STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600, Olympia, WA 98504-7600 • 360-407-6000

October 9, 2023

Karin Baldwin
Department of Ecology
Air Quality Program
Eastern Regional Office
4601 N. Monroe Street
Spokane, WA 99205-1295

Re: Second Tier Toxics Review – Connell Sand and Gravel

Dear Karin:

The Washington Department of Ecology's Air Quality Program (Ecology) has completed its review of health risks posed by diesel engine exhaust particulate (DEEP) emissions from two diesel-powered generators at Connell Sand and Gravel's Copp Pit in Franklin County, WA.

Connell Sand and Gravel mines and processes material from two pits: Copp Pit and Bauer Pit, near Connell, WA. There are several pieces of equipment on site that emit air pollutants. The current permit does not cover all the onsite equipment at their stationary plant and does not cover their portable operations, so Connell Sand and Gravel applied for a permit to cover these units. Among the emission units in the Copp Pit are two diesel-powered generators that require additional review:

- One CAT 3512 diesel-powered generator manufactured in 2001 and rated at 1500 kW. It will supply power to rock-crushing equipment within the Copp Pit. Connell Sand and Gravel proposes to limit the operation of this engine to 515 hours per year.
- One Perkins UCI224E16 diesel-powered generator rated at 60 kW. It will operate mostly in standby mode and will be limited to 200 hours of operation per year.

The increased emissions of DEEP from these engines could result in an increased cancer risk of up to 0.3 in one million (3×10^{-7}) at the maximally impacted residential location to the southeast of the Copp Pit.

We also evaluated non-cancer hazards associated with Connell Sand and Gravel's proposed diesel engine emissions. We determined that non-cancer health effects are not likely to occur from long-term exposure to project-related DEEP.

We find that Connell Sand and Gravel's project-related health risks are permissible under WAC 173-460-090 because:

- The increase in emissions of TAPs is not likely to result in an increase in cancer risk of more than one in one hundred thousand (10 in one million) which is the maximum risk allowed by a Second Tier review.
- The non-cancer hazard is acceptable.

The applicant has satisfied all requirements of a second tier analysis.

If you would like to discuss this project further, please contact Gary Palcisko at gary.palcisko@ecy.wa.gov or (360) 407-7338.

Sincerely,

Chris Hanlon-Meyer
Science and Analysis Section Manager
Air Quality Program

ch-m/te

Enclosure

Second Tier Review Recommendation for: Connell Sand and Gravel Copp Pit Franklin County, Washington

Air Quality Program
Washington Department of Ecology
Olympia, Washington

DEPARTMENT OF ECOLOGY
State of Washington

Contact Information

Air Quality Program

PO Box 47600
Olympia, WA 98504-7600
360-407-6800
https://ecology.wa.gov/contact

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Second Tier Review Recommendation for:

Connell Sand and Gravel – Copp Pit

Franklin County, Washington

Air Quality Program
Washington Department of Ecology
Olympia, WA

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Executive Summary

This document presents and summarizes a review of health risks from toxic air pollutants emitted by two diesel-powered generators at Connell Sand and Gravel's Copp Pit in Franklin County, Washington. These engines will be used to provide power to rock-crushing equipment in the Copp Pit. In general, toxic air pollutant impacts in the area near the Copp Pit will not result in excessive cancer risk or cause serious short- or long-term health effects. Ecology concludes that the health risk is acceptable and recommends approval of the project.

Connell Sand and Gravel mines and processes material from two pits: Copp pit and Bauer pit, near Connell, WA. There are several pieces of equipment at these pits that emit air pollutants. The current permit does not cover all of the onsite equipment at their stationary plant and does not cover their portable operations, so Connell Sand and Gravel applied for a permit to cover these units. Among the emission units at the Copp Pit are two diesel-powered generators that require additional review:

- One CAT 3512 diesel-powered generator manufactured in 2001 and rated at 1500 kW. It will supply power to rock-crushing equipment within the Copp Pit. Connell Sand and Gravel proposes to limit the operation of this engine to 515 hours per year.
- One Perkins UCI224E16 diesel-powered generator rated at 60 kW. It will operate mostly in standby mode and will be limited to 200 hours of operation per year.

These engines may emit a toxic air pollutant—diesel engine exhaust particulate—at a rate triggering a requirement to prepare a health impact assessment (Second Tier Toxics Review). A health impact assessment describes the increased health risks from exposure to toxic air pollutants.

