DEPARTMENT OF
ECOLOGY
State of Washington

Second Tier Review Recommendation Document for

The McGregor Company
Creston, Washington

July 23, 2013

1. Summary and Purpose

The McGregor Company (McGregor) proposes to construct a new project at their facility in Creston, Washington. The proposed project consists of storing and handling fertilizer including anhydrous and aqua ammonia, manufacturing aqua-ammonia, and use of a contractors mobile pipe reactor to manufacture ammonium polyphosphate fertilizer (i.e., 11-37-0 Fertilizer),[1] or other ammonium polyphosphate blends. The mobile pipe reactor will be hauled in on a large trailer to produce fertilizer onsite for up to 240 hours per year.

Estimated ammonia (NH_3) emissions from these activities occur at a rate that causes ambient impacts in excess of a regulatory trigger level called an acceptable source impact level (ASIL). McGregor was therefore required to submit a second tier petition under WAC 173-460-090. A second tier petition requires a health impact assessment (HIA) quantifying the health risks posed by their emissions of NH_3.

McGregor hired Risk Management & Engineering (RME) to prepare a HIA (RME, 2013). In this assessment, RME estimated acute and chronic hazards to individuals potentially exposed to McGregor's project-related emissions.

In general, NH_3 impacts potentially causing respiratory irritation are localized to a small area very near the mobile pipe reactor and tanks. McGregor's NH_3 emissions are not likely to result in adverse health effects (e.g., reduced lung function) from long-term exposure. Short-term emissions potentially exceed ATSDR's acute minimal risk level (MRL) but do not exceed OEHHA's acute reference exposure level (REL). These reference levels were derived such that exposure at that level is not likely to reduce in short-term respiratory irritation. This means that even if someone happened to be exposed at the highest estimated levels near McGregor, health effects will not necessarily occur unless a person is very sensitive. Additionally, the off-site area that is potentially impacted at levels greater than the acute MRL is very close to the fence line on or near a railroad right-of-way, and levels above the MRL are likely to occur infrequently. Finally, the health endpoint of concern (respiratory irritation) at levels relevant to exposures potentially occurring near McGregor is likely to be relatively minor even in sensitive individuals.

Ecology concluded that the non-cancer hazard is acceptable, and the project could be approvable under WAC 173-460-090.

This summary document presents Ecology's review of the proposed McGregor HIA and other requirements under WAC 173-460.

2. Second Tier Review Processing and Approval Criteria

2.1. Second Tier Review Processing Requirements

In order for Ecology to review the second tier petition, each of the following regulatory requirements under Chapter 173-460-090 must be satisfied:

[1] 11-37-0 fertilizer consists of 11% nitrogen, 37% phosphorous, and 0% potassium.

(a) The permitting authority has determined that other conditions for processing the NOC Order of Approval (NOC) have been met, and has issued a preliminary approval order.

(b) Emission controls contained in the preliminary NOC approval order represent at least tBACT.

(c) The applicant has developed a HIA protocol that has been approved by Ecology.

(d) The ambient impact of the emissions increase of each TAP that exceed ASILs has been quantified using refined air dispersion modeling techniques as approved in the HIA protocol.

(e) The second tier review petition contains a HIA conducted in accordance with the approved HIA protocol.

Ecology provided comments to RME regarding the HIA protocol (item (c)) on June 4, 2013. Ecology found that the HIA protocol essentially contained sufficient information and requested a final HIA. The final HIA (item (e)) was received by Ecology on July 18, 2013. Ecology's air dispersion modeler found the refined modeling conducted by RME to be acceptable (item (d)).[2]

Acting on behalf of Ecology's Eastern Regional Office (ERO), the "permitting authority" for this project, an engineer at Ecology's Headquarters, satisfied items (a) and (b) above on June 17, 2013.[3] The applicant has therefore satisfied all of the five requirements above.

2.2. Second Tier Review Approval Criteria

As specified in WAC 173-460-090(7), Ecology may recommend approval of a project that is likely to cause an exceedance of ASILs for one or more toxic air pollutants (TAPs) only if it:

(a) Determines that the emission controls for the new and modified emission units represent tBACT.

(b) The applicant demonstrates that the increase in emissions of TAPs is not likely to result in an increased cancer risk of more than one in one hundred thousand.

(c) Ecology determines that the non-cancer hazard is acceptable.

2.2.1. tBACT Determination

An engineer at Ecology's Headquarters, acting on behalf of the ERO, determined that McGregor's proposed tBACT will be met through a combination of best management practices and operational limits including:

- Operation at a production rate (36 tons per hour) that allows the reaction to approach completion.

[2] Clint Bowman, "20130528_PNW-Solutions_McGregor_Modeling_Review_Checklist_cb.docx" Checklist submitted to Gary Palcisko, June 17, 2013.
[3] Gary Huitsing, "McGregor," e-mail message, addressed to Gary Palcisko, June 17, 2013.

