SULFENTRAZONE	6.47	High
SULFOMETURON-METHYL	2.74	Mod
TRICLOPYR	2.41	Mod
TRICLOPYR, BUTOXYETHYL ESTER	1.84	Low
TRICLOPYR, TRIETHYLAMINE SALT	4.49	High
TRIFLURALIN	0.17	Low
ZINC SULFATE MONOHYDRATE, pH 5	3.12	High
ZINC SULFATE MONOHYDRATE, pH 7	0.00	Low

INSECTICIDES

ACTIVE INGREDIENT	GUS	GUS RANK
ABAMECTIN (AVERMECTIN B1)	0.44	Low
ACEPHATE	1.76	Low
ACETAMIPRID	2.13	Mod
AZADIRACHTIN	3.80	High
BETA-CYFLUTHRIN	-0.90	Low
BIFENTHRIN	-1.95	Low
BIOALLETHRIN	0.00	Low
BORIC ACID	6.21	High
CAPSAICIN	0.39	Low
CARBARYL	1.52	Low
CHLORANTRANILIPROLE	4.01	High
CLOTHIANIDIN	5.20	High
CYANTRANILIPROLE	2.48	Mod
CYFLUTHRIN	-1.48	Low
CYHALOTHRIN	-2.20	Low
CYHALOTHRIN, GAMMA	-1.11	Low
CYHALOTHRIN, LAMBDA	-1.85	Low
CYPERMETHRIN	-2.20	Low
DDVP (DICHLORVOS; DICHLOROVOS)	-0.76	Low
DELTAMETHRIN	-3.98	Low
DIFLUBENZURON	0.00	Low
DINOTEFURAN	4.95	High
D-TRANS ALLETHRIN	5.17	High
EMAMECTIN BENZOATE	3.60	High
ESFENVALERATE	0.43	Low
ETOFENPROX	-1.02	Low
EUGENOL	0.49	Low
FENVALERATE	0.43	Low
FIPRONIL (AMINODICHLOROPYRAZOLE CARBONITRILE)	2.06	Mod
GERANIOL	0.49	Low

ACTIVE INGREDIENT	GUS	GUS RANK
HYDRAMETHYLNON	-1.86	Low
IMIDACLOPRID	3.69	High
IMIPROTHRIN	0.98	Low
INDOXACARB	0.48	Low
KAOLIN	0.49	Low
LIMONENE	0.62	Low
MALATHION	0.00	Low
MGK 264 (N-OCTYL BICYCLOHEPTENE DICARBOXIMIDE)	2.65	Mod
MINERAL OIL/PETROLEUM DISTILLATE	1.00	Low
NOVALURON	0.06	Low
OIL, CANOLA	0.00	Low
OIL, CITRONELLA	1.08	Low
OIL, CLOVE	1.40	Low
OIL, GARLIC	0.39	Low
OIL, MINT	0.00	Low
OIL, NEEM (CLARIFIED HYDROPHOBIC EXTRACT)	0.00	Low
OIL, NEEM (COLD-PRESSED)	1.69	Low
OIL, SOYBEAN	0.00	Low
OIL, THYME	0.49	Low
PERMETHRIN	-1.48	Low
PHENOTHRIN	0.00	Low
PHENYLETHYL PROPIONATE	0.49	Low
PIPERONYL BUTOXIDE	-1.06	Low
POTASSIUM LAURATE	0.00	Low
PRALLETHRIN-ETOC-	1.73	Low
PROPOXUR	3.73	High
PYRETHRINS	-1.08	Low
PYRIPROXYFEN (NYLAR)	-0.22	Low
S-METHOPRENE	0.49	Low

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INSECTICIDES CONT.

ACTIVE INGREDIENT	GUS	GUS RANK
SODIUM BORATE (BORAX)	2.18	Mod
SODIUM LAURYL SULFATE	1.08	Low
SPINOSAD	-0.69	Low
SULFUR	3.18	High
TAU-FLUVALINATE	-2.95	Low
TETRAMETHRIN	0.40	Low
THIAMETHOXAM	3.58	High
TRICHLORFON	3.00	Mod
ZETA-CYPERMETHRIN	-1.09	Low

OTHER

ACTIVE INGREDIENT	GUS	GUS RANK	LABEL TYPE
CAPSAICIN	0.39	Low	Insect & Vertebrate Repellent
GERANIOL	0.49	Low	Insect & Vertebrate Repellent
IRON PHOSPHATE	0.49	Low	Molluscicide
METALDEHYDE	1.62	Low	Molluscicide
OIL, BLACK PEPPER	2.60	Mod	Vertebrate Repellent
OIL, CASTOR	1.08	Low	Vertebrate Repellent
OIL, GARLIC	0.39	Low	Insect & Vertebrate Repellent
OIL, LEMONGRASS	0.00	Low	Vertebrate Repellent
SODIUM FERRIC EDTA	4.04	High	Molluscicide

Don't see your preferred active ingredient on the list?

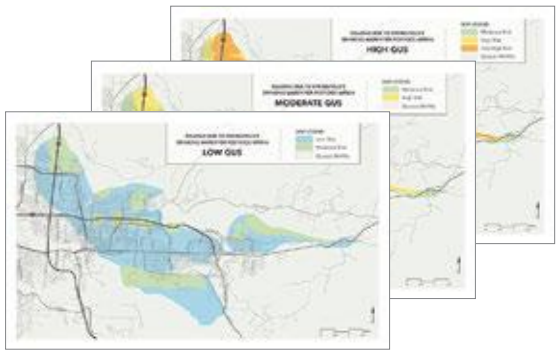
Please let us know. We plan to update this list in digital format and would like to add more active ingredients over time and as data become available. An active ingredient's absence from the list does not mean that it has no potential impact to groundwater.