Connell Sand and Gravel hired Spring Environmental to prepare a health impact assessment. Spring Environmental estimated increased health risks associated with Connell Sand and Gravel's diesel particle emissions.

Conclusions

Assuming Connell Sand and Gravel's engines operate at their full allowable annual limit, diesel particle emissions result in a maximum increased lifetime cancer risk of less than one in one million. The maximum risk occurs for the maximally impacted residential receptor southeast of the Copp Pit. This location is near a house surrounded largely by open land.

- Cancer risk can be expressed either as an increase in an individual's risk of disease or as the number of cancers that might occur in addition to those normally expected in a population of one million people. The reported estimates of diesel engine exhaust particulate-related cancer risk represent increases above a baseline lifetime cancer risk of about 40 percent in the United States.

- Lifetime exposure to “background” levels of diesel particles in the area results in a risk of about 28 in one million.

Exposure to diesel particles in the area is not likely to result in long- or short-term non-cancer health effects.

Ecology’s recommendation

Ecology recommends approval of the project because:

- Emission controls for the new and modified emission units represent best available control technology for toxics.
- The applicant demonstrated that the increase in emissions of toxic air pollutants is not likely to result in an increased cancer risk of more than one in one hundred thousand (10 in one million) which is the maximum risk allowed by a second tier review.
- The non-cancer hazard is acceptable.

Second Tier Review Processing and Approval Criteria

The health impacts assessment (HIA) for Connell Sand and Gravel's toxic air pollutant (TAP) emissions submitted by Spring Environmental is part of the second tier toxics review process under WAC 173-460 (Spring Environmental, 2023). Ecology is responsible for processing and reviewing second tier review petitions statewide.

Second tier review processing requirements

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

(a) The permitting authority has determined that other conditions for processing the Notice of Construction 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 best available control technology for toxics (tBACT).

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

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

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

Acting as the "permitting authority" for this project, Ecology's project permit engineer satisfied item (a) and verified item (b) above on September 26, 2023.[1] Although Spring Environmental did not submit an HIA protocol (item (c)), a complete final HIA (item (e)) was received by Ecology on August 1, 2023. Ecology's modeler determined that Spring Environmental conducted the refined modeling (item (d)) appropriately.[2]

The key processing requirements above are satisfied.

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 TAPs only if it:

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

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[1] David Finley, "RE: Connell Sand & Gravel – Copp Pit NOC Application," email message with attachments, September 26, 2023.
[2] Beth Friedman, "RE: Connell Sand & Gravel – modeling review," email message, September 28, 2023.

(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.

tBACT determination

Ecology's permit engineer determined that Connell Sand and Gravel's proposed annual limits on operation and adherence to manufacturer-recommended operation and maintenance provisions satisfy the BACT and tBACT requirements for these engines. Ecology considered add-on controls such as a diesel particulate filter (DPF) and/or diesel oxidation catalyst (DOC) to be feasible, but ultimately, these controls were determined to be cost-prohibitive for reducing Diesel Engine Exhaust Particulate on these engines (Ecology, 2023).

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 reviews the HIA to determine if the methods and assumptions are appropriate for assessing and quantifying risks to the surrounding community from a new project.

For the Connell Sand and Gravel Copp Pit, the HIA focused on health risks attributable to diesel engine exhaust particulate (DEEP) exposure because the modeled ambient air concentrations exceeded its respective ASIL.

DEEP health effects summary

Diesel engines emit very small fine (<2.5 micrometers [µm]) and ultrafine (<0.1 µm) particles. These particles can easily enter deep into the lungs when inhaled. Mounting evidence indicates that inhaling fine particles can cause or contribute to numerous adverse health effects.

Studies of humans and animals specifically exposed to DEEP show that diesel particles can cause both acute and chronic health effects including cancer. Ecology has summarized these health effects in "Concerns about Adverse Health Effects of Diesel Engine Emissions" (Ecology, 2008).

Toxicity reference values

Agencies develop toxicity reference values for use in evaluating and characterizing exposures to chemicals in the environment. As part of the HIA, Spring Environmental identified appropriate toxicity values for DEEP.