- Monitoring of and limiting reactants to stoichiometric quantities (no excess of either reactant).
- Limiting hours of operation of the MPR to limit the annual emissions of this operation (240 hours per year maximum).
- Maintaining emissions of the MPR to no more than 10.5 pounds per hour NH_3.
- Maintenance activities to ensure reactor, heat exchanger, and mist eliminator are operating in optimum condition.
- Limiting hours of operation to limit the annual emissions of the emergency diesel engine for the reactor generator operation (two hours per year). According to the project consultant, limited operation of the engine to two hours per year will result in emissions of 0.54 pounds per year.

3. Health Impact Assessment Review

As described above, the applicant is responsible for preparing the HIA under WAC 173-460-090. Ecology's project team consisting of an engineer, a toxicologist, and a modeler review the HIA to determine if the methods and assumptions are appropriate for assessing and quantifying the surrounding community's risk from a new project.

The HIA focused mainly on health risks attributable to NH_3 exposure as this was the only TAP with a modeled concentration in ambient air that exceeded an ASIL. RME also described emissions and exposure to hydrogen fluoride (HF) because this pollutant exceeded a small quantity emission rate (SQER), and Ecology requested that cumulative health hazards from exposure to these pollutants be quantified because both could potentially affect the respiratory system.

3.1. Ammonia Health Effects Summary

Studies of animals and humans exposed to NH_3 suggest that the respiratory tract is the most sensitive target of toxicity (ATSDR, 2004). Health effects caused by inhaling NH_3 depend in part on the level in air and the duration of exposure. Short-term exposures to NH_3 may cause irritation to the nose, throat, and eyes. Higher concentrations may cause more serious health effects including pulmonary edema and death. However, the levels estimated to result in these serious effects are not expected to occur in areas impacted by McGregor's emissions.

Some studies of workers exposed repeatedly to NH_3 in air have been conducted. Generally, lower levels of chronic exposure have not shown respiratory effects including reduced lung function. Other studies of workers exposed to higher levels showed a relationship between chronic exposure and respiratory effects such as bronchial reactivity, inflammation, cough, wheezing, or shortness of breath and/or a decrease in lung function parameters (ATSDR, 2004). There is no evidence that NH_3 causes cancer.

Individuals with asthma or other existing respiratory illness may be expected to be more susceptible to respiratory effects of NH_3 exposure.

3.1.1. Ammonia Toxicological Reference Values

Several agencies have developed toxicological reference values for NH_3. These values are derived from studies of animals and humans that were exposed to a known amount (concentration) of NH_3. Uncertainty factors are applied to exposure levels to yield values that are intended to represent a level at or below which adverse non-cancer health effects are not expected. Table 1 shows NH_3 non-cancer values considered by Ecology for determining potential health hazards to the general public.

United States Environmental Protection Agency's (EPA) reference concentration (RfC), California EPA Office of Environmental Health Hazard Assessment's (OEHHA) chronic reference exposure level (REL), and the Agency for Toxic Substances and Disease Registry's (ATSDR) chronic MRL for NH_3 were derived from an occupational study in which workers were exposed to a time-weighted average of 6,400 $\mu g/m^3$ NH_3 for an average duration of about 12 years (EPA, 2003; CalEPA, 2000; ATSDR, 2004). While some workers reported symptoms such as coughing, wheezing, nasal complaints, eye irritation, throat discomfort and skin problems; there was no difference in lung function between the exposed versus the unexposed group. The exposure level, 6,400 $\mu g/m^3$, was determined to be the NOAEL[4] for chronic effects. The difference in the resulting toxicological values derived by each agency resulted from dissimilar ways occupational exposure concentrations were adjusted to produce a continuous exposure concentration and different uncertainty factors were applied to the NOAEL.

For acute exposures, OEHHA developed an acute REL of 3,200 $\mu g/m^3$ protective against mild adverse health effects based on four different studies of humans exposed to varying levels of NH_3 for short periods (CalEPA, 2008a). The 95% lower confidence limit of the concentration expected to produce a response (i.e., irritation) rate of five percent (BMC_{05})[5] was used to derive the REL.

ATSDR developed an acute MRL of 1,184 $\mu g/m^3$ based on mild irritation to the eyes, nose, and throat in humans exposed to NH_3 gas for two hours. ATSDR's acute MRL is typically considered protective of exposure occurring over a duration of 1–15 days. In this case, ATSDR noted that the mild irritation experienced by subjects in the study was not time dependent, but concentration dependent. Therefore, Ecology judged that the MRL can be applied to exposures occurring over 1-hour duration.

For more severe health effects, OEHHA identified levels protective against severe adverse effects and life-threatening effects at levels of 78,000 $\mu g/m^3$ and 240,000 $\mu g/m^3$, respectively (CalEPA, 2008a).

