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BEFORE THE BOARD OF ENVIRONMENTAL QUALITY
STATE OF IDAHO

IN THE MATTER OF AIR QUALITY PERMIT TO CONSTRUCT P-2019.0047 ______________________________ NEZ PERCE TRIBE, IDAHO CONSERVATION LEAGUE, and SAVE THE SOUTH FORK SALMON, Petitioners, v. IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY, Respondent, and PERPETUA RESOURCES IDAHO, INC., Intervenor-Respondent.	Case Docket No. 0101-22-01 OAH Case No. 23-245-01 **EXPERT DECLARATION OF KEVIN SCHILLING**

I, KEVIN SCHILLING, hereby declare under penalty of perjury and pursuant to the law of the State of Idaho that the foregoing is true and correct:

I. Introduction

1. My name is Kevin Schilling. I am the Stationary Source Air Modeling Supervisor for the Stationary Source Bureau at the State Air Quality Division of the Idaho Department of Environmental Quality (DEQ) in Boise. I have held this position since September of 2004; however, the title of the position and location within the organizational structure of the Air Quality Division has changed over time.

2. Presently, two staff positions, both Air Quality Dispersion Modeling Analysts, report directly to me. Darrin Mehr fills one of those positions and the other is filled by Christina Boulay. Ms. Boulay filled the position vacated by Dr. Pao Baylon, who left DEQ in 2023 for employment with a private environmental consulting company. Dr. Baylon was the lead Air Quality Dispersion Modeling Analyst for review of the Perpetua Resources Idaho, Inc. (PRI) Stibnite Gold Project (SGP) air impact analyses that were submitted with the Permit to Construct (PTC) application.

3. My role in the permitting of the SGP has been both supervisory and technical/policy review and evaluation. As mentioned above, Dr. Baylon was the lead in review and verification of impact analyses submitted with the application, and he also performed supplemental analyses to support DEQ's conclusion that the SGP would not cause or contribute to violation of air quality standards or increments. Where air impact modeling methods used by PRI and presented in the PTC application were atypical or of questionable appropriateness, Dr. Baylon discussed the approach, data, and analyses with me. Prior to permit issuance, Dr. Baylon, DEQ Permit Writer Kelli Wetzel, Permitting Supervisor Darrin Pampaian, Stationary Source Bureau Chief Mike Simon, and I discussed various aspects of the SGP, including proposed operations, emission calculations, permit provisions needed to assure compliance, and monitoring and recordkeeping requirements. This was done to provide a comprehensive assessment of DEQ's confidence of NAAQS and TAP compliance in a weight-of-evidence type approach. At the conclusion, DEQ was highly confident that operation of the SGP, as described in the application and as required by the DEQ PTC, will not cause or contribute to a violation of a National Ambient Air Quality Standard (NAAQS) or exceed an applicable Toxic Air Pollutant (TAP) increment.

A. Assignment

4. The *Final Order in the Matter of Air Quality Permit to Construct P-2019.0045*[1] ("Final Order") indicated there was "insufficient evidence to support DEQ's analysis of the ambient arsenic air concentrations." Three remaining issues were identified by the Board of Environmental Quality (DEQ Board) for resolution. These are:

[1] REC 3706, *Final Order in the Matter of Air Quality Permit to Construct P-2019.0047*, *Nez Perce Tribe, Idaho Conservation League, and Save the South Fork Salmon v. Idaho Department of Environmental Quality*, Case Docket No. 0101-22-01, OAH Case No. 23-245-01 (Final Order at 12).

a. DEQ did not act reasonably in using a five-year rolling average for T-RACT that was not properly supported by permit conditions.

b. There was insufficient evidence to support the T-RACT analysis limiting the non-West End pit production limit.

c. DEQ did not act reasonably and in accordance with law when it applied the 16/70 calculation to the ambient arsenic air concentration analysis.

5. The identified issues pertain to specific requirements for how analyses and developed permit conditions and restrictions must provide for satisfactory assurance that the facility will operate as described in the application and as needed to comply with applicable air quality standards and/or increments. The accuracy, representativeness, and/or conservatism of methods and data used to estimate impacts were described in detail in the PTC application materials submitted by PRI and in DEQ's *Modeling Review Memorandum* and the *TAPs Addendum Modeling Review Attachment* attached thereto.[2] The aspects of methods and data used in the analyses are not in question by any of the three remaining issues, and this report will not revisit or expand on DEQ's confidence in the results of impact analyses. This report will address the above-listed issues by showing how DEQ's regulatory interpretation is appropriate and that the permit conditions adequately assure compliance with the arsenic T-RACT TAP increment.

B. Summary of Opinions

6. This Expert Declaration will show that:

a. Use of a 5-year rolling average production limit for assessing compliance with the T-RACT AACC is appropriate because long-term exposure to a given concentration over the life of the project is the critical parameter for the risk-based AACCs. Short-term fluctuations in impacts do not affect compliance and do not impact long-term exposure concentrations.

b. A specific limit on non-West End Pit production is not necessary to assure compliance with T-RACT AACCs. Since West End Pit production is the risk driver in analyses, the combination of a limit on total production and a limit on the fraction of total production that may occur from West End Pit sources is adequate to assure compliance with the T-RACT AACC.

[2] *See* REC 699, 701-711, 719-720, Idaho Department of Environmental Quality, *TAPs Addendum Modeling Review Attachment* to the PRI SGP *Modeling Review Memorandum* (January 6, 2022) (REC 697-713, Demonstrating Compliance with IDAPA 58.01.01.203.02 (NAAQS) and 203.03 (TAPs) as it relates to air quality impact analyses) ("DEQ's TAPS Modeling Attachment"). For convenience, a true and correct copy of DEQ's TAPS Modeling Attachment is attached hereto as Exhibit A.

c. DEQ acted reasonably and in accordance with law when it applied a 16/70 factor to adjust concentrations for comparison to the T-RACT AACC. The Expert Declaration of DEQ Environmental Toxicologist Dr. Norka Paden[3] shows that the factor is appropriate because cancer risk estimates, as evaluated by the EPA risk model, are conservative and are a function of a combination of concentration, exposure time, exposure frequency, and exposure duration. Dr. Paden's Declaration provides the primary justification for using the 16/70 factor to account for the limited duration SGP, and this Declaration provides a brief description of how that meets the requirements of carcinogenic TAP permitting rules.

C. Qualifications and Experience

7. I received a Bachelor of Science (BS) degree in Environmental Science, with a minor in chemistry, from Washington State University in 1986. After graduation I was employed by Washington State University as a Research Assistant at the Laboratory for Atmospheric Research while attending graduate school. I received a Masters of Science (MS) degree in Environmental Engineering (specializing in atmospheric chemistry, air pollution meteorology, air pollution monitoring, and atmospheric pollutant dispersion) from Washington State University in 1988.

8. I initially began employment with DEQ (at that time the Division of Environmental Quality) in 1989 and then left the agency in 1990 for employment with Morrison Knudsen Company, a large Idaho-based construction company. I worked in Morrison Knudsen's Environmental Group, performing a wide range of air quality related projects where a key focus was air pollutant impact assessment. These projects included permitting, pollutant emissions estimation, atmospheric dispersion modeling, air pollution monitoring, and industrial hygiene functions.

9. In the mid-1990s, I actively participated in the initial development of Idaho's TAP permitting regulations while working at Morrison Knudsen. I provided technical and regulatory assistance to the Idaho Association of Commerce and Industry (IACI). IACI negotiated with DEQ on the development and promulgation of the TAP rules. I held the position of Chair of the Air Toxics Subcommittee during part of the multi-year negotiations. I stepped down from Chair of the subcommittee before final promulgation of the TAP rules because of other project obligations at Morrison Knudsen that required extensive work outside of Idaho. The work on the IACI Air Toxic Subcommittee involved:

a. Evaluation of the basis from which carcinogenic and non-carcinogenic air impact limits would be established.

b. Ensuring that the interests and concerns of the regulated community were considered in the development of regulations.

[3] *Expert Declaration of Dr. Norka Paden* (August 13, 2024) ("Paden Decl."), ¶¶ 11-18.

c. Structuring regulations in a format that is easily used in the context of air permitting for industrial facilities and DEQ.

10. I returned to DEQ in December of 2001, working in the Technical Services Division where I primarily reviewed air impact modeling analyses submitted as part of air permit applications. I transferred to the Air Quality Program Office as the Stationary Source Air Modeling Coordinator in 2004. Later my title was changed from *coordinator* to *supervisor*.

11. My primary responsibilities as Stationary Source Air Modeling Supervisor are both management/administrative and senior level technical and regulatory oversight. A critical component of my position in the Stationary Source Modeling Group is performing, reviewing, and overseeing technical and regulatory aspects of air impact analyses that satisfy regulatory requirements for permit issuance. Where project-specific conditions present unique circumstances, and there is uncertainty in the acceptability of proposed technical and regulatory approaches to address those unique circumstances, DEQ collectively employs its expertise and experience to develop and evaluate the approach.

II. Background Discussion

A. Permitting Requirements for TAPs

12. TAPs were regulated only by *Idaho Air Rules* Section 161[4] prior to the mid-1990s. DEQ developed a permitting TAPs Policy to provide consistency in how TAPs would be addressed in air permitting. The foundation of that policy was to ensure that a proposed project would not cause impacts to ambient air exceeding: 1) non-carcinogenic pollutant concentration levels that are based on occupational exposure limits; and 2) carcinogenic pollutant concentration levels that are based on EPA inhalation Unit Risk Factors (URFs) (as described in more detail in the Expert Declaration of Dr. Norka Paden[5]) and a selected acceptable lifetime cancer risk. The unit risk is lifetime[6] excess cancer risk estimated to result from continuous exposure to a toxic air contaminant at a concentration of 1 microgram/cubic meter of air ($\mu g/m^3$).

13. The regulated community (those applying for and regulated by an air quality permit from DEQ) expressed concerns in the early 1990s regarding DEQ regulation of TAPs by policy. The regulated community, under the representation of IACI, then engaged in regulatory negotiation with DEQ to establish TAP rules for air permitting. The goals of the negotiations were to develop rules that: 1) are reasonably protective of public health, but still afford flexibility to regulated

[4] *Idaho Administrative Procedures Act 58.01.01, Rules for the Control of Air Pollution in Idaho* ("Idaho Air Rules"), Section 161, Toxic Air Pollutants. This Section states: "Any contaminant that is by its nature toxic to human or animal life or vegetation must not be emitted in such quantities or concentrations as to alone, or in combination with other contaminants, injure or unreasonably affect human or animal life or vegetation."

[5] Paden Decl., ¶¶ 12-16.

[6] 70 years was selected as a lifetime.

facilities and projects; 2) are relatively easy to understand and implement; and 3) do not require excessive expenditure of time and resources by DEQ and the permittee during the permitting process.

14. During development of the TAP rules, DEQ's reliance on EPA URFs remained the regulatory approach cornerstone for developing consistent acceptable methods to evaluate impacts to ambient air for carcinogenic TAPs. A DEQ internal memorandum[7] responding to a request for layman's explanation of URF & TLV/100 stated, "Within IAQB (Idaho Air Quality Bureau) New Source Review (NSR) policy, URFs are used to calculate acceptable ambient levels for a given carcinogen. IAQB generally establishes that an ambient concentration which causes no more excess cancers than one in a million (1×10^{-6}) is acceptable." In the early stages of TAP regulation development, DEQ sent IACI a letter that provided a "straw-man" of possible TAP regulatory language.[8] That regulatory straw-man proposal stated the following for procedures to demonstrate compliance for emissions of carcinogenic pollutants:

> "For sources that can demonstrate, using Department-approved methods, that emissions of carcinogens contribute an ambient air cancer risk probability of less than 1:1,000,000 and that emissions of non-carcinogens contribute to an ambient air concentration less than one percent of the Threshold Limit Value, no additional procedures are needed."

15. During development of the TAP rules, DEQ continually asserted that carcinogenic TAPs resulting from a permitting project should be regulated to prevent an unacceptable excess cancer risk based on a 70-year lifetime. Excess inhalation cancer risk probability over a 70-year lifetime is calculated from the EPA Inhalation Unit Risk and the Exposure Concentration, as described in the Expert Declaration of Dr. Norka Paden.[9] The formula is as follows:

Excess Cancer Risk Probability = (IUR)(EC)

Where: IUR = Inhalation Unit Risk per $\mu g/m^3$ of exposure
EC = Exposure Concentration in $\mu g/m^3$

An acceptable arsenic concentration can be calculated by rearranging the formula and solving for EC using an allowable risk of 10^{-6} (1-in-1,000,000) and a IUR of $0.0043/(\mu g/m^3)$ for arsenic. The resulting EC is 2.3 E-4 $\mu g/m^3$, which is the AACC listed in *Idaho Air Rules* Section 586. This clearly shows how the EPA cancer risk model was used to generate AACCs to protect against lifetime cancer risk from long-term exposures.

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[7] State of Idaho Department of Health and Welfare, Division of Environmental Quality. *Request for layman's explanation of URF& TLV/100*. From Robert Wilkosz and Tim Teater. To Orvil [sic] Green. March 7, 1991. A true and correct copy of this memorandum is attached hereto as Exhibit B.

[8] State of Idaho Department of Health and Welfare, Division of Environmental Quality. Letter from Robert Wilkosz, Bureau Chief, Technical Services Bureau, to Dick Rush, Vice President, IACI. July 29, 1992. A true and correct copy of this letter is attached hereto as Exhibit C.

[9] Paden Decl., ¶ 15.

16. Dr. Paden further explains that the Exposure Concentration can be calculated using the contaminant concentration, exposure time, exposure frequency, exposure duration, and applicable averaging time by the following:

$$EC = (CA \times ET \times EF \times ED)/AT$$

Where: EC = Exposure Concentration (μg/m³)
CA = Contaminant Concentration (μg/m³)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (day/year)
ED = Exposure Duration (years)
AT = Averaging Time (70 years x 365 days/year x 24 hours/day)

17. The above formula is used to calculate an Exposure Concentration for a specified project duration over a 70-year average lifetime. This Exposure Concentration can then be compared to a concentration limit that is protective for lifetime cancer risk, such as the AACC or the T-RACT AACC. Although the AACC is expressed as an annual average, it represents the concentration averaged over a 70-year lifetime, as defined by how it was generated from URFs and how it is intended to limit long-term exposure concentration and limit the associated excess cancer risk to 1-in-1,000,000. When the Exposure Duration is equal to the 70-year Averaging Time, and the Exposure Frequency and Time are conservatively set to 365 day/year and 24 hours/day, then the Exposure Concentration is simply equal to the Contaminant Concentration, which is the annual impact obtained from the model. Since the vast majority of DEQ permitting projects are of permanent operations (70 years), no adjustment of the Contaminant Concentration is required to obtain the Exposure Concentration.