DEEP toxicity values

Spring Environmental identified toxicity values for DEEP from two agencies: the U.S. Environmental Protection Agency (EPA) (EPA, 2002; EPA, 2003), and California EPA's Office of Environmental Health Hazard Assessment (OEHHA) (CalEPA, 1998). These agencies derived toxicity values from studies of animals exposed to a known amount (concentration) of DEEP, or from epidemiological studies of exposed humans. These values represent a level at or below which we do not expect adverse non-cancer health effects and a metric by which to quantify increased risk from exposure to a carcinogen. Table 1 shows the appropriate DEEP non-cancer and cancer toxicity values identified by Spring Environmental.

EPA based its reference concentration (RfC) and OEHHA based its reference exposure level (REL) for diesel engine exhaust (measured as DEEP) on dose-response data on inflammation and changes in the lung from rat inhalation studies. Each agency established a level of 5 µg/m^3 as the concentration of DEEP in the air at which long-term exposure is unlikely to cause adverse non-cancer health effects.

EPA promulgated National Ambient Air Quality Standards (NAAQS) and other regulatory toxicological values for short- and intermediate-term exposure to particulate matter, but values specifically for DEEP exposure at these intervals do not currently exist.

OEHHA derived a unit risk factor (URF) for estimating cancer risk from exposure to DEEP. They based the URF on a meta-analysis of several epidemiological studies of humans occupationally exposed to DEEP. In these studies, researchers determined exposure on measurements of elemental carbon and respirable particulate representing fresh diesel exhaust. Therefore, we define DEEP as the filterable fraction of particulate emitted by diesel engines.[3] The URF is expressed as the upper-bound probability of developing cancer, assuming continuous lifetime exposure to a substance at a concentration of one microgram per cubic meter (1 µg/m^3) and is expressed in units of inverse concentration [i.e., (µg/m^3)$^{-1}$]. OEHHA's URF for DEEP is 0.0003 per µg/m^3 meaning that a lifetime of exposure to one µg/m^3 of DEEP results in an increased individual cancer risk of 0.03 percent or a population cancer risk of 300 excess cancer cases per million people exposed.

Table 1: Diesel Particulate Toxicity Values or Comparison Values Considered in Assessing and Quantifying Non-cancer Hazard and Cancer Risk

Agency	Non-cancer	Cancer
U.S. Environmental Protection Agency	RfC[1] = 5 µg/m^3	NA[2]
California EPA–Office of Environmental Health Hazard Assessment	Chronic REL[3] = 5 µg/m^3	URF[4] = 0.0003 per µg/m^3

[1] RfC – Reference Concentration

[2] EPA considers DEEP to be a probable human carcinogen but has not established a cancer slope factor or unit risk factor.

[3] REL – Reference Exposure Level

[4] URF – Unit Risk Factor

Community/receptors

Connell Sand and Gravel's Copp Pit is in an area surrounded by agriculturally zoned land (Franklin County, 2023) (Figure 1). A few rural residences are scattered around the facility with the nearest homes about 3/4 mile south and southeast of the Copp pit. A denser residential area is located about six miles west of the facility in the city of Connell. Air dispersion modeling indicated that proposed DEEP emissions would not result in long-term concentrations greater than the ASIL at parcels with residential land use codes (Ecology, 2022).

[3] Condensable particulate does not represent DEEP for the purposes assessing health risks from DEEP exposure; however, we consider both the filterable and condensable fractions of particulate when determining compliance with NAAQS for the purposes of the NOC application.

To assess increased cancer risk and non-cancer hazards, Spring Environmental identified receptor locations where the highest exposure to project-related air pollutants could occur at or near the project boundary, nearby residences, and nearby commercial locations (Table 2, Figure 2).[4] Spring Environmental also identified other sensitive receptor exposures at area preschools, schools, and health care centers. None of these other sensitive receptors is in the area in which Connell Sand and Gravel's ambient impacts exceed ASILs.

Ecology's review of the HIA found that Spring Environmental conservatively identified receptors to represent the highest Connell Sand and Gravel attributable exposures for residential, commercial, and other receptors. In the case of the maximally impacted residential receptor (MIRR), Spring Environmental identified a receptor near the facility that cannot be reasonably anticipated to consist of current or future residential land use. Spring Environmental intentionally made this conservative assumption to avoid underestimating potential exposures to pollutants emitted by Connell Sand and Gravel. Ecology identified an existing home about one mile southeast of the Copp Pit as an alternative location of the MIRR.