PLEASE NOTE:

The GUS index is a simple indicator of a chemical's potential for leaching into groundwater. It is based on two environmental fate properties of the chemical and takes no account of environmental conditions. It is not a substitute for in-depth assessments that consider site characteristics and/or a broader range of chemical characteristics.

STEP 3: DETERMINE THE RELATIVE RISK

Now consider the pesticide and the location together to determine the relative risk to Springfield's drinking water.



➔ At the back of this guide, you will find three maps of Springfield, labeled "**Low GUS**," "**Moderate GUS**," and "**High GUS**." The map you use depends on whether your GUS is low, moderate, or high.

➔ **Locate your application site on the correct map.** The color shading on the map tells you the relative risk to Springfield's drinking water of using your product at that location.

➔ **On your log sheet, circle the relative risk.** If your location crosses the border between two different colors, circle the higher risk ranking. See example below.

PESTICIDE EVALUATION LOG

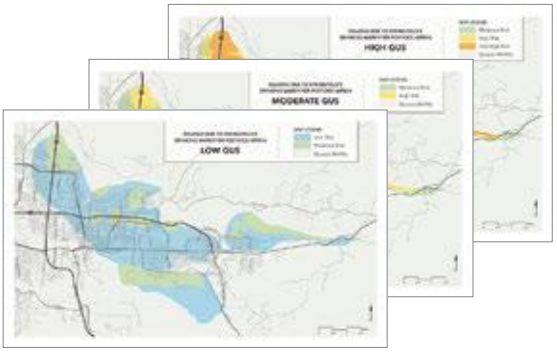
DATE & ADDRESS OF APPLICATION:	NOTES FROM LABEL:	GUS NUMERICAL VALUE:	PEST MANAGEMENT APPROACH/NOTES:
5/1/20 123 Green Street		-6.00, 1.24, 0.29	
PRODUCT NAME: No-name Brand Weed and Grass Killer		GUS RANKING (circle one): Low Moderate (High)	
ACTIVE INGREDIENT(S): Dicamba, Dimethylamine Salt Diquat dibromide Fluazifop-p-butyl	SIGNAL WORD: PRECAUTIONS:	RELATIVE RISK TO SPRINGFIELD'S DRINKING WATER (circle one): Low (Moderate) High Very High Outside Wellhead Protection Area	

WHY IS THE RISK "RELATIVE?"

These risk classifications are **relative**, which means that their risk level is **as compared to other pesticides**. They do not represent absolute risk. For example, a low relative risk means the risk is low as compared to other pesticide-site pairings.

STEP 4: MAKE SENSE OF THE RISK

Now that you have determined the relative risk, Step 4 will help you use that information. The goal is to figure out how to achieve your pest management needs with the lowest possible risk to Springfield's drinking water.



The table below explains how to make sense of each relative risk classification.

RELATIVE RISK	ACTION TO TAKE
OUTSIDE WHPAs	The pesticide application will occur outside of Springfield's designated Wellhead Protection Areas. Keep in mind that there may be other nearby wells and surface water bodies. Regardless of your location, always follow the label and adhere to best management practices for pesticide mixing, loading, application, transportation, storage, and disposal.
LOW RISK	The pesticide application will pose a low relative risk to Springfield's drinking water. Follow the label and refer to the best management practices on pages 15-17.
MODERATE RISK	Try to reduce the risk by using a pesticide with the lowest possible GUS. If your evaluation yields a moderate risk even when the GUS is low, that means you are working in a very sensitive area. In that case follow the label, proceed with caution, and closely follow the best management practices on pages15-17 to help protect groundwater. Adopting Integrated Pest Management will also help you reduce risk by allowing you to use less pesticide.
HIGH RISK	Return to the lists starting on page 8 to find active ingredients that have lower GUS values. If you are unable to identify low-risk options, consider contacting the Oregon State University Extension Office in Lane County (541-344-5859) to discuss your pest management needs. If you find yourself applying pesticides in a high-risk situation, you can still take steps to mitigate the impact (see best management practices on pages 15-17). Adopting Integrated Pest Management will also help you reduce risk by allowing you to use less pesticde.
VERY HIGH RISK	

STEP 5: PLAN YOUR MANAGEMENT APPROACH

After going through the first four steps and evaluating your options and alternatives, you can use the extra space on the log sheet for notes about the pest management approach you will take. See example below:

PESTICIDE EVALUATION LOG

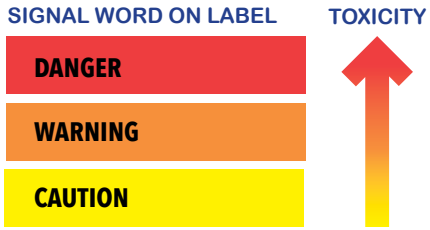
DATE & ADDRESS OF APPLICATION:	NOTES FROM LABEL:	GUS NUMERICAL VALUE:	PEST MANAGEMENT APPROACH/NOTES:
5/1/20 123 Green Street		-6.00, 1.24, 0.29	For this location, switch to pesticide with lower GUS. If have to use this chemical closer to wells, brush-on only.
PRODUCT NAME: No-name Brand Weed and Grass Killer	SIGNAL WORD:	GUS RANKING (circle one): Low Moderate (High)	
ACTIVE INGREDIENT(S): Dicamba, Dimethylamine Salt Diquat dibromide Fluazifop-p-butyl	PRECAUTIONS:	RELATIVE RISK TO SPRINGFIELD'S DRINKING WATER (circle one): Low (Moderate) High Very High Outside Wellhead Protection Area	