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[4] No-observed-adverse-effect level (NOAEL): The highest exposure level in at which there are no biologically significant increases in the frequency or severity of adverse effect between the exposed population and its appropriate control; some effects may be produced at this level, but they are not considered adverse or precursors of adverse effects.

[5] Benchmark Concentration (BMC): A dose or concentration that produces a predetermined change in response rate of an adverse effect (called the benchmark response or BMR) compared to background.

3.2. Hydrogen Fluoride Heath Effects and Toxicological Reference Values

Although HF emissions did not result in an ambient level that exceeded an ASIL, Ecology requested that McGregor quantify non-cancer hazards associated with HF exposure because emission rates exceeded a SQER, and like NH_3, HF can potentially cause respiratory effects.

Table 1 shows HF non-cancer values considered by Ecology for determining potential health hazards to the general public. OEHHA developed a chronic REL of 14 μg/m^3. While the REL was based on an occupational study where the primary health effect was increased bone density from exposure to HF, OEHHA also determined that this REL should also be protective against potential respiratory effects. The chronic REL is set such that people, including sensitive individuals, who are exposed continuously to a level at or below the REL, are not expected to experience adverse health effects.

ATSDR developed an acute MRL of 16 μg/m^3 based on upper respiratory irritation. The MRL was based on a study of individuals exposed to a median concentration of 0.5 ppm (409 μg/m^3) for one hour. ATSDR determined that this exposure concentration represented a LOAEL[6] because subjects noted low severity upper airway irritation. OEHHA developed an acute REL based on the same study, but noted that the effects seen at the low-end exposure levels were not statistically significantly different when comparing before-exposure reported symptoms to after-exposure reported symptoms until concentrations exceeded 2.5 mg/m^3. Therefore, OEHHA determined that the NOAEL was 2.4 mg/m^3 and the derived REL is more than on order of magnitude higher than ATSDR's MRL (CalEPA, 2008b).

Table 1. Toxicological Values Used to Assess and Quantify Non-Cancer Hazard

Pollutant	Agency	Chronic	Acute
NH_3	U.S. Environmental Protection Agency	RfC = 100 μg/m^3	N/A
	California EPA–Office of Environmental Health Hazard Assessment	REL = 200 μg/m^3	REL = 3,200 μg/m^3
	Agency for Toxic Substances and Disease Registry	MRL = 70 μg/m^3	MRL = 1,184 μg/m^3
HF	U.S. Environmental Protection Agency	N/A	N/A
	California EPA–Office of Environmental Health Hazard Assessment	REL = 14 μg/m^3	REL = 240 μg/m^3
	Agency for Toxic Substances and Disease Registry	N/A	MRL = 16 μg/m^3
Note: RME identified other potential comparison values, but Ecology determined they were not appropriate with which to evaluate potential short-term hazards to the general public and/or sensitive individuals.			

3.3. Ambient Air Quality Analysis

RME modeled emissions of NH_3 and HF from the MPR and fugitive emissions from railcars or storage tanks on-site. Ecology reviewed the modeling files and found them to represent an

[6] Lowest-observed-adverse-effect level (LOAEL): The lowest exposure level at which there are biologically significant increases in frequency or severity of adverse effects between the exposed population and its appropriate control group.

adequate ambient air quality analysis. Generally, the majority of NH_3 emissions and ambient impacts will result from the operation of the MPR.

3.4. Land Use – Exposed Receptors

The land use surrounding McGregor is largely agricultural and/or unoccupied land. In general, the ambient impacts of potential concern are localized to an area within or slightly beyond the fence line. The closest buildings near McGregor's project are about 400 meters away, and the closest residence is approximately 600 meters to the east. These residential properties are well beyond the area impacted by McGregor's emissions in excess of the ASIL. Regardless, RME calculated the chronic non-cancer hazards for maximally impacted receptors conservatively assuming frequent exposure could occur at the point of maximum impact which occurs on-site.[7] RME also estimated acute hazards associated with the highest potentially exposed off-site individuals along the northern boundary of McGregor's property to evaluate worst-case acute health hazards.

4. Non-Cancer Hazard

In order to evaluate the potential for non-cancer adverse health effects that may result from exposure to air pollutants, exposure concentrations at each receptor location are compared to relevant non-cancer toxicological values (i.e., RfC, REL, and MRL). If a concentration exceeds the toxicological value, this indicates only the potential for adverse health effects. The magnitude of this potential can be inferred from the degree to which this value is exceeded. This comparison is known as a hazard quotient (HQ) and is given by the equation below:

$$HQ = \frac{\text{time weighted average concentration of pollutant in air } (\mu g/m^3)}{\text{time interval specific RfC, MRL, or REL } (\mu g/m^3)}$$

A HQ of one or less indicates that the exposure to a substance is not likely to result in adverse non-cancer health effects. As the HQ increases above one, the probability of human health effects increases by an undefined amount. However, it should be noted that a HQ above one is not necessarily indicative of health impacts due to the application of uncertainty factors in deriving toxicological reference values.