Table 2: Estimated Increased Annual Average DEEP Concentrations at Key Receptor Locations

Receptor	UTM Coordinates Zone 11N	Increased Annual DEEP Concentration ($\mu g/m^3$)
MIRR (Spring Environmental)	367975, 5166025	0.00816
MIRR (Ecology)	367825, 5165525	0.00113
MIBR/PMI	367400, 5166975	0.03216
MICR	360700, 5168700	0.00056

MIRR (Spring Environmental) – Maximally impacted residential receptor identified by Spring Environmental

MIRR (Ecology)- Maximally impacted residential receptor identified by Ecology

MICR – Maximally impacted commercial receptor

MIBR/PMI – Maximally impacted boundary receptor/Point of maximum impact

Background concentrations of TAPs in ambient air

When reviewing increases in TAP emissions under second tier review, WAC 173-460-090 specifies that:

[4] The location of the MICR is not shown in Figure 2 because it is several miles to the west of Connell Sand and Gravel

Background concentrations of TAPs will be considered as part of a second tier review. Background concentrations can be estimated using:

- The latest National Ambient Toxics Assessment data for the appropriate census tracts; or
- Ambient monitoring data for the project's location; or
- Modeling of emissions of the TAPs subject to second tier review from all stationary sources within 1.5 kilometers of the source location.

Table 3 shows the background levels considered by Spring Environmental in the HIA. Spring Environmental used EPA's 2014 National Air Toxics Assessment (NATA) to determine background DEEP levels (EPA, 2018). More recently, the EPA developed a successor to NATA called AirToxScreen. The latest available AirToxScreen is based on emissions from 2019 (EPA, 2022). The 2019 AirToxScreen estimated concentration of diesel particles in the census tract near the Copp Pit is slightly lower than that from the 2014 NATA.

Table 3: Estimated "Background" Concentrations near Connell Sand and Gravel

Source	Average Annual Diesel Particulate Concentration ($\mu g/m^3$)
2019 AirToxScreen - Census Tract 53021020800	0.0938
NATA 2014	0.0967

Increased cancer risk

Spring Environmental assessed the increased risk of cancer from lifetime exposure to DEEP emitted from Connell Sand and Gravel's engines. They characterized cancer risk in a manner consistent with EPA guidance for inhalation risk assessment (EPA, 2009) using the following equations:

Risk = IUR x EC

Where:

IUR $(\mu g/m^3)^{-1}$ = inhalation unit risk (i.e., unit risk factor); and

EC ($\mu g/m^3$) = exposure concentration

EC = (CA x ET x EF x ED)/AT

Where:

EC ($\mu g/m^3$) = exposure concentration;

CA ($\mu g/m^3$) = contaminant concentration in air;

ET (hours/day) = exposure time;

EF (days/year) = exposure frequency;

ED (years) = exposure duration; and

AT (ED in years x 365 days/year x 24 hours/day) = averaging time

Cancer risk attributable to Connell Sand and Gravel DEEP emissions

Table 4, adapted from the HIA, shows the estimated Connell Sand and Gravel-specific cancer risk per million for residential, boundary, and commercial receptors. These receptors received the highest exposure to Connell Sand and Gravel-related diesel emissions. Figure 2 shows the location of these receptors relative to Connell Sand and Gravel. The highest increase in risks attributable to Connell Sand and Gravel's emissions is about 2.4 per million[5] for the MIRR defined by Spring Environmental. A lower risk of 0.3 per million occurs at the location of the MIRR identified by Ecology.

For the boundary area exposure scenarios, the maximally impacted commercial receptor (MIBR) may have increased risks of 0.2 per million. The maximally impacted residential receptor (MICR) may have increased risks of 0.02 per million.

Exposure to existing "background" levels of DEEP in the area results in a risk of about 28 in one million for residential receptors.

[5] Number per million represents an upper-bound theoretical estimate of the number of excess cancers that might result in an exposed population of one million people compared to an unexposed population of one million people. Alternatively, an individual's increase in risk of one in one million means a person's chance of getting cancer in their lifetime increases by one in one-million or 0.0001 percent.