If you will use a pesticide, don't forget to read the label, even if you already read it! Because this evaluation tool focuses only on the pesticide's potential impact to groundwater, pay special attention to the signal word on the label. The signal words (DANGER, WARNING, or CAUTION) describe the acute (short-term) toxicity of the formulated product. There is no relationship between GUS and signal words. It is possible for a pesticide to have a low GUS and a high toxicity! You can use your log sheet to note important information from the label. See example below:

PESTICIDE EVALUATION LOG

DATE & ADDRESS OF APPLICATION:	NOTES FROM LABEL:	GUS NUMERICAL VALUE:	PEST MANAGEMENT APPROACH/NOTES:
5/1/20 123 Green Street	Toxic to aquatic invertebrates	-6.00, 1.24, 0.29	For this location, switch to pesticide with lower GUS. If have to use this chemical closer to wells, brush-on only.
PRODUCT NAME: No-name Brand Weed and Grass Killer	SIGNAL WORD: Warning	GUS RANKING (circle one): Low Moderate (High)	
ACTIVE INGREDIENT(S): Dicamba, Dimethylamine Salt Diquat dibromide Fluazifop-p-butyl	PRECAUTIONS: Apply in calm weather w/ no rain expected in 24 hrs. Wear chemical-resistant gloves	RELATIVE RISK TO SPRINGFIELD'S DRINKING WATER (circle one): Low (Moderate) High Very High Outside Wellhead Protection Area	

The signal word can be used to select the least toxic product(s) of those that are sufficiently effective. Regardless of the signal word on the pesticide product, it is important to remember that every product still has the potential to poison. For more information about pesticide toxicity, visit the National Pesticide Information Center at npic.orst.edu.

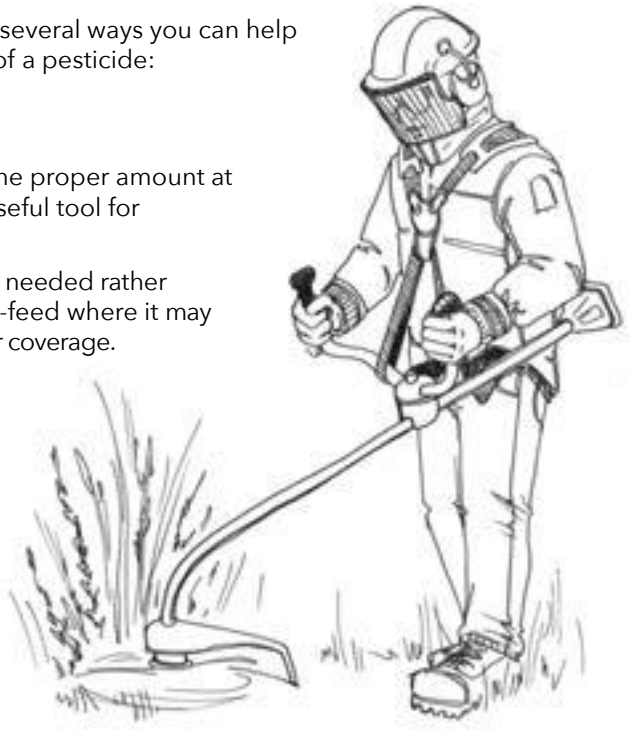


Special Notes About Using This Tool

- This tool narrowly focuses on impact to Springfield's drinking water. The pesticide applicator still must consider other factors such as toxicity, movement in the air, and appropriateness of product for the pest management goal.
- This tool does not take into account factors such as application rate and timing, rainfall, irrigation, and weather conditions. It is the applicator's responsibility to follow the label when using any pesticide product.

Best Management Practices for Application of Pesticides Within Groundwater Protection Areas

In addition to using the Pesticide Evaluation Tool, there are several ways you can help protect Springfield's drinking water when considering use of a pesticide:



Do everything possible to maximize efficacy:

- Know the size of the area you plan to treat and apply the proper amount at the proper rate and time. Google Earth Pro is a free, useful tool for determining the size of your site.
- Spot spray to kill weeds and apply fertilizer separately if needed rather than broadly applying an herbicide such as weed-and-feed where it may not be needed. Use a dye indicator to help ensure proper coverage.
- Direct application exactly onto the target site.
- Wipe or brush-on pesticide instead of spraying.
- Calibrate! During calibration, check the equipment for leaks. Be sure the equipment is working well.
- Maintain your spray equipment (i.e. clean and/or change out nozzles). Poorly maintained equipment can result in over- or under-application of pesticides.
- Keep records of pesticide use.

Minimize pesticide use:

- Use other pest control methods whenever you can. Use Integrated Pest Management.
- Buy only what you need this season; mix only what you need today.

Read the landscape and evaluate how your pesticide application will affect it:

- Think about where you will apply the pesticide in relation to groundwater and surface water. Be extra careful around low or sunken areas, sandy soils, old wells, and shallow groundwater.
- Don't apply pesticides in swales, rain gardens, or other vegetated stormwater facilities.
- Avoid pesticide use and handling close to wells, streams, ponds, and other water sources.
- Know the kind of soil you are working with. In high risk areas, use soil amendments to increase organic matter content.
- Avoid applying pesticides to fissures or cracks in dry soil.