18. The SGP will have an Exposure Duration of 16 years, the applicable Contaminant Concentration (an annual value obtained from modeling results) is 0.00416 μg/m³, the Exposure Frequency is 365 days/year, and the Exposure Time is 24 hours/day. The calculated Exposure Concentration is then:

$$EC = \frac{(0.00416\ \mu g/m^3)(24\ \text{hours/day})(365\ \text{days/year})(16\ \text{years})}{(24\ \text{hours/day})(365\ \text{days/year})(70\ \text{years})} = 0.00095\ \mu g/m^3$$

As observed in the equation, with conservative assumptions for exposure time and frequency, the equation reduces to the 16/70 factor that was used in DEQ's analysis to account for the limited life of the mine. This demonstrates how a 16/70 adjustment factor to annual estimated impacts is appropriate.

19. DEQ air permits are issued to facilities primarily for permanent and consistent operations where resulting emissions vary little through time. Rather than develop a carcinogenic TAP rule that provided for a project-specific lifetime in the calculation of allowable carcinogenic TAP concentrations in ambient air, DEQ provided simpler regulatory language that provides a concentration limit based on a 70-year continual exposure and expressed that exposure as an annual

average exposure concentration. TAP permitting regulations in *Idaho Air Rules* Section 210.15 provide a short-term project adjustment factor of 10 to apply to the allowable AAC when a project will have a duration of less than 5 years. This shows: 1) an adjustment in the exposure concentration is appropriate (in this case, the rules adjust the AACC rather than the exposure concentration); 2) an adjustment greater than 10 cannot be used for projects of duration less than 5 years. In general, DEQ determined it would not be appropriate to subject individuals to a life-time allowable cancer risk within a duration of less than 5 years. Therefore, the adjustment was capped at 10, rather than using a higher value or values calculated from exposure durations of 5 years of less (e.g., 70 years/5 years = 14 or 70 years/2 years = 35). These short-term projects were most commonly remediation and pilot-scale projects having a duration of up to several years.

B. Form of the Arsenic AACC

20. *Idaho Air Rules* Section 586 state that the AACCs "in this section are annual averages." The rules also state that the Toxic Air Pollutant Carcinogenic Increments "are based on . . . a seventy (70) year lifetime exposure." The former is the averaging period of the modeling results (CA), and the latter is the average period of the lifetime exposure concentration (EC) used for determining excess cancer risk. Air impact analyses only demonstrate compliance with standards when the analyses use the same averaging period as the applicable standard. An annual average impact concentration does not demonstrate compliance with a 24-hour standard. In the case of carcinogenic TAPs, the applicable standard is a pollutant-specific inhalation cancer risk posed in ambient air that results from allowable emissions from the proposed project for the life of the project. That acceptable cancer risk is either 10^{-6} (1-in-1,000,000) as expressed in the AACC or 10^{-5} (1-in-100,000) when controls meeting T-RACT are used. The listed annual AACCs are an expression of that standard when applied to a permanent project/facility that has no permit restrictions on operating duration. These AACCs were developed using the EPA inhalation Unit Risk Factors (URFs) that existed at the time *Idaho Air Rules* Section 586 was promulgated. The *Idaho Air Rules* do not preclude use of an exposure concentration adjustment for impacts, and the EPA risk model that was used in the development of the AACCs provides for this adjustment to calculate the exposure concentration.

C. Arsenic Compliance Approach for SGP

21. The arsenic TAP compliance demonstration approach used by PRI for the SGP permitting analyses was thoroughly described in DEQ's *TAPs Addendum Modeling Review Attachment* of the DEQ *Modeling Review Memorandum*[10] for the SGP. This Expert Declaration will summarize the regulatory approach used to demonstrate compliance and provide additional justification for that approach. It will not reiterate the conservatism of the data and methods of the modeling approach used to estimate arsenic impacts to ambient air, as that is not an identified issue.

22. During development of final SGP permitting analyses, PRI expressed concern that compliance with AACCs could not be demonstrated with the conservative assumptions used in

[10] REC 698, 710-711; DEQ's TAPS Modeling Attachment at 2, 14-15.

previous analyses, including the assumption that the SGP was a permanent source rather than one of 16-year duration. Rather than revise the analytical approach to provide a less conservative assessment of impacts, I proposed that compliance with carcinogenic TAP increments could be based on cumulative cancer risk of the limited-duration project rather than the worst-case annual impact for a project of limited duration. Since the AACC annual average is an expression of a 1-in-1,000,000 cancer risk limit for permitting projects, modeled impacts (annual contaminant concentration) must be adjusted to an exposure concentration that is appropriately comparable to the annual average AACC. Therefore, annual impacts for a project with a 16-year duration could be multiplied by a 16/70 factor to more appropriately compare to the AACC, which is based on a 70-year exposure duration. Similarly, year-to-year variability in emissions could be distributed over an alternative averaging period, provided there is still an adequate periodic evaluation that long-term risk limits are not exceeded.

23. My justification for the acceptability of using a 16/70 factor to adjust modeled impacts was based on technical/scientific considerations, my personal working-level knowledge of DEQ's TAP rules, and my limited knowledge of carcinogenic risk assessment and its relation to the TAP rules. Because of the unique 16-year project duration of the SGP and because *Idaho Air Rules* only identify AACC values for 70 years and less than 5 years, I discussed the approach with the DEQ permitting team prior to proposing use of the method. The DEQ permitting team concluded that the exposure duration consideration was an appropriate adjustment to the calculation of an exposure concentration (EC) for comparison to the T-RACT AACC, and it was concluded by the team that this approach was consistent with implementation of the URFs and identified acceptable excess cancer risks (1-in-1,000,000 or 1-in-100,000 when T-RACT is used) adopted by DEQ as AACCs into *Idaho Air Rules* Section 586.

III. Response to Remaining Issues Identified by the Board of Environmental Quality

A. DEQ Acted Reasonably in Using a 5-Year Rolling Average for T-RACT and it was Supported by Permit Conditions

24. *Idaho Air Rules* Section 586 state that AACCs are annual averages. The implication of the stated issue is that when a standard or increment is specified for a certain averaging-period, then any limits imposed on operations should be for the same averaging period or a shorter averaging period. For example, an operational limit designed to limit emissions that is based on a 5-year averaging period would not be adequate for assuring compliance with an annual average standard. This is because variability in operational rates within the 5-year period could result in a violation of the annual standard while still complying with the 5-year operational limit in the permit. For short-term 1-hour standards, DEQ uses 1-hour averaged operational limits and 1-hour averaged monitoring requirements. Permit requirements to assure compliance with a 1-hour limit would not be based on longer averaging periods such as daily rates because the 1-hour limit could be exceeded while still complying with the daily rate.

25. As I have established earlier in this declaration, carcinogenic TAP AACCs were established to ensure that impacts of any carcinogenic TAPs from a project or facility would not cause a lifetime cancer risk over 1-in-1,000,000 or 1-in-100,000 when using T-RACT. Cancer risks used to establish AACCs were based on EPA's cancer risk model (using established EPA URFs), where risk is dependent on an exposure for a certain project duration, and the risk varies linearly with exposure duration. Because limiting total project-caused cancer risk is the underlying criteria for carcinogenic TAP regulation, any permit limits must only assure that concentrations in ambient air over the total duration of the project do not cause a potential exposure concentration associated with a 1-in-1,000,000 or 1-in-100,000 cancer risk. Therefore, compliance with the carcinogenic AACCs would still be demonstrated if processing rates were only limited to the 788.4 million tons over the life of the mine (combined with the restriction on West End Pit production as described in the next section). Use of a 5-year averaging period for limiting processing rates easily accomplishes this requirement for a project with a 16-year duration, and it provides for reasonable periodic assurance of compliance with the long-term limit.

26. The *Final Order* from the DEQ Board[11] asserted that, "A five-year rolling average allows considerable daily and annual increases in exposures which are contrary to limits set forth in the Air Rules." Because pollutant-specific total project cancer risk is the blanketing objective of regulating carcinogenic TAPs, and since risks as assessed by the EPA risk model are a function of exposure concentration (accounting for exposure duration over a lifetime), any daily and annual variability is inconsequential to the exposure concentration and resulting risk. For example, assume a processing rate of 200,000 tons/year results in an annual arsenic impact of 3.0 E-4 $\mu g/m^3$, 153,000 tons/year results in 2.3 E-4 $\mu g/m^3$ (equal to the standard), and processing 100,000 tons/year results in an annual impact of 1.5 E-4 $\mu g/m^3$. Then assume a facility processes 200,000 tons during years one and two, 100,000 tons during years three and five, and 153,000 tons during year four. The total material processed over five years is 753,000 tons, and the mean annual processing rate is 150,600 tons/year. The same mean processing rate would result from processing 150,600 tons for each of the five years, and this would result in the same average annual air impact and the same carcinogenic exposure concentration. Since the exposure concentration (a resulting project caused concentration averaged over a lifetime) is a measure of compliance with AACC, the five-year rolling average is consistent with limits in *Idaho Air Rules* for carcinogenic TAPs.

B. DEQ had sufficient Evidence Supporting Limits on non-West End Pit Production

27. Final maximum potential arsenic exposures resulting from the SGP, as limited by permit conditions, were calculated from maximum modeled annual impacts and post-processing of those impacts by the following equation[12,13]:

[11] REC 3713 (Final Order at 19).

[12] REC 710-711, DEQ's TAPS Modeling Attachment at 14-15.

[13] *See* REC 1947-48, *Stibnite Gold Project Permit to Construct Application TAP Addendum.* Prepared for Perpetua Resources Idaho, Inc., Prepared by Air Sciences Inc., October 5, 2021 (full document at REC 1921-2146).

$$LifeExposure_{Wi,j,n} = \left[\left(WEPExposure_{Wi,n}\right)(50\%) + \left(nonWEPExposure_{Sj,n}\right)(50\%)\right]\left[\frac{16\ year\ LOM}{70\ year\ exposure}\right]$$

Where:

W_i	=	West End Pit scenario, where i = 1 to 4
S_j	=	Non-West End Pit scenario, where j = B1, B2, H1, H2, H3, H4, Y1, Y2, and Y3.
n	=	specific receptor.
$LifeExposure_{Wi,j,n}$	=	lifetime exposure in µg/m^3 for West End Pit scenario *i*, non-West End Pit scenario *j*, at receptor *n*.
$WEPExposure_{Wi,n}$	=	annual maximum modeled impact in µg/m^3 for West End Pit scenario *i* at receptor *n*
$nonWEPExposure_{Sj,n}$	=	annual maximum modeled impact in µg/m^3 for non-West End Pit scenario *j* at receptor *n*
16 *year LOM*	=	maximum life-of-mine
70 *year exposure*	=	lifetime exposure used for development of AACCs in *Idaho Air Rules*

The issued permit provided a total mine production limit and a production limit for West End Pit operations. The *Final Order* from the DEQ Board[14] stated, "However, the equation listed above shows that the non-West End Pit production was also limited by 50%. The Board of Environmental Quality was unable to determine from the record where this 50% reduction came from or whether it was actually applied when doing the calculation."

28. The DEQ Board, in the *Final Order*, fails to understand how the issued PTC appropriately and effectively limits both West End Pit and non-West End Pit production. The listed equation provides worst-case impacts for the various scenarios, but by itself it does not fully explain how certain sources must be limited by the permit to assure that the SGP operates as described in the application and in compliance with applicable standards and increments. The PTC limits total hauling and excavation from the mine to 788.4 million tons (West End Pit production combined with non-West End Pit production) and limits hauling and excavation from the West End Pit to 394.2 million tons, which is equal to 50% of total allowable production. Impacts to critical receptors (those having impacts that may approach the T-RACT AACC) are far greater for West End Pit sources than for non-West End Pit Sources. Analyses performed by DEQ during review of the application[15] showed that maximum arsenic impacts when 100% of the allowable production is from non-West End Pit sources (0.0023 µg/m^3 before adjusting for the life of the mine and 0.00053 µg/m^3 after adjusting for the life of the mine) are well below the maximum impact when 100% of allowable production is from West End Pit; therefore, with both a limit on total production and West End Pit production, an additional limit on non-West End Pit production is not necessary to assure that the SGP operates as represented in the application and as needed to

[14] REC 3714 (Final Order at 20).

[15] *PERPETUA RESOURCES IDAHO, INC. – P-2019.0047 PROJ 62288 - Lifetime Arsenic Exposure for Scenarios W1-W4 (DEQ's Post Processing Analysis).xlxs*. Excel Workbook. DEQ, 2021. A true and correct copy of this Excel workbook is provided concomitantly with this declaration and identified as Exhibit D.

assure that applicable emissions do not exceed the arsenic T-RACT AACC. Non-West End Pit production is limited to the facility-wide 788.4-million-ton limit for total hauling and excavation at the mine if there were no West End Pit production.

29. Production is effectively limited from non-West End Pit sources because of the following relationship:

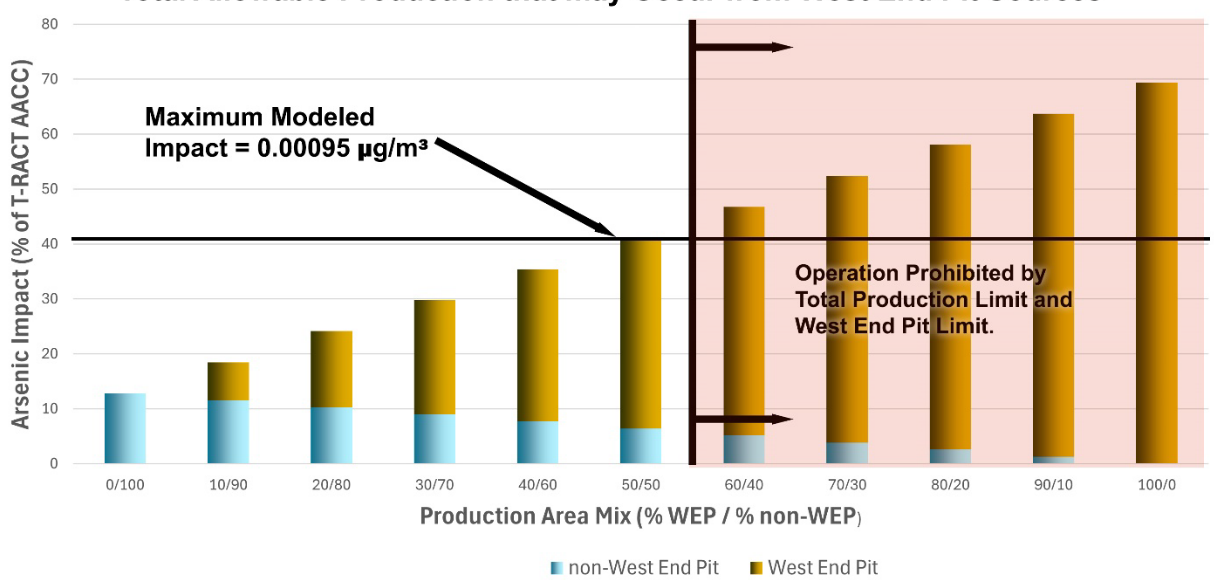
$$Production_{Non\text{-}WEP} = Production_{total} - Production_{WEP}$$

Where:

$Production_{Non\text{-}WEP}$ = production from non-West End Pit Sources
$Production_{total}$ = Total allowable production.
$Production_{WEP}$ = production from West End Pit Sources (not to exceed 50% of $Production_{total}$)

30. The effect of a limit on total production and West End Pit production can be observed by showing how maximum arsenic impacts change with changes in the fraction of total allowable production that occurs from the West End Pit. This was done for the single receptor that had the highest overall exposure concentration. Figure 1 shows how the total adjusted impact is affected by changes in the West End Pit production. The Figure shows how total impacts increase as West End Pit production increases and non-West End Pit production decreases. Figure 1 also shows how impacts would increase above the adjusted combined impact of 0.00095 μg/m^3 for West End Pit allowable production above 50% of the total allowable production from combined West End Pit and non-West End Pit sources.