Table 4: Estimated Increased Cancer Risk for Residential and Commercial Receptors Attributable to Connell Sand and Gravel's DEEP Emissions

Exposure Parameter	MIRR (ECY)	MIRR (Spring)	MICR	MIBR
CA Connell Sand and Gravel – concentration in air from Connell Sand and Gravel emissions (µg/m^3)	0.00113	0.00816	0.00056	0.03216
CA background – concentration in air from "background" sources (µg/m^3)	0.0938	0.0938	0.0938	0.0938
ET - Exposure Time (hours per day)	24	24	8	2
EF - Exposure Frequency (days per year)	365	365	250	250
ED - Exposure Duration (years)	70	70	40	30
AT - Averaging Time (hours)	613200	613200	613200	613200
EC Connell Sand and Gravel – Connell Sand and Gravel Related Exposure Concentration (µg/$^{m3)}$	0.00113	0.00816	7.31E-05	0.000787
EC background - Background source-related Exposure Concentration (µg/m^3)	0.0938	0.0938	0.0122	0.00229
IUR - Inhalation Unit Risk (µg/m^3)-1	3.00E-04	3.00E-04	3.00E-04	3.00E-04
Increased cancer risk from Connell Sand and Gravel's emissions	**3.4E-07**	**2.4E-06**	**2.2E-08**	**2.4E-07**
Cancer risk from "background" sources	2.8E-05	2.8E-05	3.7E-06	6.9E-07
Total cancer risk from diesel particle exposures near Connell Sand and Gravel	2.8E-05	3.1E-05	3.7E-06	9.2E-07

Non-cancer hazard

Spring Environmental assessed the chronic non-cancer hazards from exposure to DEEP and other TAP emissions from Connell Sand and Gravel and other local sources. They estimated non-cancer hazards consistent with EPA guidance for inhalation risk assessment (EPA, 2009) using the following equations:

HQ = EC/Toxicity Value

Where:

HQ (unitless) = hazard quotient;

EC (µg/m^3) = exposure concentration;

Toxicity Value (µg/m^3) = inhalation toxicity value (e.g., RfC, REL) that is appropriate for the exposure scenario (acute, subchronic, or chronic).

EC = CA

Where:

EC ($\mu g/m^3$) = exposure concentration;[6]

CA ($\mu g/m^3$) = contaminant concentration in air.

A hazard quotient below unity (one) means that an adverse non-cancer health effect is not likely to occur among people exposed to a given TAP. In general, none of the receptors' long-term exposures to DEEP result in hazard quotients exceeding unity (Table 5). This indicates that chronic noncancer hazards are not likely to occur from exposure to Connell Sand and Gravel-related diesel particle emissions.

Table 5: Estimated Long-term DEEP Non-cancer Hazards Attributable to Connell Sand and Gravel's Emissions

Receptor	Project-related Annual Avg. DEEP Level ($\mu g/m^3$)	Existing Background DEEP Level ($\mu g/m^3$)	Cumulative Avg. DEEP Level ($\mu g/m^3$)	Chronic REL ($\mu g/m^3$)	HQ
MIBR/MICR	0.0322	0.0938	0.126	5	<0.1
MIRR (Spring)	0.00113	0.0938	0.0949	5	<0.1

[6] EPA's guidance allows for exposure frequency and exposure duration to be considered when determining exposure concentrations for chronic health effects but, for simplicity, Spring Environmental assumed all receptors were exposed continuously to the average annual contaminant concentration in air at the relevant receptor locations.

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 Connell Sand and Gravel'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 in the HIA for Connell Sand and Gravel's diesel-powered generator emissions are exposure assumptions, emissions estimates, air dispersion modeling, and toxicity of DEEP.

Table 6: Qualitative Summary of How Uncertainty Affects the Quantitative Estimate of Risks or Hazards Attributable to Connell Sand and Gravel Emissions

Source of Uncertainty	How Does it Affect Estimated Risk from this Project?
Exposure assumptions	Continuous lifetime exposure is likely an overestimate of DEEP exposure.
Emissions estimates	Possible overestimate of emissions because Spring Environmental used conservative emission factors to estimate DEEP emissions.
Air modeling methods	Possible underestimate of average long-term ambient concentrations and overestimate of short-term ambient concentration.
Toxicity of DEEP at low concentrations	Possible overestimate of cancer risk, possible underestimate of non-cancer hazard for sensitive individuals.

Exposure uncertainty

We can only estimate the amount of time an individual will be exposed to Connell Sand and Gravel's DEEP emissions. To ensure public health protection, we typically assume a residential receptor is continuously exposed to the increase in emissions for the duration of its lifetime. We recognize that this is an unlikely scenario.