Avoid spills and accidents:

- Quickly and completely clean up any accidental spills.
- Store unused chemicals in a clean and dry storage site away from wells, cisterns, springs, and other water sources. Keep chemicals in an enclosed space like a cabinet where they are less likely to be accidently spilled. See page 17 for more information about pesticide storage.

Select the Right Herbicide

It is important to select the correct herbicide for your needs. Some herbicides kill every plant they contact, while others kill only certain plants. For example, you can apply a selective broadleaf herbicide on thegrass and this would kill only the broadleaved weeds and not the grass. Many times, it is better to apply an herbicide directly to unwanted plants rather than using "weed and feed" types of products that result in applying herbicides where weeds are not present.

In addition, the fertilizer and herbicide components of many weed-and-feed products are less effective than when the products are separate.

The timing of an herbicide application is important. You must apply herbicide at the right time to affect your target species without injuring desirable plants.

PREEMERGENCE HERBICIDES are applied before weeds appear or can be used after you have hand weeded an area to prevent weeds from coming back.

POSTEMERGENCE HERBICIDES are used after weeds appear. These applications should be very selective in controlling the weeds without harming desirable vegetation.

As always, follow the directions and warnings on the label.

Proper Storage, Disposal and Transport of Chemicals

Proper pesticide storage, disposal, and transport is important to protect people, animals, groundwater and surface water, and the pesticide itself. Keep these tips in mind:

Pesticide Storage

- Pesticides should always be stored in their original containers with their original labeling. Never store pesticides in food or drink containers.
- Extremes in temperature can change pesticide chemistry. As a general rule, pesticides are best stored between 40-9(
- Designate a place used only for pesticide storage.
- Pick a well-ventilated location that children and pets cannot access, preferably with a latch or lock.
- Keep pesticides away from food, feed, and flames.
- Store pesticides out of direct sunlight.
- Choose a location away from ponds, streams and drinking water wells.
- Store bottles inside a larger container, such as a plastic tote, that could contain liquids in the event of a leak or spill.

Pesticide disposal

- Clean containers by rinsing at least three times. The rinse water should be clear. Pour the rinse water back into the spray tank and treat sites.
- If any product is left in the container it must be disposed of as hazardous waste.
- Dispose of product as instructed on the product label.
- Never reuse a pesticide container for any purpose.
- Do not pour rinse water into any drain or on any site not listed on the product label.
- Wear protective clothing when rinsing containers.
- Make an appointment to take unused chemicals to the Lane County Waste Management Facility in Glenwood, or take chemicals to a household hazardous waste round-up event. (Contact Lane County Waste Management at 541-682-4120 to arrange disposal.)

Pesticide Transport

- Keep pesticides in their original containers with the labels attached.
- Place containers so they won't shift and/or spill.
- Line the transport area in your vehicle or place pesticides in a plastic bin to contain any spills in case of an accident.
- If pesticides are carried in the back of an open vehicle, secure and cover the load.
- Don't put pesticides in the passenger compartment of a vehicle.
- Keep pesticides away from groceries, including food for animals.
- Drive carefully!

Common Pesticides and Their GUS Rankings

LOW GUS (<2)

ACTIVE INGREDIENT	GUS	PESTICIDE TYPE
ABAMECTIN	0.44	Insecticide
BENEFIN (BENFLURALIN)	0.07	Herbicide
BIFENTHRIN	-1.95	Insecticide
CHLOROTHALONIL	1.27	Fungicide
CYHALOTHRIN, LAMBDA	-1.85	Insecticide
DIQUAT DIBROMIDE	-6.00	Herbicide
FLUROXYPYR, 1-METHYLHEPTYL ESTER	-0.61	Herbicide
GLYPHOSATE, ISOPROPYLAMINE SALT	-0.64	Herbicide
OIL, NEEM (CLARIFIED HYDRO-PHOBIC EXTRACT)	0.00	Fungicide; Insecticide
ORYZALIN	1.59	Herbicide
OXYFLUORFEN	-1.54	Herbicide
PENDIMETHALIN	0.59	Herbicide
PERMETHRIN	-1.48	Insecticide
PRODIAMINE	-0.24	Herbicide
PYRETHRINS	-1.08	Insecticide
TEBUCONAZOLE	1.86	Fungicide
TETRAMETHRIN	0.40	Insecticide
TRIFULRALIN	0.17	Herbicide

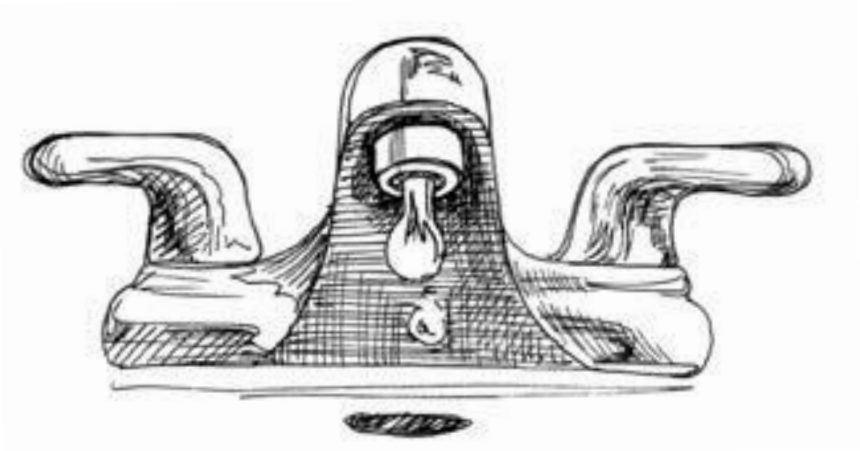
MODERATE GUS (2-3)