Figure 1: Maximum Arsenic Impacts as a Function of the Percentage of Total Allowable Production that may Occur from West End Pit Sources



C. DEQ Acted Reasonably and in Accordance with Law when it Applied the 16/70 Calculation to the Ambient Arsenic Air Concentration Analysis

31. The DEQ Board, in the Final Order, misses the point that project-caused pollutant specific cancer risk is the overriding criteria of acceptability and that AACCs, expressed as an annual average, are provided to simplistically apply to permanent sources with emissions of low variability. The Final Order states that "nowhere in the Air Rules does it provide that a project that will operate more than 5 years but less than 70 years may be adjusted in proportion to the amount of time it will operate." Idaho Air Rules do not preclude the use of such a factor within the context of the regulatory intent. *Idaho Air Rules* do not alter EPA's science nor preclude its use, which includes use of a 70-year lifetime exposure duration in calculating AACCs. For projects with an enforceable operational life of less than 70 years, an adjustment for reduced exposure duration is appropriate. Total project-caused carcinogenic risk has been identified as the criteria from which the AACCs were established, as has been described earlier in this Declaration. When specific parameters associated with a project subject to the AACCs are not consistent with the assumptions/conditions that went into development of the AACCs, DEQ staff are compelled to adjust for those in an appropriate and/or conservative manner. DEQ then used its authority to write reasonable permit conditions per IDAPA 58.01.01.211 to limit total production including specific limitations on the West End pit.

32. Additionally, DEQ did not adjust the AACC. DEQ adjusted the applicable modeled impact concentration, which has a duration of 16 years, to an exposure concentration representative of a 70-year lifetime. With this adjustment, the exposure concentration can be compared to the AACC or the T-RACT AACC. The adjustment involved assuming maximum modeled impacts persist for the 16 years of mine life, and then those impacts are evenly distributed over a 70-year period to be consistent with the assumptions of carcinogenic TAP regulations.

33. Apart from the DEQ Board's identified issue with lack of specific allowance in the *Idaho Air Rules* to use an adjustment factor to account for project duration, the *Final Order* also stated that "DEQ did not provide sufficient evidence in the form of an expert opinion from a toxicologist or other qualified expert regarding the cancer risk associated with the 16/70 adjustment." As previously mentioned, outside of DEQ's adjustment factor of 10 specified for short-term sources of less than five years, cancer risk associated with exposures between 5 and 70 years are based on the EPA risk assessment model, using established URFs and exposure concentrations. DEQ's toxicologist, Dr. Norka Paden, demonstrated in her declaration[16] that use of the 16/70 adjustment factor is appropriate to calculate exposure concentration impacts of a 16-year project to be compared to the T-RACT AACC, which is based on a 70-year lifetime.

IV. Conclusions

34. Regarding the three remaining issues identified by the DEQ Board on the arsenic analysis supporting issuance of the DEQ PTC, DEQ concludes:

[16] Paden Decl., ¶ 18.

A. A 5-year rolling average production limit and associated monitoring of production was appropriate and reasonable because the criterion of acceptance is project-caused excess inhalation cancer risk. Short-term variability is inconsequential to the total risk.

B. Limits on total production along with a limit on West End Pit production effectively limits non-West End Pit production. A separate limit on non-West End Pit production is not necessary because compliance with the T-RACT AACC is still demonstrated when 100% of total allowable production is from non-West End Pit sources.

C. DEQ acted reasonably and in accordance with law when applying the 16/70 factor to generate an Exposure Concentration to compare against the T-RACT AACC. As demonstrated, AACCs are an annual representation of the acceptable Exposure Concentration for a permanent project and a 1-in-1,000,000 excess cancer risk. Standard EPA risk assessment methods (the same methods used to develop the AACCs) were used with the modeled annual concentration to calculate an Exposure Concentration representative of the 16-year project duration while conservatively assuming a 24 hour/day Exposure Time and a 365 day/year Exposure Frequency. This reduces to the 16/70 factor applied to the modeled concentration.

DATED August 13, 2024

/s/ Kevin Schilling______________
KEVIN SCHILLING

CERTIFICATE OF SERVICE

I hereby certify that on August 13, 2024, a true and correct copy of the foregoing ***EXPERT DECLARATION OF KEVIN SCHILLING*** was served on the following:

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EXHIBIT A

TAPs Addendum Modeling Review Attachment

1.0 Introduction and Summary

Perpetua Resources Idaho, Inc. (PRI) submitted the *Stibnite Gold Project (SGP) Permit to Construct Application TAP Addendum* (*TAP Addendum*), prepared by Air Sciences Inc. (Air Sciences) and submitted to DEQ on October 5, 2021. The TAP Addendum reassessed source applicability to Toxic Air Pollutant (TAP) permitting requirements, refined TAPs regulatory methods to demonstrate compliance with applicable TAP increments, revised and/or refined operations and operational parameters affecting TAP emissions, and refined TAP air impact analyses. The revisions and refinements made for the TAP Addendum also reduced PM_{10} and $PM_{2.5}$ emissions, and this effect is presented in this *TAPs Addendum Modeling Review Attachment* (*Modeling Review Attachment*).

2.0 Scope of TAPs Addendum

DEQ reevaluated TAPs compliance regulatory interpretations and impact assessment methods following the second public comment period of February 18, 2021, through March 19, 2021. Areas of revision in response to issues identified after the public comment period included:

- Revising source-specific TAP impact assessment applicability, primarily identifying what sources can be excluded because they are “covered” or “addressed” by a National Emissions Standard for Hazardous Air Pollutants (NESHAP) or New Source Performance Standard (NSPS).
- Refining regulatory methods used to demonstrate compliance with TAP increments.
- Refining TAP emission calculation methods and dispersion-affecting parameters.
- Reassessing TAP impacts resulting from revised and/or refined methods and data.
- Providing a best-estimate of actual TAP emissions that will occur from operation of the mine, and then comparing this to maximum permit-allowable emissions.

PRI and Air Sciences, PRI’s permitting consultant, submitted the *TAP Addendum* on October 5, 2021.

3.0 Revised NESHAP/NSPS TAP Exclusion

DEQ and PRI reevaluated TAP source applicability after the second public comment period in response to expressed concerns regarding sources excluded as per *Idaho Air Rules* Section 210.20 (excluding sources that are “covered” or “addressed” by a NESHAP). TAP applicability is explained in greater detail in the main body of the DEQ Statement of Basis. As a result of the reevaluation, some additional sources were included in the TAP impact modeling analyses that were not previously. TAP sources from gold mining that were modeled in the final TAP analyses included: drilling, blasting, excavating, hauling, prill silos, rock dumps and storage piles, and tailings.

Air Sciences consulted with DEQ to refine TAP compliance demonstration methods from what was originally submitted in the application. The refinement was primarily needed to show compliance with the arsenic Acceptable Ambient Concentration of a Carcinogen (AACC). The revised methods are described in the submitted *TAP Addendum* and this DEQ *Modeling Review Attachment*.

4.0 TAPs Refined Compliance Demonstration Approach

PRI, in consultation with DEQ, used a highly refined TAPs analysis approach to demonstrate compliance with applicable TAP increments. This approach involved the following:

- AACC Adjustment for Toxic Air Pollutant Reasonably Available Control Technology (T-RACT) Utilization.
- TAP Emission Averaging Period.
- AACC Adjustment for the Operational Life of the Mine.

4.1 AACC Adjustment for T-RACT Utilization

Idaho Air Rules Section 210.12 allows TAP impacts of 10 times the AACC if the application demonstrates that T-RACT is used for the TAP emission sources. This represents a life-time cancer risk of 1-in-100,000. An adjustment cannot be made for non-carcinogenic TAPs listed in *Idaho Air Rules* Section 585.

Review of the T-RACT demonstration is performed by the DEQ permit writer and is described in the main body of the DEQ Statement of Basis.

4.2 TAP Emission Averaging Period

Annual average emissions of carcinogenic TAPs are typically used in the dispersion model to estimate maximum annual impacts. PRI refined the analyses by using source-specific emission rates that are representative of a 5-year averaging period. This approach is appropriate because carcinogenic impacts are of concern from a long-term exposure basis.

4.3 AACC Adjustment for the Operational Life of the Mine

AACCs were established based on a 1-in-1,000,000 cancer risk over a 70-year lifetime, as stated in *Idaho Air Rules* Section 006.125:

> ***Toxic Air Pollutant Carcinogenic Increments****. Those ambient air quality increments based on the probability of developing excess cancers over a seventy (70) year lifetime exposure to one (1) microgram per cubic meter (1 ug/m3) of a given carcinogen and expressed in terms of a screening emission level or an acceptable ambient concentration for a carcinogenic toxic air pollutant. They are listed in Section 586.*

PRI indicated the maximum life-of-mine will be 16 years. Life-time exposures to carcinogenic TAPs were refined by multiplying the maximum modeled annual impact by a ratio of 16/70. Section 5.7 of this *Modeling Review Attachment* provides more details on this adjustment for the project.

5.0 Refined TAP Emission Estimates and Modeling Methods/Parameters

This section describes changes made to TAP emission estimates and to methods/parameters used in the impact modeling analyses.

5.1 Operational Adjustments

PRI and Air Sciences proposed and committed to several operational adjustments to reduce actual and estimated TAP emissions:

- Installing and operating dust collection systems on drilling rigs (determined to be T-RACT).
- Capping the haul roads that are outside of the pits and development rock storage facilities (DRSFs) with clean (lower levels of arsenic) development rock (determined to be T-RACT).
- Eliminating the West End Development Rock Storage Facility, which eliminated the highest-emitting operational scenario W5.
- Limiting long-term mining production to an average of 135,000 tons/day for a 5-year rolling average.
- Constructing the Burntlog access road with offsite materials containing “background” levels of arsenic.
- Updating the bulldozing emission factor using the SGP site-specific silt content.

5.2 General Modeling Methods and Parameters

Modeling methods and parameters used in TAP impact analyses presented in the *TAP Addendum* are largely identical to those used in the previously submitted application. These include the air dispersion model used, meteorological data, terrain, building downwash, ambient air boundary, and receptors. TAP modeling was conducted for the 14 operational modeling scenarios, consistent with the NAAQS analyses. Modeling Scenario W5 was eliminated from the arsenic modeling, as discussed in Section 5.8 of this *Modeling Review Attachment*.

The meteorological dataset processed using McCall, Idaho, cloud cover data was used for analyses in the *TAP Addendum*. Impacts were not assessed using the dataset processed using the Bulk Richardson (BULKRN) method for boundary layer parameter calculations. EPA considers both methods to be acceptable. Although modeled impacts tend to be somewhat larger when using meteorological data processed by the BULKRN method, DEQ contends that the impact analyses are still largely conservative compared to actual impacts anticipated. Conservative aspects include: continual operation of the worst-case operational scenario; operation at maximum allowable rates for the averaging period; no reduction in winter-time emissions from fugitive sources, accounting for emission suppression effects of increased moisture.

5.3 TAP Modeling Applicability

Table 1 provides a comparison between applicable facility-wide maximum potential TAP emissions for the highest-emitting scenario (W3) and TAP screening emission levels (ELs) from *Idaho Air Rules* Sections 585 (for non-carcinogens) and 586 (for carcinogens). Note that TAPs also classified as HAPs emitted from sources "addressed" or "covered" by NSPS or NESHAP were not required to be evaluated for compliance with TAP increments in accordance with *Idaho Air Rules* Section 210.20. Furthermore, PRI has determined that the West End Development Rock Storage Facility will not be constructed. This change eliminated Modeling Scenario W5 (the highest-emitting scenario described in the main body of the DEQ *Modeling Review Memorandum*) as a potential operating scenario. After eliminating Modeling Scenario W5, it was determined that Modeling Scenario W3 is the highest-emitting scenario for all TAPs.

Table 1. TAP MODELING APPLICABILITY DETERMINATION (HIGHEST-EMITTING MODELING SCENARIO: W3).

HAP/TAP	Emissions (lb/hr)			EL (lb/hr)		Determination
	(a)	(b)	Total	(c)	(d)	
1,3-Butadiene	--	--	--	--	2.4E-5	EL not exceeded
3-Methylchloranthrene	--	4.5E-8	4.5E-8	--	2.5E-6	EL not exceeded
Acetaldehyde	--	--	--	--	3.0E-3	EL not exceeded
Acrolein	--	--	--	1.7E-2	--	EL not exceeded
Antimony	1.9E-2	1.6E-6	1.9E-2	3.3E-2	--	EL not exceeded
Arsenic	5.4E-1	8.2E-6	5.4E-1	--	1.5E-6	Carcinogenic EL exceeded
Benzene	--	5.3E-5	5.3E-5	--	8.0E-4	EL not exceeded
Benzo(a)pyrene[e]	--	3.0E-8	2.9E-7	--	2.0E-6	EL not exceeded
Benz(a)anthracene[e]	--	4.5E-8				
Benzo(b)fluoranthene[e]	--	4.5E-8				
Benzo(k)fluoranthene[e]	--	4.5E-8				
Chrysene[e]	--	4.5E-8				
Dibenzo(a,h)anthracene[e]	--	3.0E-8				
Indenol(1,2,3-cd)pyrene[e]	--	4.5E-8				
Beryllium	2.6E-3	3.5E-7	2.6E-3	--	2.8E-5	Carcinogenic EL exceeded
Biphenyl	--	--	--	1.0E-1	--	EL not exceeded
Cadmium	4.1E-4	2.8E-5	4.4E-4	--	3.7E-6	Carcinogenic EL exceeded
Carbon disulfide	1.4E-2	--	1.4E-2	2.0E+0	--	EL not exceeded
Chromium	7.3E-3	4.8E-5	7.4E-3	3.3E-2	--	EL not exceeded
Chromium (VI)	--	3.4E-7	3.4E-7	--	5.6E-7	EL not exceeded
Cobalt	3.3E-3	4.8E-6	3.26E-3	3.3E-3	--	EL not exceeded
Cyanide	4.5E-1	--	4.5E-1	3.3E-1	--	Non-carcinogenic EL exceeded
Dichlorobenzene	--	3.1E-5	3.1E-5	3.0E+1	--	EL not exceeded
Formaldehyde	--	1.9E-3	1.9E-3	--	5.1E-4	Carcinogenic EL exceeded
Hexane	--	4.6E-2	4.6E-2	1.2E+1	--	EL not exceeded
Hydrogen Chloride	--	--	--	5.0E-2	--	EL not exceeded
Manganese	2.4E-1	1.9E-4	2.4E-1	6.7E-2	--	Non-carcinogenic EL exceeded
Naphthalene	--	1.6E-5	1.6E-5	3.3E+0	--	EL not exceeded
Nickel	1.6E-3	5.6E-5	1.7E-3	--	2.7E-5	Carcinogenic EL exceeded
Phenol	--	--	--	1.3E+0	--	EL not exceeded
Phosphorus	5.3E-1	9.3E-5	5.3E-1	7.0E-3	--	Non-carcinogenic EL exceeded
Selenium	3.3E-4	6.2E-7	3.3E-4	1.3E-2	--	EL not exceeded
Toluene	--	8.8E-5	8.8E-5	2.5E+1	--	EL not exceeded
Xylene	--	--	--	2.9E+1	--	EL not exceeded
Aluminum	5.8E+1	6.5E-1	5.9E+1	6.7E-1	--	Non-carcinogenic EL exceeded
Barium	6.5E-1	6.8E-3	6.6E-1	3.3E-2	--	Non-carcinogenic EL exceeded
Calcium Carbonate	1.1E+1	2.2E+0	1.4E+1	6.7E-1	--	Non-carcinogenic EL exceeded
Calcium Oxide	--	7.0E-1	7.0E-1	1.3E-1	--	Non-carcinogenic EL exceeded
Copper	4.1E-3	5.3E-4	4.6E-3	6.7E-2	--	EL not exceeded
Cyclohexane	--	1.0E-3	1.0E-3	7.0E+1	--	EL not exceeded
Hydrogen Sulfide	--	9.0E-1	9.0E-1	9.3E-1	--	EL not exceeded
Iron	1.5E+1	2.1E-1	1.5E+1	6.7E-2	--	Non-carcinogenic EL exceeded
Molybdenum	8.1E-4	4.7E-4	1.3E-3	3.3E-1	--	EL not exceeded
Pentane	--	1.2E-1	1.2E-1	1.2E+2	--	EL not exceeded
Silver	4.1E-4	4.1E-4	8.2E-4	7.0E-3	--	EL not exceeded
Sulfuric Acid	--	2.0E+0	2.0E+0	6.7E-2	--	Non-carcinogenic EL exceeded