Additionally, Spring Environmental identified an area near the Copp Pit as the maximally impacted residential receptor. This was done to avoid underestimating exposure and risk. It is extremely unlikely that the location they chose will become a residence, so Ecology identified an alternative location to estimate risks for people living near the Copp Pit.

Emissions uncertainty

The exact amount of DEEP emitted from Connell Sand and Gravel's diesel-powered generators is uncertain. Spring Environmental relied on EPA's AP-42 emission factors for large stationary engines. These emission factors produced a diesel particle emission estimate that was about three times higher than manufacturer-reported emissions specifications. This means that Spring Environmental probably overestimated diesel particle emissions.

Air dispersion uncertainty

The transport of pollutants through the air is a complex process. Agencies develop regulatory air dispersion models to estimate the transport and dispersion of pollutants as they travel through the air. They update these models when more accurate techniques become known. Generally, agencies develop these models to avoid underestimating the modeled impacts. Even if we confidently know all the numerous input parameters to an air dispersion model, random effects found in the real atmosphere will introduce uncertainty.

Toxicity uncertainty

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 observed doses or concentrations that cause adverse non-cancer effects in animals or humans. Agencies apply these uncertainty factors so that they derive a toxicity value considered protective of humans including susceptible populations. In the case of DEEP exposure, EPA and OEHHA derived non-cancer reference values used in this assessment from animal studies. These reference values are probably protective of most of the population including sensitive individuals, but in the case of EPA's DEEP RfC, EPA acknowledges (EPA, 2002):

> "…the actual spectrum of the population that may have a greater susceptibility to diesel exhaust (DE) is unknown and cannot be better characterized until more information is available regarding the adverse effects of diesel particulate matter (DPM) in humans."

Quantifying DEEP cancer risk is also uncertain. Although EPA classifies DEEP as probably carcinogenic to humans, they have not established a URF for quantifying cancer risk. In their health assessment document, the EPA determined that "human exposure-response data are too uncertain to derive a confident quantitative estimate of cancer unit risk based on existing studies." However, EPA suggested that a URF based on existing DEEP toxicity studies would range from $1x10^{-5}$ to 1×10^{-3} per $\mu g/m^3$. OEHHA's DEEP URF (3×10^{-4} per $\mu g/m^3$) falls within this range. Regarding the range of URFs, EPA states in their health assessment document for diesel exhaust (EPA, 2002):

> "Lower risks are possible, and one cannot rule out zero risk. The risks could be zero because (a) some individuals within the population may have a high tolerance to exposure from [diesel exhaust] and therefore not be susceptible to the cancer risk from environmental exposure, and (b) although evidence of this has not been seen, there could be a threshold of exposure below which there is no cancer risk."

Other sources of uncertainty cited in EPA's health assessment document for diesel exhaust are:

- Lack of knowledge about the underlying mechanisms of DEEP toxicity.
- The question of whether toxicity studies of DEEP based on older engines are relevant to current diesel engines.

Conclusions and Recommendation

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

(a) The TAP emissions estimates presented by Spring Environmental represent a reasonable estimate of the project's future emissions.

(b) Emission controls for the new and modified emission units meet the tBACT requirement.

(c) The ambient impact of the emissions increases of each TAP that exceeds ASILs has been quantified using appropriate refined air dispersion modeling techniques.

(d) The HIA submitted by Spring Environmental on behalf of Connell Sand and Gravel adequately assesses project-related increased health risks attributable to TAP emissions.

In the HIA, Spring Environmental estimated lifetime increased cancer risks attributable to Connell Sand and Gravel's DEEP emissions. DEEP emissions resulted in an increase in cancer risk of about 2.4 in one million at the maximally impacted residential receptor. Ecology evaluated this receptor location and determined that the area was not likely to be a residential location now or in the future. Ecology identified a nearby home as the maximally impacted receptor and estimated a risk of 0.3 per million at that location.

Spring Environmental also assessed chronic and acute non-cancer hazards attributable to the project's emissions and from background sources and determined that long-term adverse non-cancer health effects from exposure to DEEP are not likely to occur.

Finally, Spring Environmental and Ecology assessed the cumulative health risk by adding estimated concentrations attributable to Connell Sand and Gravel emissions to an estimated background DEEP concentration. The maximum cumulative cancer risk from residents' exposure to DEEP near Connell Sand and Gravel is approximately 28 in one million.