ACTIVE INGREDIENT	GUS	PESTICIDE TYPE
2 4-D	2.70	Herbicide
2 4-D, DIMETHYLAMINE SALT	2.70	Herbicide
MCPP-P, DMA SALT	2.88	Herbicide
PROPICONAZOLE	2.04	Fungicide

HIGH GUS (>3)

ACTIVE INGREDIENT	GUS	PESTICIDE TYPE
2 4-D, ETHYLHEXYL ESTER	3.58	Herbicide
AZOXYSTROBIN	2.78	Fungicide
CLOTHIANIDIN	5.20	Insecticide
DICAMBA	3.78	Herbicide
DICAMBA, DIMETHYLAMINE SALT/ DICAMBA, POTASSIUM SALT	4.24	Herbicide
IMAZAPIC, AMMONIUM SALT	6.44	Herbicide
IMIDACLOPRID	3.69	Insecticide
MCPP-P	3.87	Herbicide
QUINCLORAC	6.11	Herbicide
SULFENTRAZONE	6.47	Herbicide
THIAMETHOXAM	3.58	Insecticide
TRICLOPYR, TRIMETHYLAMINE SALT	4.49	Herbicide

Other Ways to Protect Springfield's Drinking Water



Cautious use of pesticides is just one of the many ways we can all protect Springfield's drinking water. Here are some more:

- Be very careful with and always clean up any spills of materials like gasoline, solvents, and deck stains.
- Use a slow-release fertilizer and only the amount you need.
- Maintain natural buffer areas of native plants between your property and any stream, lake, or drainage way.
- Learn about "rain gardens" and how you can plant one in your yard. Visit springfieldstreams.org for information about rain gardens and other ways to protect Springfield's streams.
- Make sure "little litter," such as cigarette butts, go in the trash.
- Use non-toxic cleaning products around the house.
- Keep your car in tune to prevent drips and leaks. Consider using an Ecobiz-certified auto shop: lanep2c.org/find-an-ecobiz.
- Be a pooper scooper for both small and large animals.
- Cover manure piles and keep them away from any streams or wells.
- If applicable, keep your septic system healthy—protect the drainfield and pump the tank.
- Properly dispose of household hazardous waste: Make an appointment to take unused chemicals to the Lane County Waste Management Facility in Glenwood, or take chemicals to a household hazardous waste round-up event. (Contact Lane County Waste Management at 541-682-4120 to arrange disposal.)
- Dispose of unwanted or expired pharmaceuticals at one of the local drop-boxes (Lane County Sherriff's office – 125 E. 8th Ave.; Springfield Justice Center – 230 4th St.; Eugene Police Department – 300 County Club Road).
- Spread the word! Let your friends and family know about the importance of protecting our local drinking water sources.

Resources and Contacts for Additional Information

Pacific Northwest Weed Management Handbook: pnwhandbooks.org/weed

Pacific Northwest Insect Management Handbook: pnwhandbooks.org/insect

Pacific Northwest Plant Disease Management Handbook: pnwhandbooks.org/plantdisease

Pesticide Information Center Online (PICOL): picol.cahe.wsu.edu/LabelTolerance

National Pesticide Information Center: npic.orst.edu

Pollinator Protection: pesticidestewardship.org/pollinator-protection

Northwest Center for Alternatives to Pesticides: www.pesticide.org

Clean Water for Salmon: www.pesticide.org/clean_water_salmon

Integrated Pest Management: ipm.ucanr.edu

EPA Minimum-Risk Pesticides: epa.gov/minimum-risk-pesticides

Groundwater Foundation: groundwater.org

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City of Springfield, Springfield Utility Board, and Rainbow Water District, 1999. *Springfield Drinking Water Protection Plan*.

Gustafson, D. I. 1989. Groundwater ubiquity score: A simple method for assessing pesticide leachability. *Environmental Toxicology and Chemistry*, 8: 339–357. doi:10.1002/etc.5620080411.

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National Pesticide Information Center. "Website Resources." npic.orst.edu/index.html

National Association of State Departments of Agriculture Research Foundation, 2014. *National Pesticide Applicator Certification Core Manual (2nd ed.)*.

Northwest Center for Alternatives to Pesticides. Tips for Weeds, Lawns, and Landscaping. pesticide.org/resources_for_garden

Trautmann, N.M, Porter, K.S., and Wagenet, R.J. 2012. "Pesticides and Groundwater: A Guide for the Pesticide User." Natural Resources Cornell Cooperative Extension: Fact Sheets. psep.cce.cornell.edu/facts-slides-self/facts/pest-gr-gud-grw89.aspx

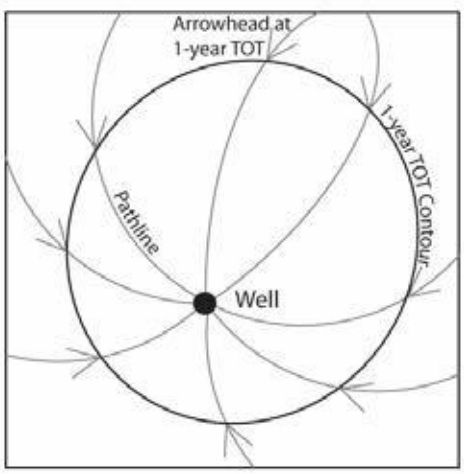
United States Environmental Protection Agency, 2017. "What is a Pesticide?" epa.gov/minimum-risk-pesticides/what-pesticide