Table 1. TAP MODELING APPLICABILITY DETERMINATION (HIGHEST-EMITTING MODELING SCENARIO: W3).						
HAP/TAP	Emissions (lb/hr)			EL (lb/hr)		Determination
	(a)	(b)	Total	(c)	(d)	
Thallium	8.1E-3	5.2E-4	8.7E-3	7.0E-3	--	Non-carcinogenic EL exceeded
Uranium	8.1E-3	5.2E-4	8.7E-3	1.3E-2	--	EL not exceeded
Vanadium	2.3E-2	8.4E-4	2.4E-2	3.0E-3	--	Non-carcinogenic EL exceeded
Trimethyl Benzene	--	1.1E-2	1.1E-2	8.2E+0	--	EL not exceeded
Tungsten	8.1E-3	5.2E-4	8.7E-3	3.3E-1	--	EL not exceeded
Zinc	2.9E-2	2.2E-3	3.1E-2	6.7E-1	--	EL not exceeded

a. Total HAP/TAP emissions for EL evaluation from mining (i.e., pits, blasting, haul roads, stockpiles and DRSF, tailings storage facility, access road, and underground exploration) and leaching. Emissions from sources covered/addressed by NSPS/NESHAP are not included in the evaluation for modeling applicability.

b. Total HAP/TAP emissions for EL evaluation from processing and production (i.e., ore processing [crushers and transfer, prill silos], ore concentration and refining [autoclave, electrowinning cells and pregnant solution tank, retort, furnace, carbon kiln], process heating [POX boiler, carbon regeneration kiln, propane vaporizer, solution heater], lime production [limestone crushers, screens, mill, transfers, lime kiln, kiln feed, lime mill, pebble lime silo, lime silos, lime mill crushing], aggregate production [portable crushers, screens, transfers], concrete production [central mixer, cement silos, aggregate bin], HVAC [heaters], emergency power [emergency generators, fire pump], fuel storage [gasoline fuel and tanks]). Emissions from sources covered/addressed by NSPS/NESHAP are not included in the evaluation for modeling applicability.

c. Non-carcinogenic EL from *Idaho Air Rules* Section 585.

d. Carcinogenic EL from *Idaho Air Rules* Section 586.

Table 1 shows that the SGP facility-wide potential TAP emissions exceed the respective EL for arsenic, beryllium, cadmium, cyanide, formaldehyde, manganese, nickel, phosphorus, aluminum, barium, calcium carbonate, calcium oxide, iron, sulfuric acid, thallium, and vanadium. Therefore, modeling was required for these 16 TAPs (11 non-carcinogenic and five carcinogenic TAPs) to demonstrate compliance with Acceptable Ambient Concentrations of Non-Carcinogens (AACs) and AACCs.

5.4 TAP Modeled Emission Rates

Table 2 lists the source-specific modeled emission rates for all 11 non-carcinogenic TAPs that required modeling (worst-case modeling scenario for all non-carcinogenic TAPs: W5). Table 3 lists the source-specific modeled emission rates for all five carcinogenic TAPs that required modeling (worst-case impacts for arsenic are associated with modeling scenario W2; worst-case impacts for all other carcinogenic TAPs are associated with modeling scenario W1). Note that all source-specific emission rates listed in Tables 2 and 3 were extracted by DEQ's modeling staff from the submitted modeling input files.

The total modeled emission rates for all non-carcinogenic TAPs are equal to the total facility-wide HAP/TAP emissions as stated in the permitting emissions inventory (excluding sources addressed by NSPS/NESHAP), evaluated at 180,000 T/day (see last two rows of Table 2). However, for carcinogenic TAPs, modeling was performed using an emission inventory that included T-RACT controls, long-term mining production limits, and other emission inventory refinements, as described in Section 4.0 of this *Modeling Review Attachment* (see last three rows of Table 3).

Table 2. MODELED EMISSION RATES FOR NON-CARCINOGENIC TAPS (WORST-CASE MODELING SCENARIOS).

Type of Source	Source ID	ALUM[a] (lb/hr)[b]	BARI[c] (lb/hr)	CACA[d] (lb/hr)	CAOX[e] (lb/hr)	CYAN[f] (lb/hr)	IRON[g] (lb/hr)	MANG[h] (lb/hr)	PHOS[i] (lb/hr)	SULF[j] (lb/hr)	THAL[k] (lb/hr)	VANA[l] (lb/hr)
Point Sources	LS1L	2.33E-04	1.50E-06	0	7.63E-03	0	1.07E-04	2.44E-06	1.34E-06	0	5.16E-08	1.60E-07
	MILLS2L	2.33E-04	1.50E-06	0	7.63E-03	0	1.07E-04	2.44E-06	1.34E-06	0	5.16E-08	1.60E-07
	AC	2.31E-05	2.31E-05	2.31E-05	0	0	2.31E-05	0	0	2.03E+00	2.31E-05	2.31E-05
	ACB	0	3.06E-06	0	0	0	0	2.64E-07	0	0	0	1.60E-06
	ACS1L	9.32E-04	5.98E-06	0	3.05E-02	0	4.27E-04	9.76E-06	5.36E-06	0	2.06E-07	6.39E-07
	ACS2L	9.32E-04	5.98E-06	0	3.05E-02	0	4.27E-04	9.76E-06	5.36E-06	0	2.06E-07	6.39E-07
	ACS3L	9.32E-04	5.98E-06	0	3.05E-02	0	4.27E-04	9.76E-06	5.36E-06	0	2.06E-07	6.39E-07
	ACS4L	4.66E-04	2.99E-06	0	1.53E-02	0	2.13E-04	4.88E-06	2.68E-06	0	1.03E-07	3.20E-07
	CKD	9.59E-05	9.59E-05	9.59E-05	0	0	9.59E-05	0	0	0	9.59E-05	9.59E-05
	CKB	0	9.73E-06	0	0	0	0	8.40E-07	0	0	0	5.08E-06
	EW	9.59E-05	9.59E-05	9.59E-05	0	0	9.59E-05	0	0	0	9.59E-05	9.59E-05
	MR	9.59E-05	9.59E-05	9.59E-05	0	0	9.59E-05	0	0	0	9.59E-05	9.59E-05
	MF	9.59E-05	9.59E-05	9.59E-05	0	0	9.59E-05	0	0	0	9.59E-05	9.59E-05
	EDG1	0	0	0	0	0	0	0	0	0	0	0
	EDG2	0	0	0	0	0	0	0	0	0	0	0
	EDG3	0	0	0	0	0	0	0	0	0	0	0
	EDFP	0	0	0	0	0	0	0	0	0	0	0
	PV	0	4.31E-07	0	0	0	0	3.73E-08	0	0	0	2.25E-07
	HS	0	2.16E-05	0	0	0	0	1.86E-06	0	0	0	1.13E-05
	H1M	0	1.73E-05	0	0	0	0	1.49E-06	0	0	0	9.02E-06
	H2M	0	1.73E-05	0	0	0	0	1.49E-06	0	0	0	9.02E-06
	HM	0	1.73E-05	0	0	0	0	1.49E-06	0	0	0	9.02E-06
	HAC	0	1.08E-06	0	0	0	0	9.31E-08	0	0	0	5.64E-07
	HR	0	1.08E-06	0	0	0	0	9.31E-08	0	0	0	5.64E-07
	HA	0	1.08E-06	0	0	0	0	9.31E-08	0	0	0	5.64E-07
	HMO	0	2.16E-06	0	0	0	0	1.86E-07	0	0	0	1.13E-06
	HTS	0	8.63E-06	0	0	0	0	7.45E-07	0	0	0	4.51E-06
	HW	0	1.29E-05	0	0	0	0	1.12E-06	0	0	0	6.76E-06
	PSL	0	0	0	0	0	0	0	0	0	0	0
	CS1L	0	0	0	0	0	0	8.01E-07	0	0	0	0
	CS2L	0	0	0	0	0	0	8.01E-07	0	0	0	0
	LS6	3.19E-03	2.05E-05	3.88E-02	0	0	1.46E-03	0	0	0	7.06E-07	2.19E-06
	LSBM	4.30E-02	2.76E-04	5.22E-01	0	0	1.97E-02	0	0	0	9.51E-06	2.95E-05
	LS9	7.54E-04	4.84E-06	9.16E-03	0	0	3.45E-04	0	0	0	1.67E-07	5.17E-07
	LK	2.07E-02	1.33E-04	2.51E-01	0	0	9.47E-03	0	0	0	4.58E-06	1.42E-05
	LKC	0	9.51E-05	0	0	0	0	0	0	0	0	4.97E-05
	LCR	6.43E-03	4.12E-05	0	2.11E-01	0	2.94E-03	0	0	0	1.42E-06	4.41E-06
	LSL	1.40E-04	8.99E-07	0	4.59E-03	0	6.41E-05	0	0	0	3.10E-08	9.60E-08

Table 2. MODELED EMISSION RATES FOR NON-CARCINOGENIC TAPS (WORST-CASE MODELING SCENARIOS).

Type of Source	Source ID	ALUM[a] (lb/hr)[b]	BARI[c] (lb/hr)	CACA[d] (lb/hr)	CAOX[e] (lb/hr)	CYAN[f] (lb/hr)	IRON[g] (lb/hr)	MANG[h] (lb/hr)	PHOS[i] (lb/hr)	SULF[j] (lb/hr)	THAL[k] (lb/hr)	VANA[l] (lb/hr)
Area Sources	WEP	5.59E+00	6.29E-02	1.10E+00	0	0	1.43E+00	2.35E-02	5.11E-02	0	7.87E-04	2.20E-03
	UGEXP	2.49E-05	2.80E-07	4.91E-06	0	0	6.38E-06	1.05E-07	2.28E-07	0	3.50E-09	9.81E-09
	TSF	0	0	0	0	2.32E-01	0	0	0	0	0	0
Line Sources	AR01	2.02E-02	2.28E-04	3.99E-03	0	0	5.18E-03	8.52E-05	1.85E-04	0	2.85E-06	7.98E-06
	AR02	1.56E-02	1.75E-04	3.07E-03	0	0	3.99E-03	6.55E-05	1.42E-04	0	2.19E-06	6.13E-06
	AR03	3.93E-02	4.43E-04	7.75E-03	0	0	1.01E-02	1.66E-04	3.60E-04	0	5.54E-06	1.55E-05
	AR04	3.77E-02	4.25E-04	7.43E-03	0	0	9.66E-03	1.59E-04	3.45E-04	0	5.31E-06	1.49E-05
Volume Sources	WEPBL	1.90E+00	2.14E-02	3.75E-01	0	0	4.88E-01	8.01E-03	1.74E-02	0	2.68E-04	7.50E-04
	WEDRSF	8.58E-01	9.66E-03	1.69E-01	0	0	2.20E-01	3.61E-03	7.85E-03	0	1.21E-04	3.38E-04
	OC1	1.04E-02	1.17E-04	2.04E-03	0	0	2.65E-03	0	0	0	1.46E-06	4.08E-06
	OC2	1.04E-02	1.17E-04	2.04E-03	0	0	2.65E-03	0	0	0	1.46E-06	4.08E-06
	OC3	1.04E-02	1.17E-04	2.04E-03	0	0	2.65E-03	0	0	0	1.46E-06	4.08E-06
	OC4	1.04E-02	1.17E-04	2.04E-03	0	0	2.65E-03	0	0	0	1.46E-06	4.08E-06
	OC5	1.04E-02	1.17E-04	2.04E-03	0	0	2.65E-03	0	0	0	1.46E-06	4.08E-06
	OC6	1.04E-02	1.17E-04	2.04E-03	0	0	2.65E-03	0	0	0	1.46E-06	4.08E-06
	OC7	8.87E-02	1.00E-03	1.75E-02	0	0	2.28E-02	0	0	0	1.25E-05	3.50E-05
	OC8	1.04E-02	1.17E-04	2.04E-03	0	0	2.65E-03	0	0	0	1.46E-06	4.08E-06
	OC9	4.90E-02	5.52E-04	9.66E-03	0	0	1.26E-02	0	0	0	6.90E-06	1.93E-05
	OC10	4.90E-02	5.52E-04	9.66E-03	0	0	1.26E-02	0	0	0	6.90E-06	1.93E-05
	OC11	4.90E-02	5.52E-04	9.66E-03	0	0	1.26E-02	0	0	0	6.90E-06	1.93E-05
	OC12	9.80E-02	1.10E-03	1.93E-02	0	0	2.51E-02	0	0	0	1.38E-05	3.86E-05
	OC13	1.14E-02	1.29E-04	2.25E-03	0	0	2.93E-03	0	0	0	1.61E-06	4.51E-06
	LS1U	1.13E-03	7.25E-06	0	3.70E-02	0	5.18E-04	1.18E-05	6.50E-06	0	2.50E-07	7.75E-07
	MILLS2U	1.13E-03	7.25E-06	0	3.70E-02	0	5.18E-04	1.18E-05	6.50E-06	0	2.50E-07	7.75E-07
	ACS1U	2.17E-03	1.39E-05	0	7.10E-02	0	9.94E-04	2.27E-05	1.25E-05	0	4.80E-07	1.49E-06
	ACS2U	2.17E-03	1.39E-05	0	7.10E-02	0	9.94E-04	2.27E-05	1.25E-05	0	4.80E-07	1.49E-06
	ACS3U	2.17E-03	1.39E-05	0	7.10E-02	0	9.94E-04	2.27E-05	1.25E-05	0	4.80E-07	1.49E-06
	ACS42U	2.17E-03	1.39E-05	0	7.10E-02	0	9.94E-04	2.27E-05	1.25E-05	0	4.80E-07	1.49E-06
	PSU	0	0	0	0	0	0	0	0	0	0	0
	CS1U	0	0	0	0	0	0	8.01E-07	0	0	0	0
	CS2U	0	0	0	0	0	0	8.01E-07	0	0	0	0
	CAL	1.56E-02	1.00E-04	0	0	0	7.14E-03	0	0	0	3.45E-06	1.07E-05
	CAU	1.56E-02	1.00E-04	0	0	0	7.14E-03	0	0	0	3.45E-06	1.07E-05
	CM	0	0	0	0	0	0	2.59E-05	8.22E-06	0	0	0
	PCSP1	1.41E-02	9.06E-05	1.72E-01	0	0	6.47E-03	0	0	0	3.12E-06	9.69E-06
	PCSP2	1.41E-02	9.06E-05	1.72E-01	0	0	6.47E-03	0	0	0	3.12E-06	9.69E-06
	LS1	3.19E-03	2.05E-05	3.88E-02	0	0	1.46E-03	0	0	0	7.06E-07	2.19E-06
	LS2	5.75E-03	3.69E-05	6.98E-02	0	0	2.63E-03	0	0	0	1.27E-06	3.94E-06
	LS3	2.66E-02	1.71E-04	3.23E-01	0	0	1.22E-02	0	0	0	5.88E-06	1.82E-05

Table 2. MODELED EMISSION RATES FOR NON-CARCINOGENIC TAPS (WORST-CASE MODELING SCENARIOS).