To assess the potential for combined effects of two or more chemicals that are potentially toxic to the same organ system, a hazard index is calculated by summing HQs as shown in the example below:

$$HI_{Respiratory} = HQ_{NH3} + HQ_{HF}$$

4.1. Chronic Hazard Quotients and Chronic Hazard Index

RME evaluated chronic hazards associated with exposure to NH_3 and HF emitted from the MPR and other sources (i.e., tanks and railcars) at each location. Although it is not likely that

[7] On-site exposure is not typically evaluated by Ecology because this scenario is usually addressed by occupational safety and health regulations.

someone would be exposed continuously to McGregor's NH_3 and HF emissions, RME assessed chronic exposure at the maximum concentration, regardless of whether it occurred on or off the plant property. In every case, the maximum concentration occurred on-site. For the purposes of identifying the worst-possible case for this evaluation, the lowest toxicological value for chronic exposures to NH_3 (i.e., the MRL of 70 $\mu g/m^3$) was used as the chronic risk-based concentration to compare to the highest annual concentration. For chronic exposure to HF, the OEHHA REL (14 $\mu g/m^3$) was used to calculate non-cancer hazards.

Table 2 shows the chronic HQs that were calculated based on the maximum concentration. These HQs are conservative because they are being used to evaluate the exposure of the potential maximally exposed off-site receptor, but they are based on the maximum on-site concentration. HQs are generally more than three-fold lower than unity for all receptors' exposure to NH_3, and more than two to three orders of magnitude lower than unity (1) for HF exposure. The combined hazard (i.e., the hazard index) is well below unity at each location. Furthermore, actual chronic hazards are likely to be much lower as the impacted area is not likely to be frequently inhabited. This indicates adverse non-cancer effects are not likely to result from chronic exposure to NH_3 and HF emitted from the MPR.

4.2. Acute Hazard Quotients and Acute Hazard Index

4.2.1. Ammonia Acute Hazard Quotient

RME calculated NH_3 HQs based on the OEHHA acute REL and the ATSDR MRL. HQs were calculated for the maximally impacted boundary receptor (Table 2). It is important to note that RME calculated a 2-hour HQ based on ATSDRs acute MRL. According to ATSDR, acute MRLs are designed to be protective of exposures occurring over a duration of 1 to 15 days. In the case of the NH_3 acute MRL, ATSDR notes that local irritation effects of NH_3 were not time-dependent (subjects were exposed for two hours) but rather concentration-dependent, so an adjustment to 24-hour exposure was not necessary. Ecology determined that the MRL could be used to assess 1-hour exposures; therefore, Ecology recalculated acute hazard quotients based on 1-hour exposure duration.

Because there were two different toxicological values for acute exposure to NH_3, Ecology presents a range of possible HQs. The low range of estimated HQs is less than unity (1), and the high-end estimated HQ is greater than unity near the northern boundary of the McGregor facility. A HQ that exceeds unity does not necessarily mean that an exposed person will experience respiratory symptoms (i.e., irritation), but it is possible that exposed sensitive individuals could experience some minor respiratory effects.

4.2.2. Hydrogen Fluoride Acute Hazard Quotient

To evaluate hazards from HF exposure, RME calculated a HQ based on ATSDR's MRL for fluorine gas over a 24-hour exposure period. Ecology determined that exposure to fertilizer products would be more likely in the form of HF (ATSDR, 2003), so Ecology estimated HQs associated with HF based on 1-hour exposure period. As mentioned previously, the acute MRL

for HF was based on mild nasal irritation in subjects exposed to HF for one hour. Therefore, Ecology conservatively used the MRL to quantify acute hazards for 1-hour averaging time.

Acute HQs for the maximum exposure to HF is much lower than unity at all sites. The highest acute HQ of 0.2 occurs adjacent to the northern boundary of the McGregor site. Maximum acute exposure to HF near the McGregor is not expected to result in minor upper airway irritation.

Chronic exposure to the McGregor's HF emissions is several orders of magnitude lower than unity meaning that emissions of HF will not likely contribute to long-term adverse health effects in the vicinity of the facility.

4.2.3. Acute Respiratory Hazard Index

The low-end acute hazard index from exposure to NH_3 and HF near McGregor does not exceed unity, but the high-end acute hazard index near could exceed one. The hazard index that exceeds one does not necessarily mean that an exposed person will experience respiratory symptoms (i.e., irritation), but it is possible that sensitive individuals could experience some minor respiratory effects.

Table 2. Chronic and Acute HQs and Hazard Indices from Exposure to NH_3 and HF at Maximally Impacted Locations near McGregor's Proposed Project

	NH_3		**HF**		
Max 1-hr Off-Site Concentration (µg/m^3)	2,535		3.85		
1-hr Toxicity Value (µg/m^3)	3,200 (REL)	1,184 (MRL)	16	Hazard Index Range	
Acute Hazard Quotient	0.8	**2.1**	0.2	1.0	**2.4**
	NH_3		**HF**		
Max Annual Concentration (µg/m^3)	9.3		0.005		
Chronic Toxicity Value (µg/m^3)	70		14	Hazard Index	
Chronic Hazard Quotient[a]	0.1		0.0	0.1	

a The chronic hazard quotient and chronic hazard index values are likely overestimated by because continuous exposure to NH_3 is unlikely to occur at the location of impact.