University of California Agriculture & Natural Resources, Statewide Integrated Pest Management Program, 2006. Pesticide Information. ipm.ucanr.edu/PMG/PESTNOTES/pn74126.html#DECISION

Appendix A: Springfield Time-of-Travel Zones

Springfield Utility Board (SUB) first began to evaluate groundwater recharge areas and travel times to water supply wells in 1992, when it undertook a demonstration project with the State focused on one of its wellfields. In 1995, SUB expanded its wellhead protection efforts to include all of the wells contributing to the public water system, including those owned by the neighboring Rainbow Water District (RWD). This earlier work was again expanded in 1998 to consider the protection of planned wells, and in 2008, shortly after a new filter plant was constructed.

For each effort, SUB and RWD have retained the services of Oregon Professional Engineers and Registered Geologists to evaluate and perform the analyses used to delineate time-of-travel zones for the water supply wells. This work has then been reviewed by State of Oregon professionals and certified as a state drinking water source area.



Since 1995, the analysis and mapping of the recharge areas to the wells has utilized a numerical groundwater computer model written by the U.S. Geological Survey (USGS) and widely used in the United States and abroad. This model, named 'MODFLOW', has been used to represent the Springfield-area groundwater flow system in three dimensions. It includes representation of each well individually, the major river systems, the horizontal and vertical extent of the aquifers, and the aquifer boundaries occurring at the valley margins and also at depth below the valley. The initial work to create the model involved detailed assessment and mapping of the groundwater resource. Subsequent efforts have built onto and enhanced the initial model.

MODFLOW provides the ability to simulate the velocities of groundwater with inclusion of the effects of multiple pumping wells, precipitation, and hydraulic continuity of the aquifer and surface waters. A companion program, named 'MODPATH', is used to calculate groundwater travel times based on the MODFLOW output. MODPATH also is a USGS computer model creation with wide application.

MODPATH provides a graphical output consisting of pathlines as would be followed by a particle of water when travelling from the recharge area to a water supply well through the groundwater flow system. At the water supply well, the particle is extracted ("pumped") out of the groundwater system. MODPATH actually performs the tracking backwards from the well to the recharge area, calculating the particle movement based on groundwater velocity vectors. Fifty to 100 particles are tracked by computer to the recharge area for each well, and thereby define the well's recharge area. Arrowheads are drawn onto the pathline at a constant time increment, which can be specified, for example as a week, month or year (see figure). In the end result, the entire area that contributes groundwater to a water supply well is defined and arrowheads indicate the time of travel (TOT) at uniform increments along the pathlines. The entire recharge area to a well is called the zone of contribution, abbreviated to ZOC.

A time-of-travel zone for a water supply well is mapped based on the pathlines obtained from MODPATH. The boundary of each time-of-travel zone is delineated by drawing a line that connects the arrowheads of equal travel time for those pathlines that terminate at the well. For the Springfield delineations, pathline arrowheads were typically spaced at 1-year increments, facilitating mapping of the 1-, 2-, 5-, 10-, and 20-year time-of-travel zones. In some cases in the Springfield area, groundwater travel time is relatively fast and the recharge area of a well is moderately small. This situation results in a recharge area with less than 20 years of total travel time. Under this condition, time-of-travel zones are mapped as appropriate out to the ZOC. This condition has resulted in several of the wells having only the 1-, 2-, 5-, and 10-year time-of-travel zones mapped.

Appendix B: Groundwater Ubiquity Score

The GUS is an empirically derived value that relates pesticide persistence (half-life) and sorption in soil (sorption coefficient, Koc). The longer a pesticide persists in the environment (i.e. long half-life) or the less tightly it sorbs to the soil (i.e. small Koc), the greater the potential for that pesticide to make its way to groundwater. The GUS may be used to rank pesticides for their potential to move toward groundwater. The GUS is calculated using the expression: GUS = log10(half-life) x [4 - log10(Koc)].

The primary data used to calculate the GUS values for the active ingredients listed in this manual came from the Windows Pesticide Screening Tool (WIN-PST), a pesticide environmental risk screening tool developed and supported by the United States Department of Agriculture Natural Resources Conservation Service:

nrcs.usda.gov/wps/portal/nrcs/detailfull/national/water/quality/?cid=stelprdb1044769

PESTICIDE EVALUATION LOGS

PESTICIDE EVALUATION LOG

DATE & ADDRESS OF APPLICATION:	**NOTES FROM LABEL:**	**GUS NUMERICAL VALUE:**	**PEST MANAGEMENT APPROACH/NOTES:**
PRODUCT NAME:	***SIGNAL WORD:***	**GUS RANKING (circle one):** Low Moderate High	
ACTIVE INGREDIENT(S):	***PRECAUTIONS:***	**RELATIVE RISK TO SPRINGFIELD'S DRINKING WATER (circle one):** Low Moderate High Very High Outside Wellhead Protection Area	