Type of Source	Source ID	ALUM[a] (lb/hr)[b]	BARI[c] (lb/hr)	CACA[d] (lb/hr)	CAOX[e] (lb/hr)	CYAN[f] (lb/hr)	IRON[g] (lb/hr)	MANG[h] (lb/hr)	PHOS[i] (lb/hr)	SULF[j] (lb/hr)	THAL[k] (lb/hr)	VANA[l] (lb/hr)
	LS4	5.75E-03	3.69E-05	6.98E-02	0	0	2.63E-03	0	0	0	1.27E-06	3.94E-06
	LS5	2.66E-02	1.71E-04	3.23E-01	0	0	1.22E-02	0	0	0	5.88E-06	1.82E-05
	LS7	3.19E-03	2.05E-05	3.88E-02	0	0	1.46E-03	0	0	0	7.06E-07	2.19E-06
	LS8	3.19E-03	2.05E-05	3.88E-02	0	0	1.46E-03	0	0	0	7.06E-07	2.19E-06
	LS10	7.54E-04	4.84E-06	9.16E-03	0	0	3.45E-04	0	0	0	1.67E-07	5.17E-07
	LS11	6.29E-03	4.03E-05	7.63E-02	0	0	2.88E-03	0	0	0	1.39E-06	4.31E-06
	LS12	7.54E-04	4.84E-06	9.16E-03	0	0	3.45E-04	0	0	0	1.67E-07	5.17E-07
	LSU	1.40E-05	8.99E-08	0	4.59E-04	0	6.41E-06	0	0	0	3.10E-09	9.60E-09
	MILLTANKS	0	0	0	0	2.21E-01	0	0	0	0	0	0
	HRT001-HRT072[m]	2.62E-01	2.95E-03	5.16E-02	0	0	6.71E-02	1.10E-03	2.40E-03	0	3.69E-05	1.03E-04
	HRN001-HRN022[m]	2.62E-01	2.95E-03	5.16E-02	0	0	6.71E-02	1.10E-03	2.40E-03	0	3.69E-05	1.03E-04
Total Modeled Rates		***3.37E+01***	***3.79E-01***	***8.76E+00***	***6.96E-01***	***4.53E-01***	***8.69E+00***	***1.39E-01***	***3.03E-01***	***2.03E+00***	***5.17E-03***	***1.39E-02***
Total Emission Rates at 180,000 T/day[n]		***3.37E+01***	***3.79E-01***	***8.76E+00***	***6.96E-01***	***4.53E-01***	***8.69E+00***	***1.39E-01***	***3.03E-01***	***2.03E+00***	***5.17E-03***	***1.39E-02***

a. Aluminum (worst-case modeling scenario: W5).
b. Pounds per hour.
c. Barium (worst-case modeling scenario: W5).
d. Calcium carbonate (worst-case modeling scenario: W5).
e. Calcium oxide (worst-case modeling scenario: W5).
f. Cyanide (worst-case modeling scenario: W5).
g. Iron (worst-case modeling scenario: W5).
h. Manganese (worst-case modeling scenario: W5).
i. Phosphorus (worst-case modeling scenario: W5).
j. Sulfuric acid (worst-case modeling scenario: W5).
k. Thallium (worst-case modeling scenario: W5).
l. Vanadium (worst-case modeling scenario: W5).
m. The Haul Road was represented in the model as a series of volume sources. The emission rates listed in this table represent each individual volume source.
n. Total emission rates at 180,000 tons per day were derived from Worksheet "TblA" in the emission inventory dated October 5, 2021. The total emission rates in this row represent all facility-wide HAP/TAP emission sources from mining, leaching, and processing and production (excluding emissions from sources "addressed" or "covered" by NSPS/NESHAP).

Table 3. MODELED EMISSION RATES FOR CARCINOGENIC TAPS (WORST-CASE MODELING SCENARIOS).						
Type of Source	**Source ID**	**ARSE[a] (lb/hr)[b]**	**BERY[c] (lb/hr)**	**CADM[d] (lb/hr)**	**FORM[e] (lb/hr)**	**NICK[f] (lb/hr)**
Point Sources	LS1L	1.14E-08	3.96E-10	1.24E-10	0	2.47E-09
	MILLS2L	1.14E-08	3.96E-10	1.24E-10	0	2.47E-09
	AC	0	0	0	0	0
	ACB	1.28E-07	7.66E-09	7.02E-07	4.79E-05	1.34E-06
	ACS1L	4.55E-08	1.58E-09	4.94E-10	0	9.89E-09
	ACS2L	4.55E-08	1.58E-09	4.94E-10	0	9.89E-09
	ACS3L	4.55E-08	1.58E-09	4.94E-10	0	9.89E-09
	ACS4L	2.27E-08	7.91E-10	2.47E-10	0	4.94E-09
	CKD	0	0	0	0	0
	CKB	4.07E-07	2.44E-08	2.24E-06	1.52E-04	4.27E-06
	EW	0	0	0	0	0
	MR	0	0	0	0	0
	MF	0	0	0	0	0
	EDG1	0	0	0	0	0
	EDG2	0	0	0	0	0
	EDG3	0	0	0	0	0
	EDFP	0	0	0	0	0
	PV	1.80E-08	1.08E-09	9.91E-08	6.76E-06	1.89E-07
	HS	9.01E-07	5.41E-08	4.96E-06	3.38E-04	9.46E-06
	H1M	7.84E-07	4.71E-08	4.31E-06	2.94E-04	8.24E-06
	H2M	7.84E-07	4.71E-08	4.31E-06	2.94E-04	8.24E-06
	HM	7.84E-07	4.71E-08	4.31E-06	2.94E-04	8.24E-06
	HAC	4.90E-08	2.94E-09	2.70E-07	1.84E-05	5.15E-07
	HR	4.90E-08	2.94E-09	2.70E-07	1.84E-05	5.15E-07
	HA	4.90E-08	2.94E-09	2.70E-07	1.84E-05	5.15E-07
	HMO	9.80E-08	5.88E-09	5.39E-07	3.68E-05	1.03E-06
	HTS	3.92E-07	2.35E-08	2.16E-06	1.47E-04	4.12E-06
	HW	5.88E-07	3.53E-08	3.24E-06	2.21E-04	6.18E-06
	PSL	0	0	0	0	0
	CS1L	2.90E-08	3.33E-09	0	0	2.86E-07
	CS2L	2.90E-08	3.33E-09	0	0	2.86E-07
	LS6	0	0	0	0	0
	LSBM	0	0	0	0	0
	LS9	0	0	0	0	0
	LK	0	0	0	0	0
	LKC	0	0	0	0	0
	LCR	0	0	0	0	0
	LSL	0	0	0	0	0
Area Sources	WEP	9.40E-03	4.51E-05	7.04E-06	0	2.82E-05
	UGEXP	2.34E-07	1.12E-09	1.75E-10	0	7.01E-10
	TSF	0	0	0	0	0
Line Sources	AR01	7.12E-07	9.12E-07	1.42E-07	0	5.70E-07
	AR02	5.48E-07	7.01E-07	1.10E-07	0	4.38E-07
	AR03	1.38E-06	1.77E-06	2.77E-07	0	1.11E-06
	AR04	1.33E-06	1.70E-06	2.65E-07	0	1.06E-06

Table 3. MODELED EMISSION RATES FOR CARCINOGENIC TAPS (WORST-CASE MODELING SCENARIOS).						
Type of Source	**Source ID**	**ARSE[a] (lb/hr)[b]**	**BERY[c] (lb/hr)**	**CADM[d] (lb/hr)**	**FORM[e] (lb/hr)**	**NICK[f] (lb/hr)**
Volume Sources	WEPBL	1.79E-02	8.57E-05	1.34E-05	0	5.36E-05
	FDRSF	4.23E-03	[redacted]	[redacted]	[redacted]	[redacted]
	STKP	[redacted]	2.72E-05	4.25E-06	0	1.70E-05
	OC1	0	0	0	0	0
	OC2	0	0	0	0	0
	OC3	0	0	0	0	0
	OC4	0	0	0	0	0
	OC5	0	0	0	0	0
	OC6	0	0	0	0	0
	OC7	0	0	0	0	0
	OC8	0	0	0	0	0
	OC9	0	0	0	0	0
	OC10	0	0	0	0	0
	OC11	0	0	0	0	0
	OC12	0	0	0	0	0
	OC13	0	0	0	0	0
	LS1U	5.51E-08	1.92E-09	5.99E-10	0	1.20E-08
	MILLS2U	5.51E-08	1.92E-09	5.99E-10	0	1.20E-08
	ACS1U	2.21E-07	7.67E-09	2.40E-09	0	4.79E-08
	ACS2U	2.21E-07	7.67E-09	2.40E-09	0	4.79E-08
	ACS3U	2.21E-07	7.67E-09	2.40E-09	0	4.79E-08
	ACS42U	1.10E-07	3.84E-09	1.20E-09	0	2.40E-08
	PSU	0	0	0	0	0
	CS1U	2.90E-08	3.33E-09	0	0	2.86E-07
	CS2U	2.90E-08	3.33E-09	0	0	2.86E-07
	CAL	0	0	0	0	0
	CAU	0	0	0	0	0
	CM	2.03E-06	0	4.86E-09	0	1.70E-06
	PCSP1	0	0	0	0	0
	PCSP2	0	0	0	0	0
	LS1	0	0	0	0	0
	LS2	0	0	0	0	0
	LS3	0	0	0	0	0
	LS4	0	0	0	0	0
	LS5	0	0	0	0	0
	LS7	0	0	0	0	0
	LS8	0	0	0	0	0
	LS10	0	0	0	0	0
	LS11	0	0	0	0	0
	LS12	0	0	0	0	0
	LSU	0	0	0	0	0
	MILLTANKS	0	0	0	0	0

Table 3. MODELED EMISSION RATES FOR CARCINOGENIC TAPS (WORST-CASE MODELING SCENARIOS).

Type of Source	Source ID	ARSE[a] (lb/hr)[b]	BERY[c] (lb/hr)	CADM[d] (lb/hr)	FORM[e] (lb/hr)	NICK[f] (lb/hr)
Volume Sources	HRF001-HRF055[g]	1.03E-03	[redacted]	[redacted]	[redacted]	[redacted]
	HRQ001-HRQ049[g]	1.03E-03	[redacted]	[redacted]	[redacted]	[redacted]
	HRR001-HRR006[g]	1.03E-03	[redacted]	[redacted]	[redacted]	[redacted]
	HRN001-HRN022[g]	1.03E-03	9.27E-06	1.45E-06	0	5.80E-06
	HRB001-HRB003[g]	1.03E-03	[redacted]	[redacted]	[redacted]	[redacted]
	HRP001-HRP057[g]	[redacted]	9.27E-06	1.45E-06	0	5.80E-06
	HRO001-HRO002[g]	1.03E-03	9.27E-06	1.45E-06	0	5.80E-06
Total Modeled Rates		***1.73E-01***	***9.15E-04***	***1.71E-04***	***1.89E-03***	***6.27E-04***
Total T-RACT Emission Rates[h]		***1.73E-01***	***9.1E-04***	***1.7E-04***	***1.9E-03***	***6.3E-04***
Total Emission Rates at 180,000 T/day[i]		***4.03E-01***	***1.36E-03***	***2.40E-04***	***1.89E-03***	***9.04E-04***

a. Arsenic (worst-case modeling scenario: W2).
b. Pounds per hour.
c. Beryllium (worst-case modeling scenario: W1).
d. Cadmium (worst-case modeling scenario: W1).
e. Formaldehyde (worst-case modeling scenario: W1).
f. Nickel (worst-case modeling scenario: W1).
g. The Haul Road was represented in the model as a series of volume sources. The emission rates listed in this table represent each individual volume source.
h. Total T-RACT emission rates – calculated based on T-RACT controls, long-term mining production limits, and other emission inventory refinements, as described in Section 4.0 of this *Modeling Review Attachment* – are derived from Tables B-W2 (for Arsenic) and B-W1 (for Beryllium, Cadmium, Formaldehyde, and Nickel) in Appendix B of the *TAP Addendum*.
i. Total emission rates at 180,000 tons per day were derived from Worksheet "TblA" in the emission inventory dated October 5, 2021. The total emission rates in this row represent all facility-wide HAP/TAP emission sources from mining, leaching, and processing and production (excluding emissions from sources "addressed" or "covered" by NSPS/NESHAP).

5.5 Cyanide Modeling Emission Source Parameters

Modeling analyses for cyanide introduced two new emission sources that were not previously evaluated by DEQ: tailings storage facility (model ID: TSF) and mill tanks (model ID: MILLTANKS).

1. The tailings storage facility was modeled by Air Sciences as a surface-based (zero release height above ground-level and zero initial vertical dimension) AREA source. The easterly and northerly lengths were calculated as square-root of the TSF area (easterly length = northerly length = $\sqrt{1{,}338{,}158\ square\ meters}$ = 1,157 meters).