Because the increase in cancer risk attributable to the new sources alone is less than the maximum risk allowed by a second tier review, which is 10 in one million, and the non-cancer hazard is acceptable, the project is approvable under WAC 173-460-090.

The project review team concludes that the HIA represents an appropriate estimate of potential increased health risks posed by Connell Sand and Gravel TAP emissions. The risk manager may recommend approval of the permit because:

- The cancer risk from Connell Sand and Gravel's TAP emissions is less than the maximum risk (10 in one million) allowed by a second tier review.
- Ecology determined that the non-cancer hazard is acceptable.

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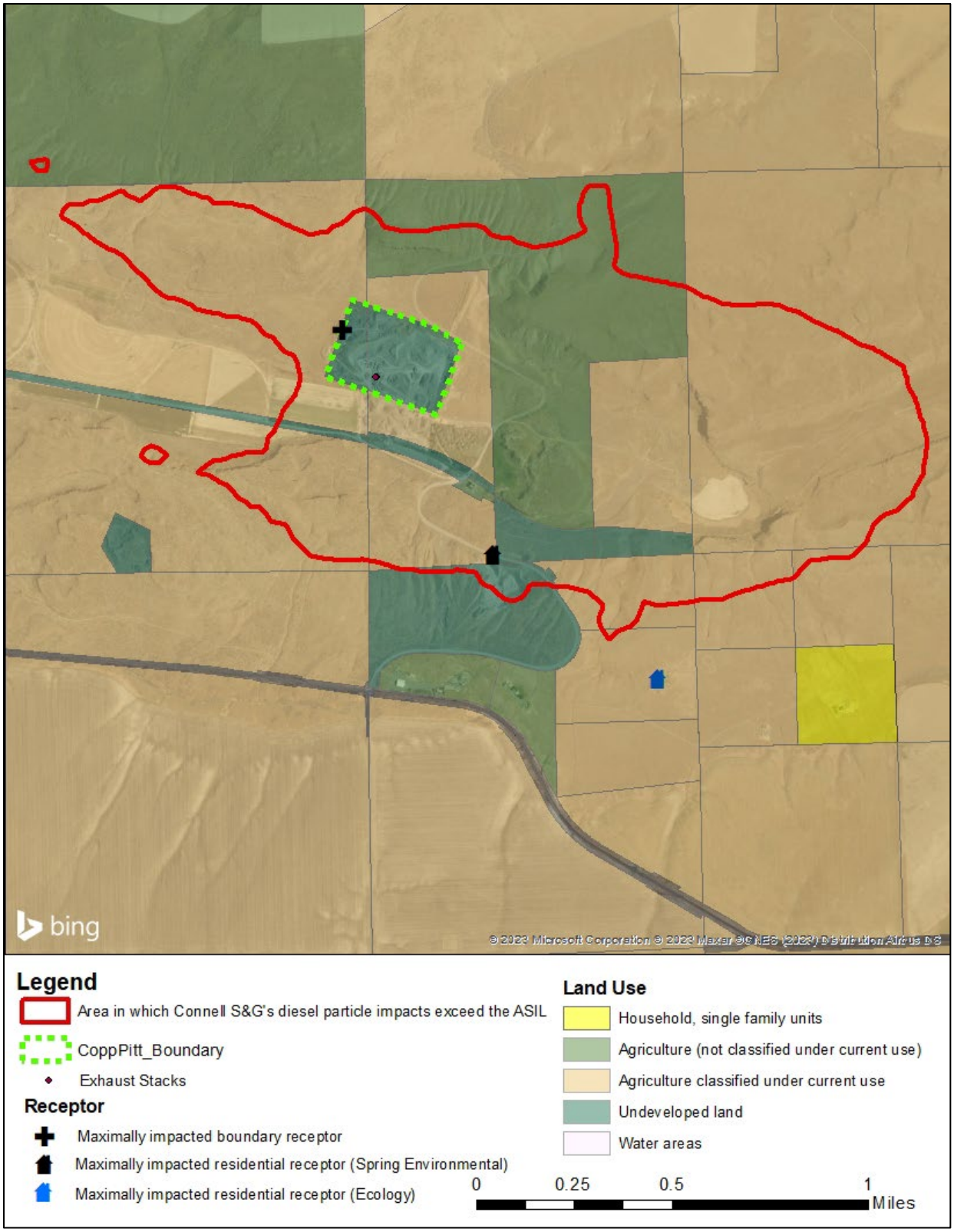