DATE & ADDRESS OF APPLICATION:	**NOTES FROM LABEL:**	**GUS NUMERICAL VALUE:**	**PEST MANAGEMENT APPROACH/NOTES:**
PRODUCT NAME:	***SIGNAL WORD:***	**GUS RANKING (circle one):** Low Moderate High	
ACTIVE INGREDIENT(S):	***PRECAUTIONS:***	**RELATIVE RISK TO SPRINGFIELD'S DRINKING WATER (circle one):** Low Moderate High Very High Outside Wellhead Protection Area	

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ACTIVE INGREDIENT(S):	***PRECAUTIONS:***	**RELATIVE RISK TO SPRINGFIELD'S DRINKING WATER (circle one):** Low Moderate High Very High Outside Wellhead Protection Area	

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Emergency Phone Numbers for Pesticide Accidents

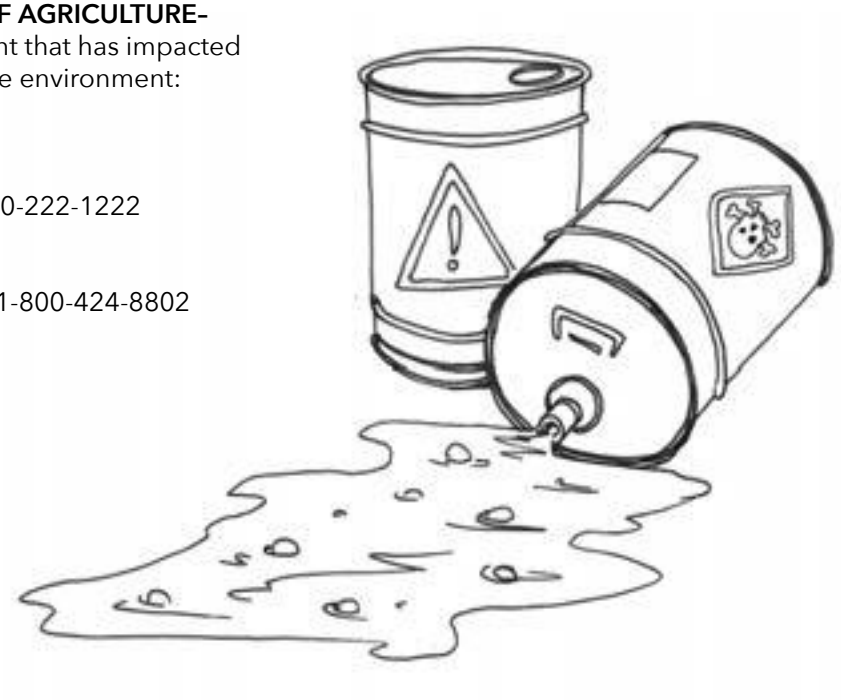
Call 911 for pesticide emergencies and/or the appropriate contacts below:

PESTICIDE ANALYTICAL & RESPONSE CENTER, OREGON DEPARTMENT OF AGRICULTURE–
To report a pesticide incident that has impacted people, animals, bees, or the environment:
503-986-6470

HUMAN POISONING-
Poison Control Center: 1-800-222-1222

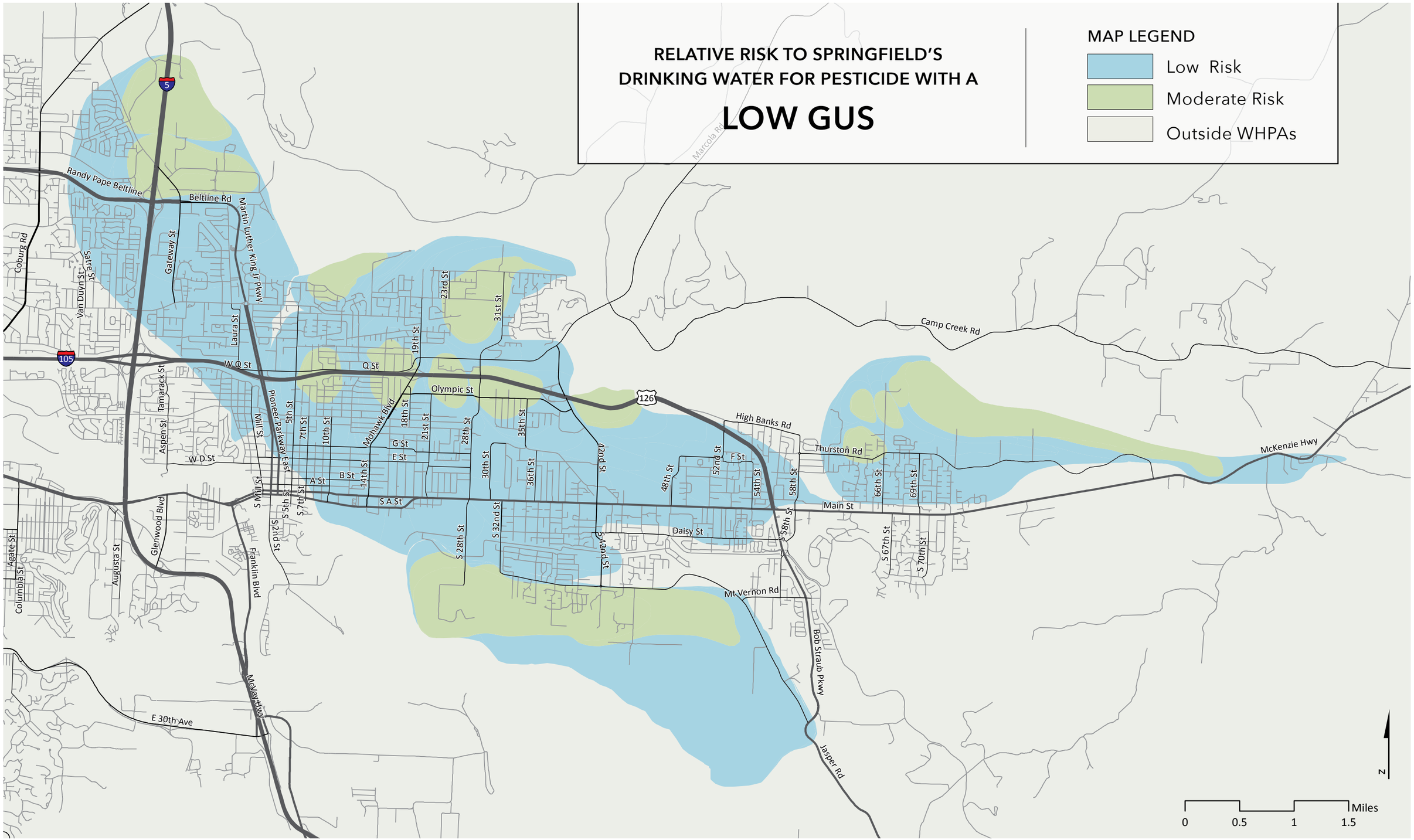
LARGE SPILLS-
National Response Center: 1-800-424-8802
Chemtrec: 1-800-424-9300