2. The mill tanks were grouped and modeled by Air Sciences as a single VOLUME source. The tanks sit on the ground, so the release height was set to the average tank height of 12.2 meters (40 feet). The initial lateral dispersion (σ_y) was calculated as the equivalent diameter of the combined (18) tank area divided by the single VOLUME source coefficient of 4.3:

$$\sigma_{y(MILLTANKS)} = \frac{Equivalent\ diameter}{4.3} = \frac{\sqrt{\Sigma(d)^2}}{4.3} = 42.8\ feet$$

The individual tank diameters (d) are: two tanks at 40 feet, four tanks at 52 feet, six tanks at 54 feet, and six tanks at 20 feet.

DEQ typically requires that tailings storage facilities be modeled as an AREAPOLY source with an outline that follows the contour of the emission source, and that mill tanks be represented in the model as individual volume sources; but, given that the maximum modeled concentration for cyanide is safely below the AAC (0.08%), DEQ's modeling team accepted the modeling analysis submitted by Air Sciences and concluded that it confidently demonstrates that the cyanide AAC will not be exceeded.

5.6 Deposition Modeling

Air Sciences applied particle deposition algorithms in the impact modeling for particulate TAPs. The particulate deposition parameters used in the NAAQS compliance analysis were derived for PM_{10} and $PM_{2.5}$ (see Tables 22 and 23 in the main body of the DEQ *Modeling Review Memorandum*). Dust-related metal TAP emissions include total particulates (all size fractions of particulate matter [PM] up to PM_{30}). Therefore, the deposition parameters for PM were calculated using the same methodology and EPA references used for PM_{10} and $PM_{2.5}$ in the NAAQS compliance demonstration analyses. The PM deposition parameters are provided below in Table 4. The same density values were used as in the previous TAPs modeling analysis. However, an additional deposition characterization bin was added to better handle deposition of 10 μm to 30 μm particulates; mass fractions were adjusted accordingly.

Table 4. PARTICULATE MATTER DEPOSITION PARAMETERS BY SOURCE CATEGORY.

Source Category	Parameter	PM				
		Bin 1	Bin 2	Bin 3	Bin 4	Bin 5
Haul Roads	Bin Upper Diameter (μm)	2.50	10.00	30.00	--	--
	Mass Fraction	0.02	0.23	0.75	--	--
	Mass Mean Diameter (μm)	2.50	10.00	30.00	--	--
	Density (g/cm^3) (YPP, HFP, WEP DR average)	2.46	2.46	2.46	--	--
Material Handling (Ore, DR, Limestone)	Bin Upper Diameter (μm)	2.50	5.00	10.00	30.00	--
	Mass Fraction	0.07	0.20	0.20	0.53	--
	Mass Mean Diameter (μm)	2.50	5.00	10.00	30.00	--
	Density (g/cm^3) (Ore)	Pit-specific, see Table 23[a].				
	Density (g/cm^3) (Ore and Waste)	Pit-specific, see Table 23.				
	Density (g/cm^3) (Limestone)	1.09	1.09	1.09	1.09	--
Baghouses	Bin Upper Diameter (μm)	2.50	6.00	10.00	30.00	--
	Mass Fraction	0.25	0.45	0.20	0.10	--
	Mass Mean Diameter (μm)	2.50	6.00	10.00	30.00	--
	Density (g/cm^3) (Ore)	Pit-specific, see Table 23.				
Diesel Engines	Bin Upper Diameter (μm)	1.00	2.50	6.00	10.00	30.00
	Mass Fraction	0.82	0.08	0.03	0.03	0.04
	Mass Mean Diameter (μm)	1.00	2.50	6.00	10.00	30.00
	Density (g/cm^3) (Diesel Combustion)	1.00	1.00	1.00	1.00	1.00
Heaters and Boilers	Bin Upper Diameter (μm)	1.00	2.50	6.00	10.00	30.00
	Mass Fraction	0.23	0.22	0.25	0.09	0.21
	Mass Mean Diameter (μm)	1.00	2.50	6.00	10.00	30.00
	Density (g/cm^3) (Propane Combustion)	1.24	1.24	1.24	1.24	1.24

Table 4. PARTICULATE MATTER DEPOSITION PARAMETERS BY SOURCE CATEGORY.						
Source Category	**Parameter**	**PM**				
		Bin 1	**Bin 2**	**Bin 3**	**Bin 4**	**Bin 5**
Lime Loading and Unloading (Quick, Pebble)	Bin Upper Diameter (µm)	2.50	10.00	30.00	--	--
	Mass Fraction	0.05	0.29	0.66	--	--
	Mass Mean Diameter	2.50	10.00	30.00	--	--
	Density (g/cm^3) (Quick)	0.44	0.44	0.44	--	--
	Density (g/cm^3) (Pebble)	0.96	0.96	0.96	--	--
Lime Unloading (Quick, Pebble)	Bin Upper Diameter (µm)	2.50	10.00	30.00	--	--
	Mass Fraction	0.09	0.49	0.42	--	--
	Mass Mean Diameter (µm)	2.50	10.00	30.00	--	--
	Density (g/cm^3) (Quick)	0.44	0.44	0.44	--	--
	Density (g/cm^3) (Pebble)	0.96	0.96	0.96	--	--
Cement and Aggregate Loading and Unloading	Bin Upper Diameter (µm)	2.50	10.00	30.00	--	--
	Mass Fraction	0.05	0.29	0.66	--	--
	Mass Mean Diameter (µm)	2.50	10.00	30.00	--	--
	Density (g/cm^3) (Cement)	1.44	1.44	1.44	--	--
	Density (g/cm^3) (Aggregate)	1.28	1.28	1.28	--	--
Prill Loading and Unloading	Bin Upper Diameter (µm)	2.50	10.00	30.00	--	--
	Mass Fraction	0.05	0.30	0.65	--	--
	Mass Mean Diameter (µm)	2.50	10.00	30.00	--	--
	Density (g/cm^3) (Prill)	0.84	0.84	0.84	--	--
Refining Processes	Bin Upper Diameter (µm)	1.00	2.50	6.00	10.00	30.00
	Mass Fraction	0.72	0.10	0.07	0.03	0.08
	Mass Mean Diameter (µm)	1.00	2.50	6.00	10.00	30.00
	Density (g/cm^3) (Diesel Combustion)	1.00	1.00	1.00	1.00	1.00
Portable Crushing and Screening Plant	Bin Upper Diameter (µm)	2.50	10.00	30.00	--	--
	Mass Fraction	0.05	0.32	0.63	--	--
	Mass Mean Diameter (µm)	2.50	10.00	30.00	--	--
	Density (g/cm^3) (YPP, HFP, WEP DR average)	2.46	2.46	2.46	--	--
Lime Kiln and Ball Mill	Bin Upper Diameter (µm)	2.50	10.00	30.00	--	--
	Mass Fraction (Kiln)	0.27	0.28	0.45	--	--
	Mass Fraction (Ball Mill)	0.30	0.54	0.16	--	--
	Mass Mean Diameter (µm)	2.50	10.00	30.00	--	--
	Density (g/cm^3)	1.09	1.09	1.09	--	--
Blasting and Drilling	Bin Upper Diameter (µm)	2.50	10.00	30.00	--	--
	Mass Fraction	0.03	0.49	0.48	--	--
	Mass Mean Diameter (µm)	2.50	10.00	30.00	--	--
	Density (g/cm^3) (Ore or DR)	Pit-specific, see Table 23.				
Dozing	Bin Upper Diameter (µm)	2.50	10.00	15.00	30.00	--
	Mass Fraction	0.11	0.08	0.06	0.75	--
	Mass Mean Diameter (µm)	2.50	10.00	15.00	30.00	--
	Density (g/cm^3) (DR)	Pit-specific, see Table 23.				

[a] See Table 23 in the main body of the DEQ *Modeling Review Memorandum*.

5.7 Carcinogenic TAP Modeling Lifetime Exposure Adjustment

Maximum modeled concentrations for carcinogenic TAPs were adjusted to account for the life-of-mine production limits, which affects the lifetime exposure.

PRI evaluated the highest modeled annual carcinogenic TAP concentration from each of the 14 modeling scenarios for lifetime exposure as follows:

$$Lifetime\ exposure\ \left(\frac{\mu g}{m^3}\right) = \frac{Highest\ annual\ concentration\ \left(\frac{\mu g}{m^3}\right) \times 16\ (mine\ operation\ years)}{70\ (years, lifetime\ exposure)}$$

This equation assumes that the highest annual concentration from the 14 modeling scenarios is repeated for 16 years of mining operation. This was then averaged over 70 years to calculate the 70-year lifetime exposure.

PRI and Air Sciences contend that calculating lifetime exposure based on 16 years of mining operation is conservative. The annual emissions for carcinogenic TAP modeling are based on 135,000 tons/day (see Section 5.1 of this *Modeling Review Attachment*) and 365 days per year. Over 16 years, this equates to a potential mining production of 788.4 million tons:

$$\frac{135{,}000\ \left(\frac{tons}{day}\right) \times 365\ \left(\frac{days}{year}\right) \times 16\ years}{1{,}000{,}000\ \left(\frac{tons}{million\ ton}\right)} = 788.4\ million\ tons$$

The actual life-of-mine total production as described in the SGP *Refined Proposed Action* (*ModPRO2*) mine plan is only 402.86 million tons (Perpetua 2021), which is 51.1% of the potential life-of-mine production represented in the above equation and related emission evaluations.

5.8 Arsenic Compliance Demonstration for Modeling Scenarios W1-W4

To demonstrate compliance with the AACC for arsenic, PRI applied two additional operating limitations:

- The removal of Modeling Scenario W5 as a potential operating scenario
- Limiting the West End Pit's life-of-mine potential mining production to 50% of the total life-of-mine potential mining production of 788.4 million tons: 50% * 788.4 million tons = 394.2 million tons

PRI has determined that the West End Development Rock Storage Facility (DRSF) will not be constructed. This change eliminated Modeling Scenario W5 from the arsenic modeling evaluation. The remaining four West End Pit modeling scenarios (W1–W4) are evaluated using the 70-year lifetime exposure equation from Section 5.7 and adjusting for the proposed West End Pit life-of-mine production limit of 50% of the total production as follows:

$$LifeExpose_{Wi,j,n} = \left[\left(WEPExpose_{Wi,n}\right)(50\%) + \left(nonWEPExpose_{Sj,n}\right)(50\%)\right]\left[\frac{16\ year\ LOM}{70\ year\ exposure}\right]$$

where:

W*i*	=	West End Pit scenario, where $i = 1$ to 4.
S*j*	=	non West End Pit scenario, where j = B1, B2, H1, H2, H3, H4, Y1, Y2, and Y3.
n	=	specific receptor.
$LifeExpose_{Wi,j,n}$	=	lifetime exposure in µg/m^3 for West End Pit scenario *i*, non West End Pit scenario *j*, at receptor *n*.
$WEPExpose_{Wi,n}$	=	annual maximum impact in µg/m^3 for West End Pit scenario *i* at receptor *n*.
$nonWEPExpose_{Sj,n}$	=	annual maximum impact in µg/m^3 for non West End Pit scenario *j* at receptor *n*.
16 year LOM	=	maximum life-of-mine.
70 year exposure	=	Lifetime exposure used for development of AACCs in *Idaho Air Rules*.

The above equation was used to calculate the lifetime arsenic exposure from the West End Pit scenarios (W1–W4) on a receptor-by-receptor basis. Combining the concentrations from Modeling Scenarios W1–W4 with the highest concentration from the remaining non-West End Pit scenarios (B1, B2, H1, H2, H3, H4, Y1, Y2, or Y3) conservatively ensures that the maximum potential impacts from applicable sources are evaluated and remain below AACCs.

PRI contends that calculating lifetime arsenic exposure based on the proposed West End Pit life-of-mine production limit of 50% of the total production is conservative. The actual life-of-mine total production from the West End Pit as described in the ModPRO2 mine plan is only 198.26 million tons (Perpetua 2021), which is 50.3% of the proposed West End Pit life-of-mine production limit of 394.2 million tons.

6.0 Impact Results

TAP impact analysis results, as submitted in the *TAP Addendum* and as further assessed by DEQ, are discussed in this section. The effect of various operational refinements also reduced PM_{10} and $PM_{2.5}$ impacts, and this is discussed in Section 6.2.

6.1 TAP Impact Analyses Results

This section describes the revised TAP impact analyses and demonstrates that applicable TAP emissions resulting from operation of the SGP will not result in increased impacts that exceed AACs or AACCs.

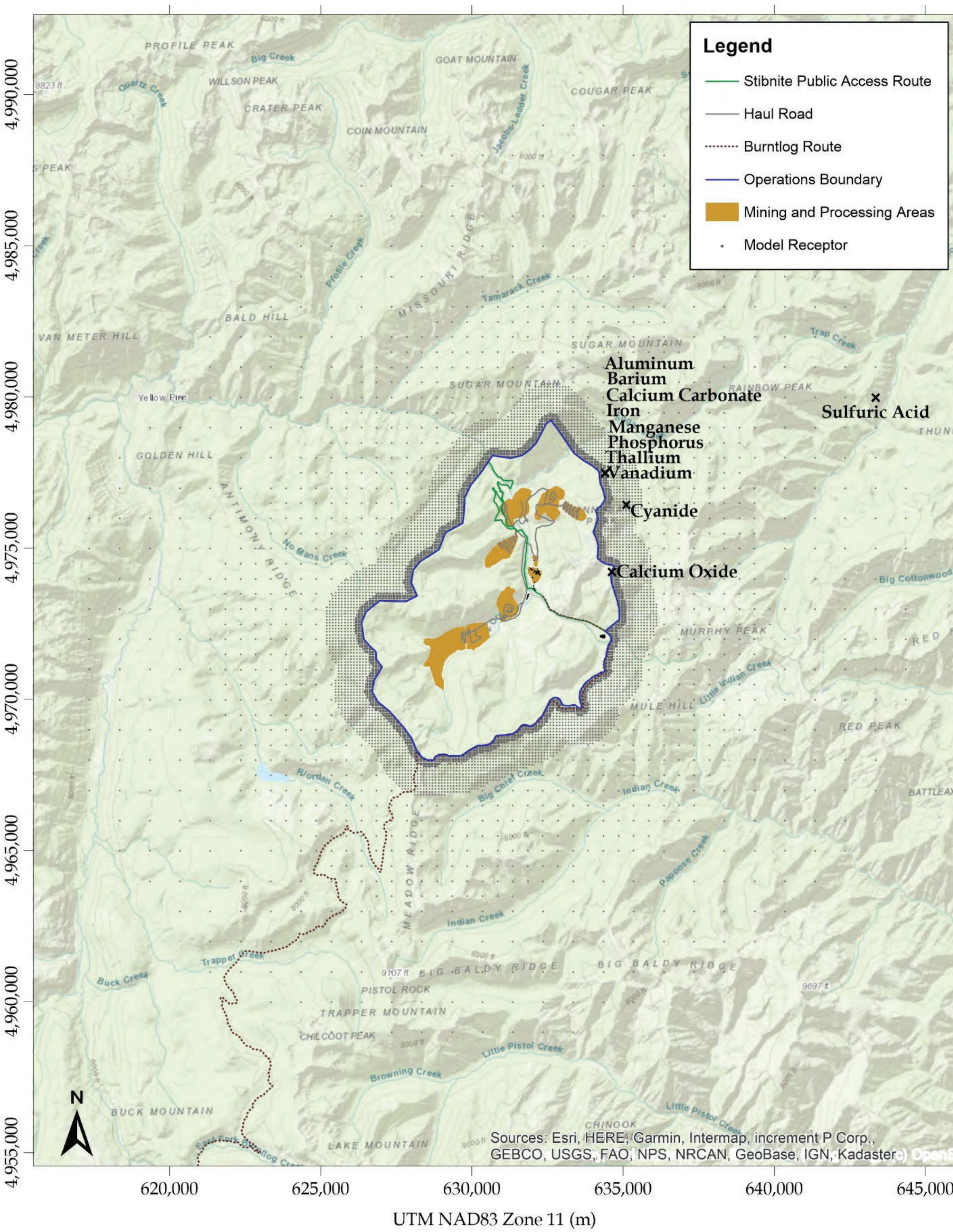
6.1.1 Modeling Non-Carcinogenic TAPs

The non-carcinogenic TAPs subject to impact modeling requirements to demonstrate compliance with AACs of *Idaho Air Rules* Section 585 were modeled at the emission levels shown in Table 1 above. The maximum 24-hour modeled concentration for each of the 14 modeling scenarios demonstrates compliance with the applicable AAC, as summarized below in Table 5. PRI elected to include Scenario W5 in the modeling analysis for non-carcinogenic TAPs. Figure 1 illustrates the locations of the maximum impacts for each non-carcinogenic TAP.