Note: The background concentration of NH_3 is not available in EPA's national-scale air toxics assessment (NATA). For comparison, a recent study in Yakima Valley showed range of average concentrations of 1 to 9.4 ppb (0.7 to 6.5 µg/m^3) in limited summertime sampling near homes distant and proximal to dairies respectively (Williams et al., 2011). The background concentration of HF in NATA is negligible.

5. Exposure Likelihood

RME determined that none of the off-site ambient impacts exceed California's acute REL. This supports their conclusion that short-term health effects are not likely to occur. However, RME also noted that there were potential impacts in excess of ATSDR's acute MRL.

The MPR will only be permitted to operate 240 hours per year, so there will be limited opportunity for off-site impacts at levels exceeding ATSDRs MRL to occur frequently.

Furthermore, the area impacted outside the fence line at a level above the MRL is an estimated 400 m^2 (0.1 acre). Much of this area falls within the right-of-way of the Eastern Washington Gateway rail line meaning that it is not likely for a bystander to be repeatedly or frequently present in the impacted location. Regardless, Ecology requested that RME analyze the frequency of potential occurrences where NH_3 concentrations exceed the MRL (Figure 3). The most frequent occurrence near the McGregor fence line was approximately 500 2-hour intervals over a 5-year period (i.e., 43,830 hours). For the sake of simplicity, we can assume that the meteorology is conducive to potentially produce off-site ambient impacts that exceed an acute MRL no more than about 1,000 hours of out of 43,830 hours.

As stated above, RME identified conditions that would cause the 1-hour NH_3 concentration to reach or exceed the REL at off-site locations and found these possible occurrences to be infrequent. Given that the MPR is only expected to operate for no more than 240 hours per year, the likelihood of MPR operation coinciding with unfavorable meteorology further reduces the likelihood of excessive ambient impacts. A combination of independent probabilities allows evaluation of the joint probability that conditions could occur simultaneously. Ecology determined that most impacted off-site area near McGregor could experience a 1-hour NH_3 level above the acute MRL at most about once every two months (assuming 240 hours of day and night operation). The joint probability estimate was derived as shown below:

$$P(X \cap Y) = P(X) \cdot P(Y)$$

Where:

P(X) = The number of unfavorable atmospheric condition hours that occurred over the 5-year modeling period divided by the total number of hours in the same period, i.e., 43,830 hours.

P(Y) = The maximum number of hours that the MPR is expected to operate at any location, (i.e., 240 hours per year) divided by the total number of hours considered (i.e., 8,760 hours per year).

$P(X \cap Y)$ = The hourly probability that the NH_3 concentration at a given receptor will exceed the REL.

$$P(X \cap Y) = (1{,}000 \text{ hr}/43{,}830 \text{ hr}) \cdot (240 \text{ hr}/8{,}760 \text{ hr})$$

$$= 0.00063 \text{ or } 0.063\%$$

Based on this joint probability, the estimated frequency of times per year that an ambient 1-hour NH_3 concentration at a given receptor will exceed the acute MRL, given use of the MPR for 710 hours of operation per year, is:

Frequency (1-hour occurrences per year) = $P(X \cap Y) \cdot 8760$ hr/yr

= 5.5 1-hour occurrences per year

This analysis indicates that NH_3 concentrations at the fence line could exceed ATSDR's MRL about five to six hours per year. It is important to note that the levels at the fence line are not expected to exceed OEHHA's acute REL. Exposures above the MRL, but below the REL, probably will not result in adverse effects except in only very sensitive individuals. Furthermore, the off-site area is not large, nor are people expected to be present frequently at the location of impacts, so the five or six potential occurrences per year that an ambient concentration exceeds the MRL may not result in an actual exposure.

6. Uncertainty

Many factors of the HIA are prone to uncertainty. Uncertainty relates to the lack of exact knowledge regarding many of the assumptions used to estimate the human health impacts of McGregor's emissions. The assumptions used in the face of uncertainty may tend to over- or underestimate the health risks estimated in the HIA. Key aspects of uncertainty related to the HIA for McGregor's proposed project are:

6.1. Emissions

NH_3 and HF emissions estimates were based on a MPR stack test. While the resulting emission estimates are reasonable, it is uncertain how emission rates fluctuate, and therefore emissions at any point in time could be higher or lower than the estimates used in this analysis.