FOR HAZARDOUS MATERIAL LEAKS/SPILLS IN SPRINGFIELD-
Hazardous Material Response – 911
Springfield Utility Board – 541-746-8451



GROUNDWATER GUARDIAN

SUB
SPRINGFIELD UTILITY BOARD


RELATIVE RISK TO SPRINGFIELD'S
DRINKING WATER FOR PESTICIDE WITH A
LOW GUS
MAP LEGEND
Low Risk
Moderate Risk
Outside WHPAs
Randy Pape Beltline
Beltline Rd
Martin Luther King Jr Pkwy
Gateway St
Coburg Rd
Van Duyn St
Santa St
Laura St
W Q St
Q St
Olympic St
Tamarack St
Aspen St
Mill St
Pioneer Parkway East
5th St
7th St
10th St
Mohawk Blvd
18th St
21st St
28th St
35th St
23rd St
31st St
19th St
Camp Creek Rd
126
High Banks Rd
Thurston Rd
McKenzie Hwy
W D St
G St
E St
A St
B St
14th St
30th St
36th St
42nd St
48th St
52nd St
54th St
58th St
66th St
69th St
F St
S Mill St
S 5th St
S 7th St
S A St
Main St
S 32nd St
S 28th St
S 42nd St
S 58th St
S 67th St
S 70th St
Daisy St
Mt Vernon Rd
Agate St
Columbia St
Augusta St
Glenwood Blvd
S 1st St
S 2nd St
Franklin Blvd
Bob Straub Pkwy
Jasper Rd
Marcola Rd
E 30th Ave
Marcola Hwy
N
0
0.5
1
1.5
Miles

RELATIVE RISK TO SPRINGFIELD'S
DRINKING WATER FOR PESTICIDE WITH A

MODERATE GUS

MAP LEGEND

- Moderate Risk
- High Risk
- Outside WHPAs

5
105
126
Randy Pape Beltline
Beltline Rd
Martin Luther King Jr Pkwy
Gateway St
Coburg Rd
Seavey St
Van Duyn St
Laura St
W Q St
Q St
Olympic St
Tamarack St
Aspen St
Pioneer Parkway East
Mill St
5th St
7th St
10th St
Mohawk Blvd
18th St
19th St
21st St
23rd St
28th St
31st St
35th St
W D St
G St
E St
B St
A St
14th St
S Mill St
S 5th St
S 7th St
S 21st St
S A St
30th St
36th St
42nd St
S 28th St
S 32nd St
S 42nd St
Camp Creek Rd
High Banks Rd
Thurston Rd
McKenzie Hwy
48th St
52nd St
F St
54th St
58th St
66th St
69th St
Main St
Daisy St
S 58th St
S 67th St
S 70th St
Mt Vernon Rd
Bob Straub Pkwy
Jasper Rd
Glenwood Blvd
Augusta St
Franklin Blvd
Columbia St
McKay Hwy
E 30th Ave
Marcola Rd

N

0 0.5 1 1.5

RELATIVE RISK TO SPRINGFIELD'S DRINKING WATER FOR PESTICIDE WITH A

HIGH GUS

MAP LEGEND

- Moderate Risk
- High Risk
- Very High Risk
- Outside WHPAs

Randy Pape Beltline
Beltline Rd
Martin Luther King Jr Pkwy
Gateway St
Coburg Rd
Seavey St
Van Duyn St
Laura St
W Q St
Q St
Olympic St
Tamarack St
Aspen St
Pioneer Parkway East
5th St
7th St
10th St
Mohawk Blvd
18th St
21st St
28th St
35th St
19th St
23rd St
31st St
42nd St
W D St
G St
E St
B St
A St
14th St
30th St
36th St
S Mill St
S 5th St
S 7th St
S 2nd St
S A St
S 32nd St
S 28th St
S 42nd St
Glenwood Blvd
Franklin Blvd
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Jasper Rd
48th St
52nd St
54th St
58th St
66th St
69th St
F St
S 58th St
S 67th St
S 70th St
Marcola Rd
5
105
126

N

0 0.5 1 1.5 Miles