Table 5. RESULTS FOR TAPS IMPACT ANALYSES FOR NON-CARCINOGENIC TAPS.					
Toxic Air Pollutant	**Averaging Time**	**Maximum Modeled Concentration ($\mu g/m^3$)[a]**	**Model Scenario**	**AAC[b] ($\mu g/m^3$)**	**Percent of AAC**
Aluminum	24-hour	6.17	W5	500	1.23%
Barium	24-hour	0.07	W5	25	0.28%
Calcium carbonate	24-hour	1.22	W5	500	0.24%
Calcium oxide	24-hour	0.15	All	100	0.15%
Cyanide	24-hour	0.20	All	250	0.08%
Iron	24-hour	1.58	W5	50	3.16%
Manganese	24-hour	0.03	W5	250	0.01%
Phosphorus	24-hour	0.06	W5	5	1.20%
Sulfuric acid	24-hour	0.41	All	50	0.82%
Thallium	24-hour	0.001	W5	5	0.02%
Vanadium	24-hour	0.002	W5	2.5	0.08%

a. Micrograms per cubic meter.
b. Acceptable Ambient Concentration of a Non-carcinogenic TAP.

Figure 1. SGP NON-CARCINOGENIC MAXIMUM TAP IMPACT LOCATIONS.



6.1.2 Modeling Carcinogenic TAPs

The carcinogenic TAPs subject to impact modeling requirements to demonstrate compliance with AACCs of *Idaho Air Rules* Section 586 were modeled using an emission inventory that includes the T-RACT controls, long-term mining production limits, and other emission inventory refinements, as described in Section 4.0 and 5.0 of this *Modeling Review Attachment*.

The maximum modeled impact for each of the 14 modeling scenarios demonstrated compliance with the T-RACT AACC, as summarized below in Table 6. The SGP maximum concentrations were adjusted to account for the life-of-mine production limits, which affect the lifetime exposure, and to account for the elimination of Modeling Scenario W5. See Sections 5.7 and 5.8 of this *Modeling Review Attachment* for more detail. The locations of the maximum impacts for each carcinogenic TAP are presented in Figure 2. Arsenic concentrations are considerably lower in areas away from the location of maximum impact as shown in Figure 3.

Table 6. RESULTS FOR TAPS IMPACT ANALYSES FOR CARCINOGENIC TAPS.

Toxic Air Pollutant	Averaging Time	Maximum Modeled Lifetime Exposure Concentration (μg/m^3)[a,b]	Model Scenario	AACC[c] (μg/m^3)	T-RACT[d] AACC	Percent of T-RACT AACC
Arsenic	Annual	0.00095	W2	0.00023	0.0023	41.30%
Beryllium	Annual	0.00001	W1	0.0042	0.042	0.02%
Cadmium	Annual	0.000002	W1	0.00056	0.0056	0.04%
Formaldehyde	Annual	0.00007	W1	0.077	0.77	0.01%
Nickel	Annual	0.00001	W1	0.042	0.42	<0.01%

a. Micrograms per cubic meter.
b. The lifetime exposure concentrations are based on the proposed restrictions discussed in Sections 5.7 and 5.8 of this *Modeling Review Attachment*.
c. Acceptable Ambient Concentration of a Carcinogenic TAP.
d. Toxic Air Pollutant Reasonably Available Control Technology allows the AACCs to be increased by a factor of ten per *Idaho Air Rules* Section 210.12(b).

Figure 2. SGP CARCINOGENIC MAXIMUM TAP IMPACT LOCATIONS.

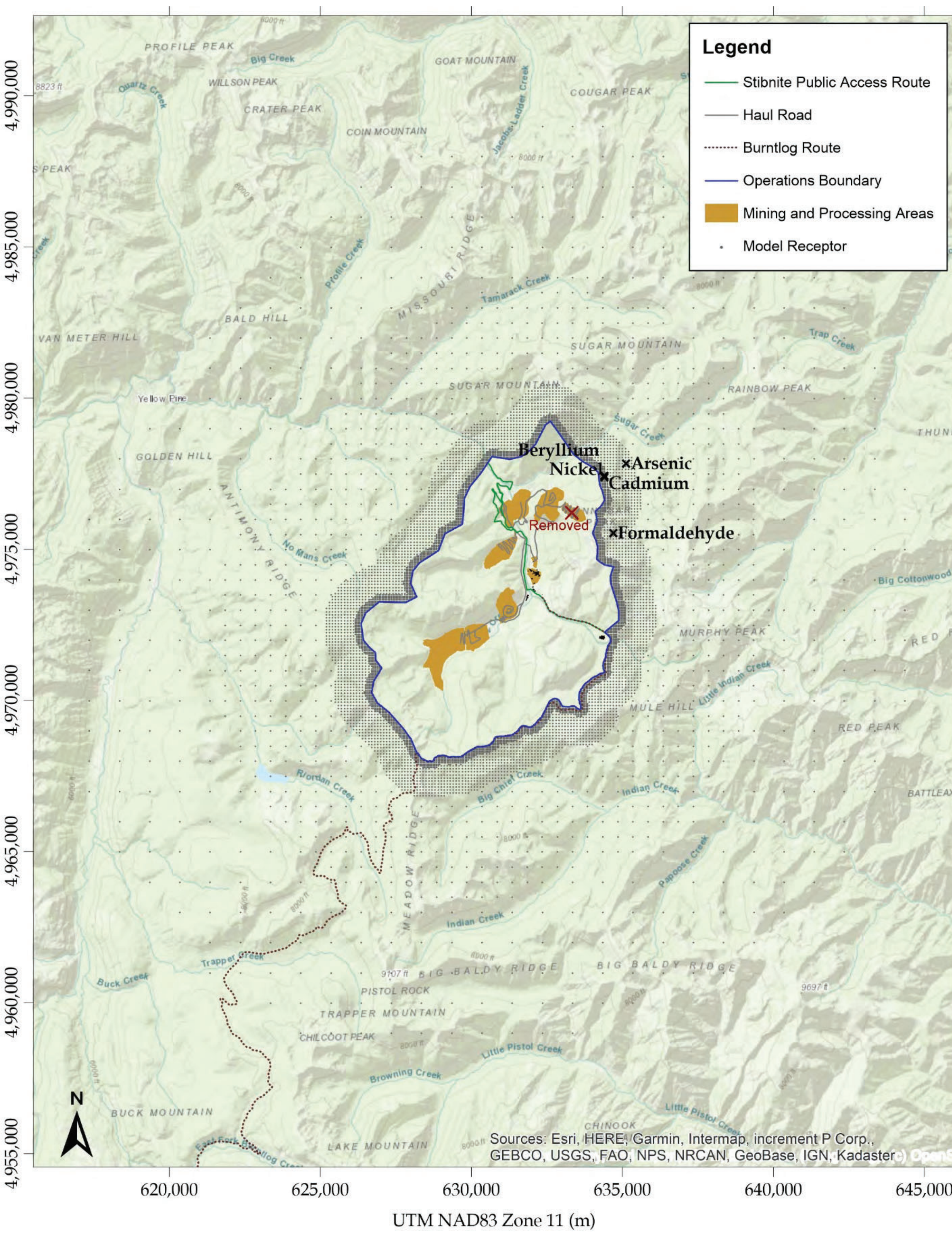
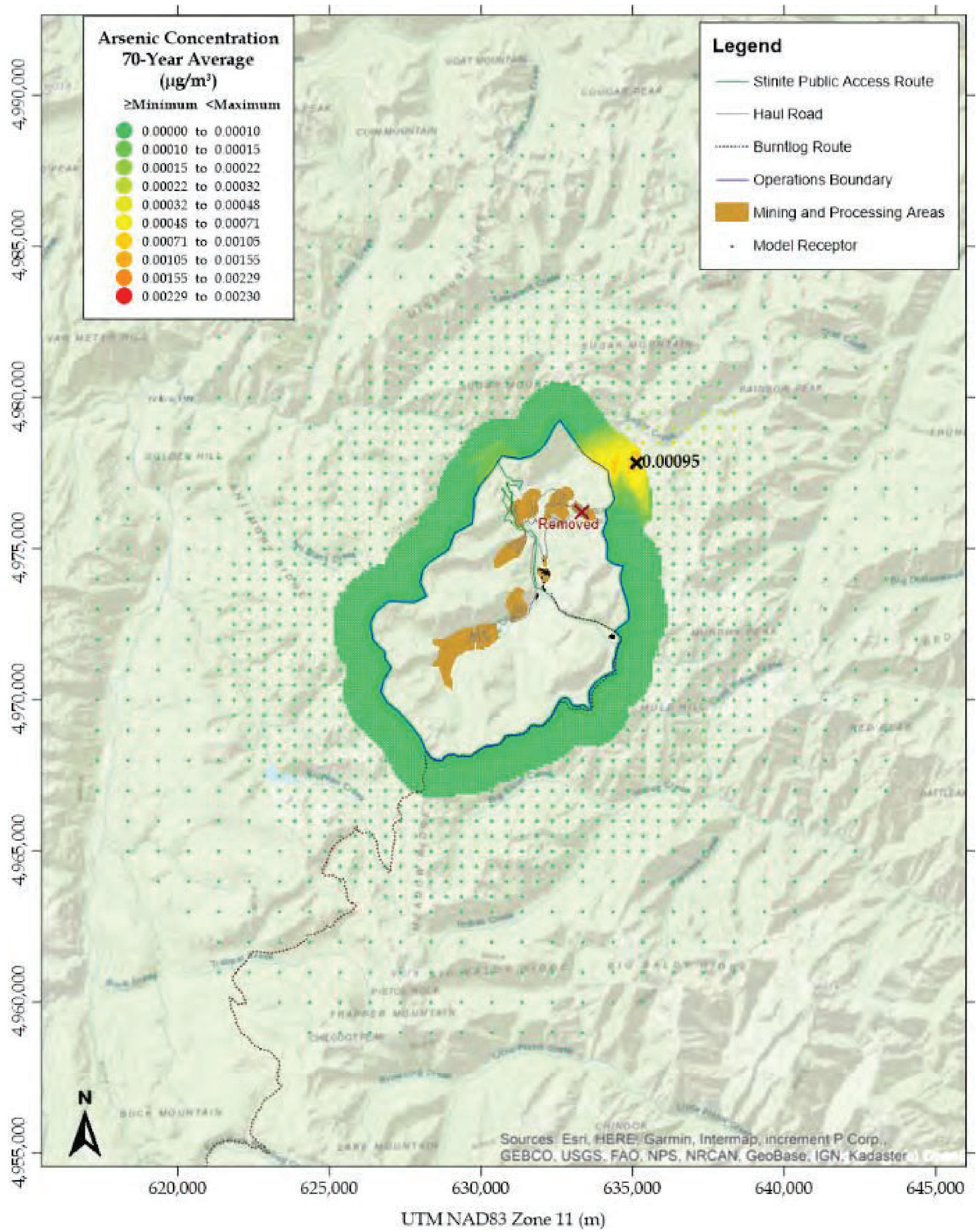


Figure 3. SGP CONTOURS OF LIFETIME ARSENIC IMPACTS.



6.2 *Effect of Changes to Modeled PM_{10} Results*

PRI has determined that the West End Development Rock Storage Facility will not be constructed. This change eliminated Modeling Scenario W5 as a potential operating scenario. In Section 4.1.4 in the main body of the DEQ *Modeling Review Memorandum*, DEQ identified PM_{10} NAAQS exceedances at four hotspot receptors when using the BULKRN meteorological dataset for Modeling Scenario W5 (the highest PM_{10} impact modeling scenario). When Modeling Scenario W5 is removed, the highest modeled impacts are predicted to occur for Modeling Scenario W3, which represents the transport of development rock from the West End Pit to the Hangar Flats Development Rock Storage Facility.

Table 7 presents results for the cumulative NAAQS impact analyses for Scenario W3. Results still exceed the 24-hour PM_{10} NAAQS even when Modeling Scenario W5 is eliminated. However, there is only one hotspot receptor exceeding NAAQS. The modeled violation is also predicted to occur during winter. This is a critical consideration because during winter, not only are fugitive emissions minimized because of the higher moisture content of material handled or driven over, but background concentrations in such remote areas are also generally much lower because of the absence of wildfires and dust-generating sources.

Table 7 also lists the results when using temporally varying backgrounds, instead of a single-value background, in the cumulative NAAQS impact analysis (using the “SEASON” and “MONTH” options in AERMOD). The highest daily average PM_{10} concentrations measured at Stibnite for every season and month in 2014 were used as inputs in the model. Table 7 shows that the SGP facility *safely* demonstrates compliance with the 24-hour PM_{10} NAAQS when temporally varying backgrounds (both seasonal and monthly) are used instead of the single-value background. Summing modeled design values with a single-value background that is on the upper end of the distribution results in a very conservative estimate of total impacts. DEQ strongly believes that using temporally varying backgrounds that respect seasonality is appropriate for the SGP facility, and that using the highest value in the period interval is very conservative.

TABLE 7. RESULTS FOR 24-HOUR PM_{10} CUMULATIVE NAAQS IMPACT ANALYSES FOR MODELING SCENARIO W3.

Backgrounds Scenario	Max. Conc.[a] ($\mu g/m^3$)[b]	Model Scenario	Back. Conc.[c] ($\mu g/m^3$)	Total Conc.[d] ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	Percent of NAAQS
Single-Value Background	116.9	W3	34.0	150.9[e]	150	100.6%
Seasonally Varying Backgrounds	123.5[f]	W3	*Seasonal*	123.5[f]		82.3%
Monthly Varying Backgrounds	123.5[f]	W3	*Monthly*	123.5[f]		82.3%

a. Max. Conc. = maximum modeled design concentration.
b. Micrograms per cubic meter.
c. Back. Conc. = background concentration.
d. Total Conc. = total (modeled + background) concentration.
e. One hotspot receptor exceeds NAAQS.
f. The maximum modeled design concentration already incorporates the seasonal and monthly background values.