6.2. Air Modeling

The transport of pollutants through the air is a complex process. Regulatory air dispersion models are developed to estimate the transport and dispersion of pollutants as they travel through the air. The models are frequently updated as techniques that are more accurate become known but are written to avoid underestimating the modeled impacts. Even if all of the numerous input parameters to an air dispersion model are known, random effects found in the real atmosphere will introduce uncertainty. Typical of the class of modern steady-state Gaussian dispersion models, the AERMOD model used for the McGregor analysis may slightly overestimate the short-term (1-hour average) impacts and somewhat underestimate the annual concentrations.

6.3. Toxicity

One of the largest sources of uncertainty in any risk evaluation is associated with the scientific community's limited understanding of the toxicity of most chemicals in humans following exposure to the low concentrations generally encountered in the environment. To account for uncertainty when developing toxicity values (e.g., RfCs), EPA and other agencies apply "uncertainty" factors to doses or concentrations that were observed to cause adverse non-cancer effects in animals or humans. Agencies apply these uncertainty factors so that they derive a toxicity value that is considered protective of humans including susceptible populations. In the case of ammonia exposure, the toxicity values used in this assessment were generally derived from either occupational exposure studies or experimental exposures on human volunteers. The resulting toxicity values are probably protective of the majority of the population including sensitive individuals.

7. Conclusions and Recommendation

The project review team has reviewed the HIA and determined that:

a) The TAP emissions estimates presented by RME represent a reasonable estimate of the project's future emissions.
b) Emission controls for the new and modified emission units meet or exceed the tBACT requirement.
c) The ambient impact of the emissions increase of each TAP that exceeds ASILs has been quantified using refined air dispersion modeling techniques as approved in the HIA protocol.
d) The HIA submitted by RME on behalf of McGregor adequately assesses project-related increased health risk attributable to TAP emissions.

The project review team concludes that the HIA to represent an appropriate estimate of potential increased health risks posed by McGregor's TAP emissions.

The HIA presented both chronic and acute HQs and hazard indices. Long-term exposure to McGregor's NH_3 and HF emissions is not likely to result in long-term respiratory effects.

High-end acute HQs and hazard indices presented in the HIA exceeded unity outside McGregor's boundary. It is possible that sensitive individuals exposed to brief and infrequent episodes could experience some respiratory irritation. However, the potentially impacted area is a railroad right-of-way meaning the chances someone is present at the location coincident with elevated short-term ambient impacts are low. Given the land use at the impacted area, the infrequency of episodes in which NH_3 levels could be elevated, and the low severity of health effect at the estimated levels, Ecology determined that the McGregor's project-related emissions are unlikely to cause short- or long-term adverse respiratory symptoms among people exposed to ambient emissions of NH_3 and HF.

The risk manager may recommend approval of the proposed project because project-related health risks are permissible under WAC 173-460-090.

8. References

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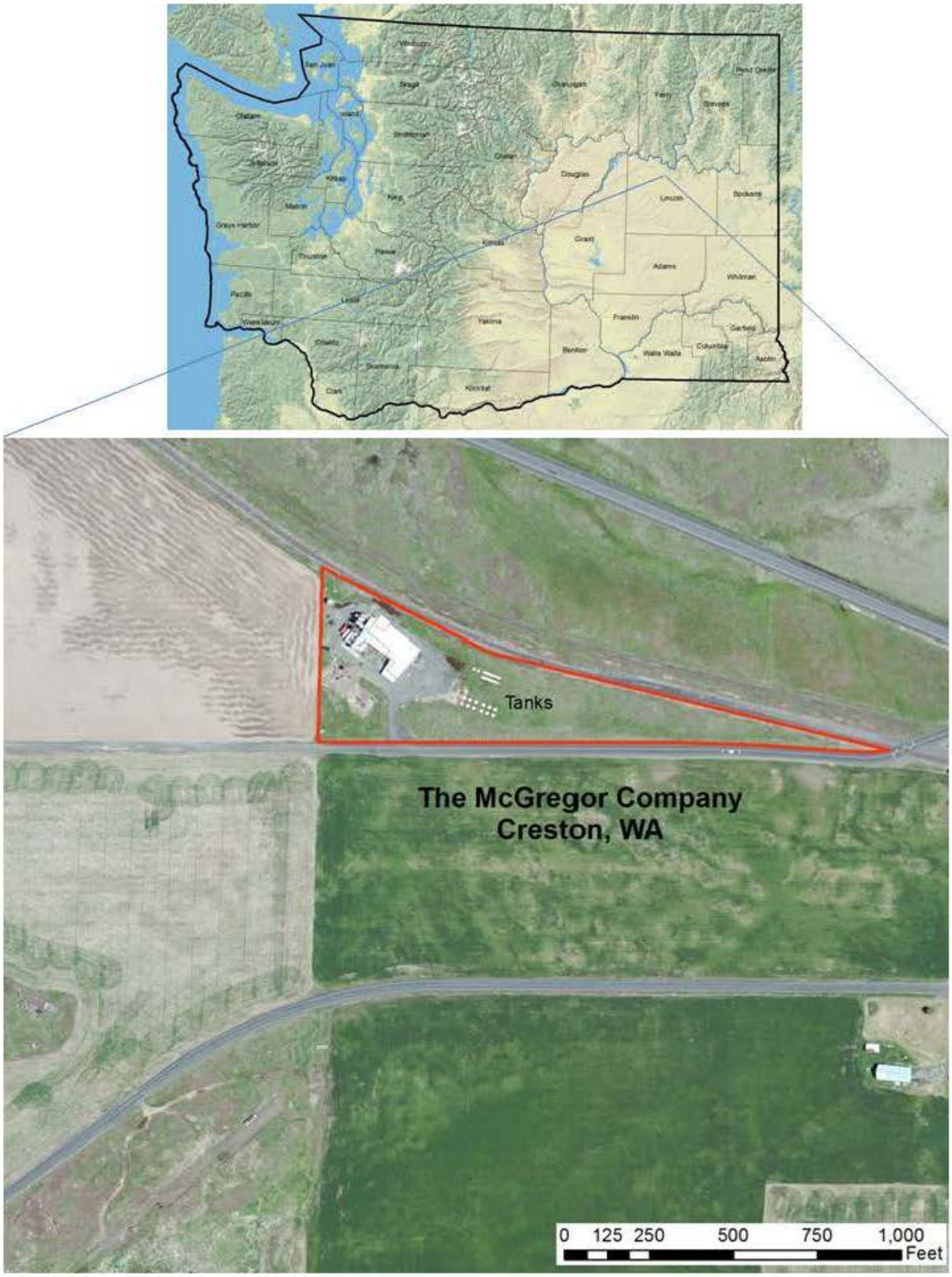