Figure 1: Current land use in the area where Connell Sand and Gravel DEEP emissions may cause impacts that exceed the ASIL

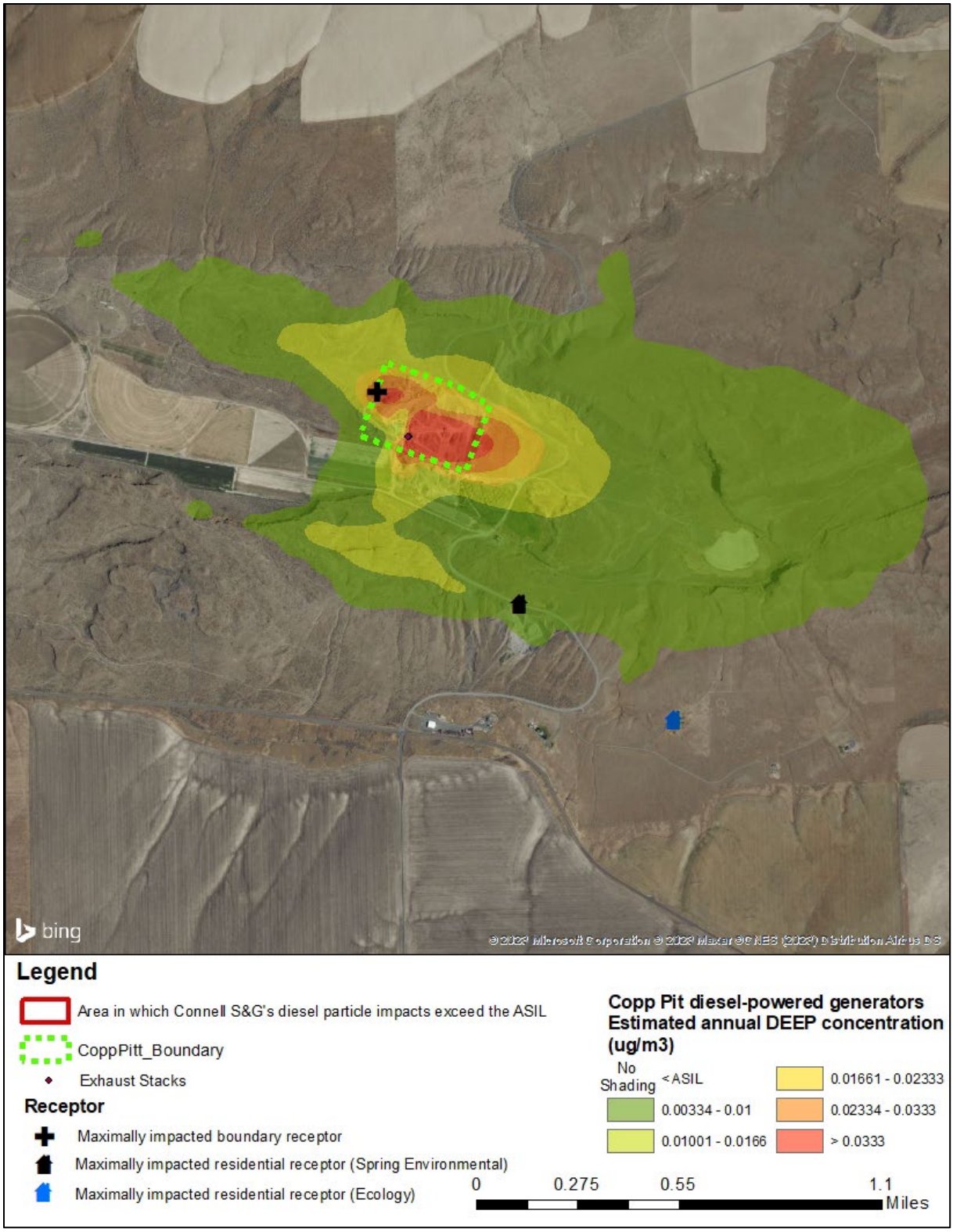

Figure 2: DEEP concentrations attributable to Connell Sand and Gravel's engines and key receptor locations evaluated in the HIA