Figure 1. The McGregor Company, located in Creston, WA.

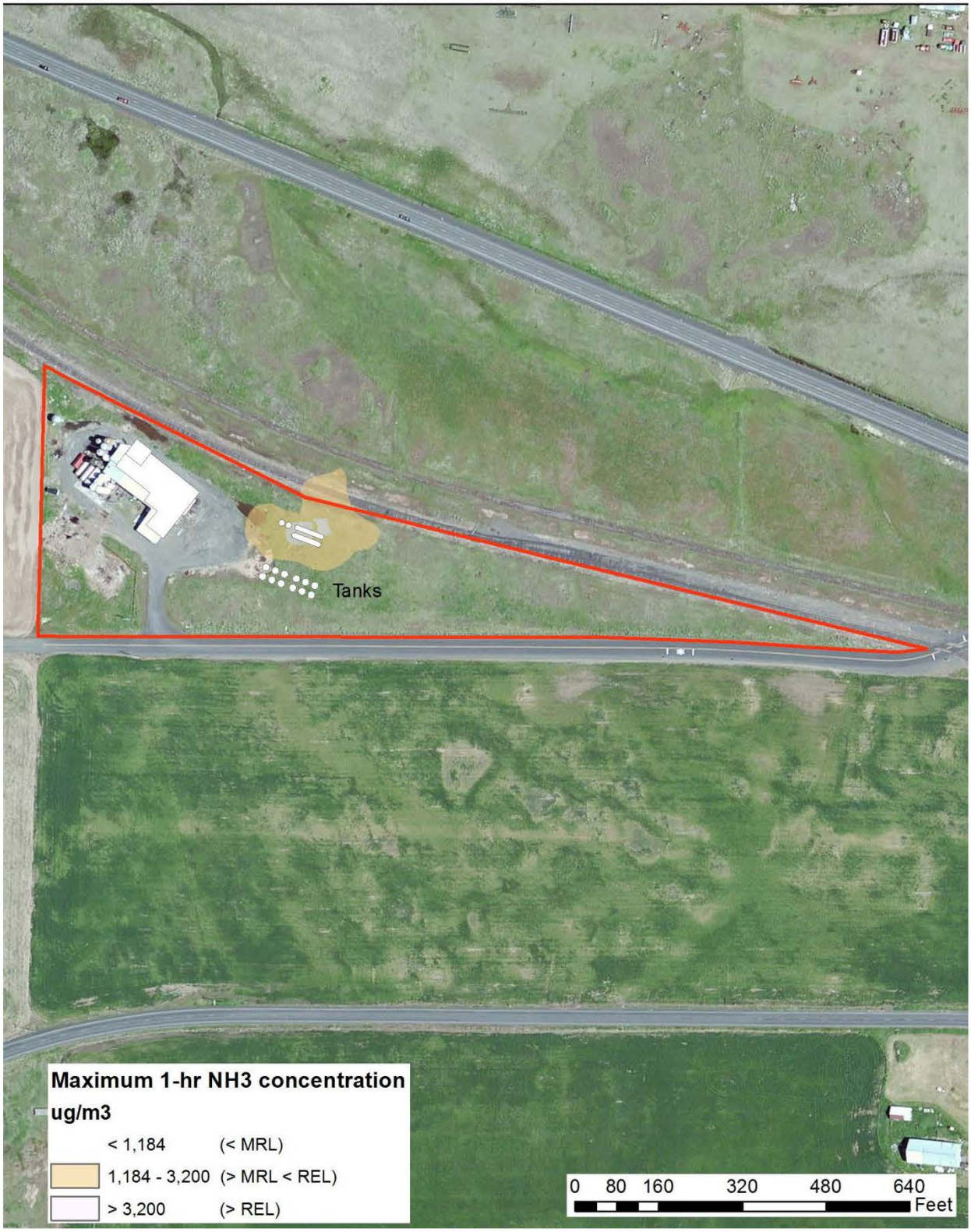

Figure 2. Maximum 1-hour NH_3 levels resulting in acute HQs > 1 near McGregor boundary.

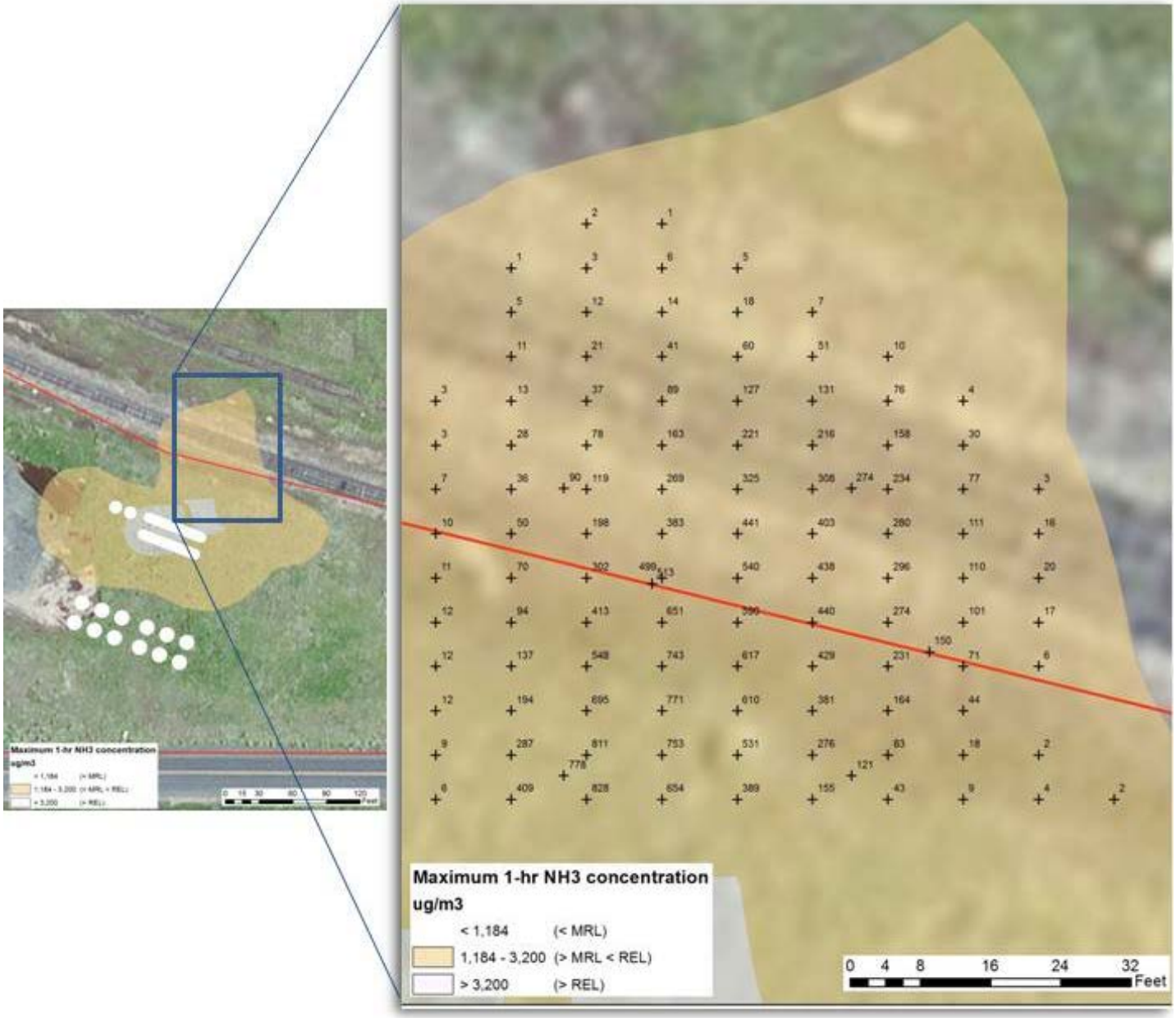

Figure 3. Number of 2-hour intervals over a 5-year period in which meteorology could produce NH_3 levels in excess of the acute MRL.