The time series plot in Figure 4 and the box-and-whiskers plot in Figure 5 illustrate the variability in daily average PM_{10} concentrations collected at the Stibnite Site in 2014. Figures 4 and 5 confirm that the highest concentrations from the modeled and monitored datasets do *not* occur simultaneously. Highest modeled impacts are predicted to occur during winter while the highest background concentrations were measured at Stibnite during summer. Therefore, the summation method, where total impacts are calculated by summing modeled design values with a background concentration that is also consistent in form with the regulatory design value, results in a very conservative estimate of the total impact for comparison to NAAQS. DEQ concludes that use of temporally varying (i.e., seasonal and monthly) backgrounds for SGP is justified. DEQ is highly confident that operation of the SGP will not cause or contribute to a violation of NAAQS.

PM_{10} and $PM_{2.5}$ NAAQS compliance was previously demonstrated prior to refinements and adjustments proposed in the submitted *TAP Addendum*. The main body of the DEQ *Modeling Review Memorandum* discussed and considered results from both modeling with meteorological data processed using the BULKRN method and modeling with data processed using cloud cover data, and DEQ concluded that NAAQS compliance was demonstrated with a high degree of confidence. The adjustments and refinements described in the *TAP Addendum* further increase DEQ's confidence in NAAQS compliance.

Figure 4. TIME SERIES OF DAILY AVERAGE PM_{10} CONCENTRATIONS MEASURED AT STIBNITE IN 2014.

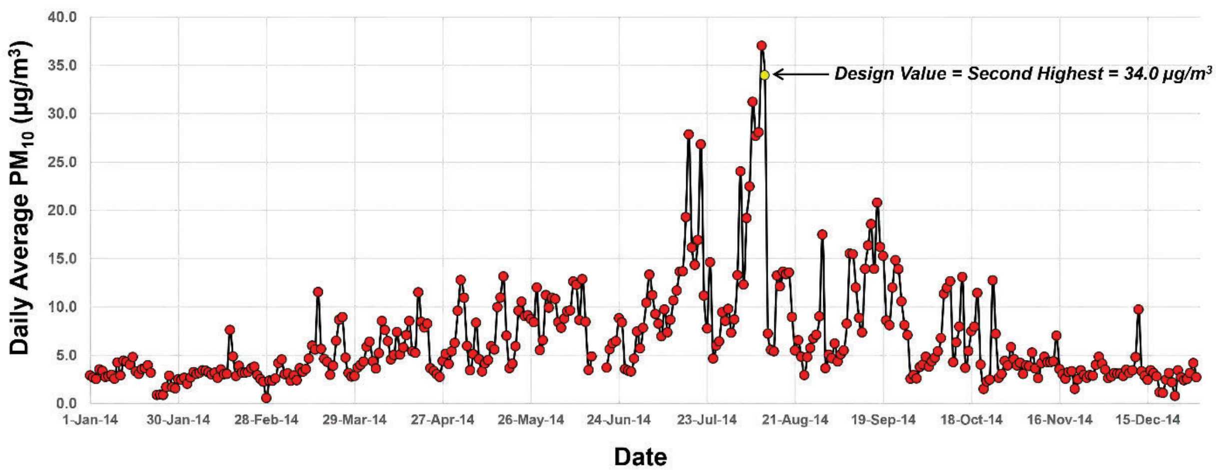
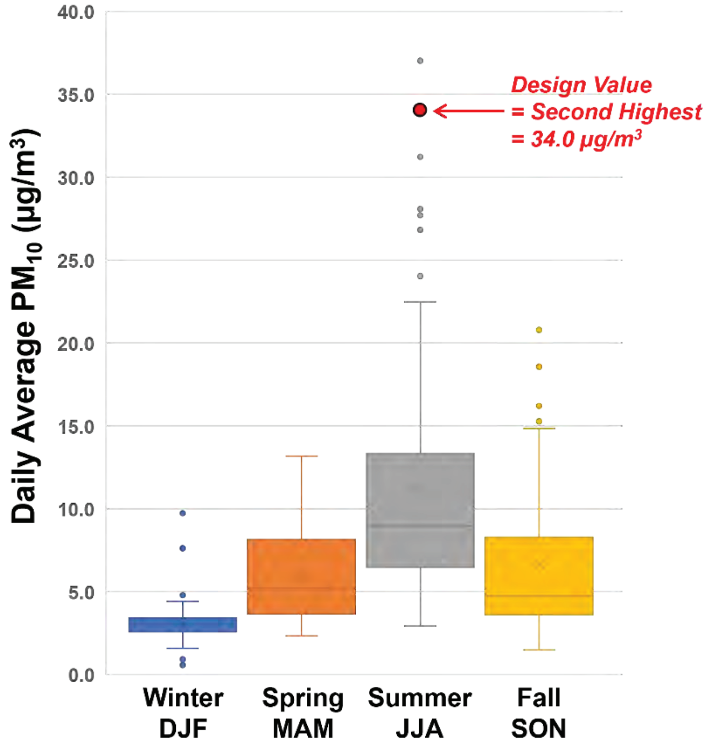


Figure 5. BOX-AND-WHISKERS PLOT FOR SEASONAL PM_{10} BACKGROUND CONCENTRATIONS MEASURED AT STIBNITE IN 2014.



In Figure 5 the middle line of each box represents the median. The "x" in the box represents the mean. The bottom and the top lines of the box represent the 1st quartile (25th percentile) and the 3rd quartile (75th percentile), respectively. The whiskers extend to the minimum and maximum values not considered outliers. Outliers are plotted individually.

7.0 Conclusions

This section provides conclusions of the *TAP Addendum* and DEQ's review of the *TAP Addendum*.

7.1 Conclusions of Revised TAP Analyses

The revised and refined TAP analyses:

- Revised TAP-applicable sources at the SGP facility.
- Proposed additional emission control measure and adjusted operations to reduce TAP emissions.
- Refined the approach used to demonstrate compliance with TAP regulations.

The submitted application, with the adjustments and refinements to analyses as described in the *TAP Addendum*, demonstrated to DEQ's satisfaction that the emissions of applicable TAPs will not result in impacts to ambient air that exceed TAP increments of *Idaho Air Rules* Section 585 and 586.

7.2 Effects of Adjustments/Revisions on NAAQS Compliance Demonstrations

The submitted application, prior to the *TAP Addendum*, demonstrated compliance with NAAQS to DEQ's satisfaction; and the operational measures proposed in the *TAP Addendum* will only further reduce estimated emissions. Eliminating Modeling Scenario W5 impacts, with the elimination of the West End Development Rock Storage Facility, affects the 24-hour PM_{10} impact modeling analysis for SGP. Modeling Scenario W3 is now the scenario producing the highest modeled impacts, and NAAQS compliance is easily demonstrated when using temporally varying background PM_{10} values, which were obtained from onsite monitoring data.

7.3 Conservatism of Permitting Analyses

Emissions and locations from which emissions occur are highly dynamic at mining facilities. This presents unique challenges for permit development because permits must include limits and operational requirements that ensure air quality standards are not violated. Permitting rules require that air impacts be assessed using maximum potential emissions as limited by either the capacity of the unit/operation or as limited by enforceable permit provisions. A permit where actual emissions are nearly representative of maximum allowable emissions, through imposing permit limits, would be exceedingly complex and require overly burdensome monitoring and record-keeping requirements. To avoid this, applicants typically calculate allowable emissions and perform impact analyses based on simplistic operational scenarios that largely overstate emissions estimated to occur from the facility.

PRI and Air Sciences have asserted that the submitted emission estimates, operational scenarios, and air impact analyses associated with the permit application greatly overstate best-estimated values. This point is evident when comparing the permit application materials and analyses with those presented in ModPRO2, PRI's revised mine plan and associated impacts. ModPRO2 is used in support of the Environmental Impact Statement (EIS).

Reference

Perpetua. 2021. "ModPRO2 Mine Plan." *File: Midas Stibnite Mine Plan and Equipment Schedule (10Feb21).xlsx.* Email from R. McCluskey, Perpetua Resources Inc., to E. Memon, Air Sciences Inc., February 11.

EXHIBIT B

State of Idaho
DEPARTMENT OF HEALTH AND WELFARE
Division of Environmental Quality

1410 N. Hilton
Boise, Idaho 83706

CECIL D. ANDRUS
Governor
RICHARD P. DONOVAN
Director

March 7, 1991

M E M O R A N D O M

To: Orvil Green

From: Robert Wilkosz RW
Tim Teater TT

Subject: Request for layman's explanation of URF & TLV

Attached, per your request is a draft explanation of URF and TLV/100 concepts as utilized in TAP NSR. This, of course, represents our tox. based views of what will do the job. We defer this draft to you for final decision as to what a layman might understand.

In developing emissions limits for new permitted facilities, the Idaho Air Quality Bureau (IAQB) uses the terms Unit Risk Factors and Threshold Limit Values. The following is an explanation of these terms and how they are used.

UNIT RISK FACTOR

A unit risk factor (URF) is used to describe the possibility of developing excess cancers over a average 70 year lifetime. This is based on being exposed to concentration of one microgram of a carcinogenic (cancer causing) substance in one cubic meter (1 $ug/m^{3)}$ of air over the 70 years. The term excess cancers means cases of cancers in excess of what would be normal for a given population. For example, if there was normally 5 cases of a given type of cancer in Anytown USA before a given exposure to some substance and 7 after the exposure, there would be 2 excess cancers.

Inhalation URFs are developed by the U.S. Environmental Protection Agency for carcinogenic substances. Each URF represents months of research and often years of policy process. Teams of toxicologists gathered all the toxicological information for each known or suspected carcinogen that could be found around the world. The available data were then rated or point factored per the quality of the research involved. A URF then is a probability statement derived from this process. Each URF was proposed by EPA and extensively reviewed and debated in public by scientists, health officials and industry representatives. Every URF represents a consensus of the best science and health opinion of the potency of a given carcinogen.

URFs are usually expressed as a number times 10 to some negative power. For example, benzine, an organic hydrocarbon found in various petroleum products and cigarette smoke has a unit risk factor of 8.3×10^{-6}. This means that there are 8.3 chances in one million of getting cancer if a person is exposed to 1 ug/m^3 24 hours a day for 70 years.

Another example would be asbestos. Asbestos has a URF of 2.3×10^{-1}. That means that if exposed to 1 ug/m^3 concentration for 70 years, the chances of getting cancer would be 2.3 in 10.

Within IAQB New Source Review (NSR) policy, URFs are used to calculate acceptable ambient levels for a given carcinogen. IAQB generally establishes that an ambient concentration which causes no more excess cancers than one in a million (1×10^{-6}) is acceptable. Once an acceptable ambient level is established, IAQB can then back calculate via engineering equations to an acceptable emission rate (in pounds per hour) for a given stack.

THRESHOLD LIMIT VALUE

Threshold Limit Value (TLV) is a time weighted exposure limit developed by the Occupational and Safety Administration and or the American Council of Government Industrial Hygienists. This value is used to limit the exposure of informed workers to a given toxic substance in the work place. The value is based on exposure of adult males working an eight hour shift. The IAQB uses TLV information to screen proposed new source emissions levels. The IAQB divides the TLV first by a value of 10 due to the fact that an ambient air exposure of a carcinogen means people are usually living under that exposure longer than eight hours out of 24. This value is then again divided by 10 to compensate for the fact that not everyone who is potentially exposed is an adult male. Other people may be more sensitive. The TLV thus is divided by a total of 100 for use in setting an acceptable ambient level.

For example, the TLV for cyanide is 5 milligrams per cubic meter (mg/m^3). An acceptable ambient level under IAQB policy would be 5 divided by 100 or 0.05 mg/m^3. For another example, the TLV for Lindane (an insecticide) would be 0.5 mg/m^3 concentration. The acceptable ambient level would be 0.5 divided by 100 or 0.005 mg/m^3.

As with carcinogens, the TLV derived acceptable ambient levels are used by the IAQB engineers to back calculate an acceptable stack emission rate for any proposed new source. A more pointed treatment these concepts can be found in The Toxic Air Pollutant NSR Policy Summary or the more thorough Draft Guidance Manual for Obtaining a Permit to Construct, Modify or Operate an Air Pollution Source.

EXHIBIT C

R. Wilkosz

IDAHO DEPARTMENT
OF HEALTH AND WELFARE

DIVISION OF
ENVIRONMENTAL QUALITY

1410 North Hilton, Statehouse Mail, Boise, ID 83720-9000, (208) 334-0502

Cecil D. Andrus, Governor   Richard P. Donovan, Director

July 29, 1992

Dick Rush, Vice President
IACI
P. O. Box 389
Boise, ID 83701

Dear Mr. Rush:

Attached is the DEQ list of ideas for rules to control new sources of toxic air pollutants in Idaho. This submittal should be considered a "straw-man" in that our deputy attorney general has not had adequate time to review this material. Nor has anyone from the State Bureau of Health had opportunity to comment. I will continue to try to get that input prior to our next meeting. But for now, we must consider this specific submittal for discussion purposes only.

The package is formatted so that comparisons can be made to the existing Air Quality Rules. If you have any questions, please call me.

Sincerely,

Robert Wilkosz

Robert Wilkosz
Bureau Chief
Technical Services Bureau
Division of Environmental Quality

RW:br/Rush.ltr

Attachment

cc: COF 1.1

TOXIC AIR POLLUTION
-- RULES CHANGE IDEAS FROM DEQ

IDAPA 16.01.01003 -- DEFINITIONS.

Approved Fuels. Natural gas, propane gas, liquified petroleum gas, distillate fuel oils, residual fuel oils, and diesel fuel; except that waste oil, gasoline, or refined gasoline are not approved fuels.

Environmental Remediation Source. An emission source that functions to remediate or recover any release, spill, leak, discharge or disposal of any petroleum product or substance or any hazardous waste as defined by IDAPA 16.01.01003,44, from any soil or ground or surface waters. Any Environmental Remediation Source shall have an operational life of no greater than five (5) years from the inception of actual operations to the cessation of actual operations.

Pilot or Experimental Plant. An emission source that functions to test processing, mechanical, or pollution control equipment to determine full-scale feasibility.

Occupational Exposure Limit. Refers to airborne concentrations of substances and represents conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse effects. Occupational exposure Limits can be found in Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices with Intended Changes for 1991-92 or the current edition, adopted by the American Conference of Governmental Industrial Hygienists, or the National Institute for Occupational Safety and Health (NIOSH) current Relative Exposure Limit (REL), or the Occupational Health and Safety Administration (OSHA) Air Contaminate Standards, current Permissible Exposure Limit (PEL) or current Worker Protection Standards for Agricultural Pesticides promulgated by the Environmental Protection Agency under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). In the case of conflicting values, the most stringent value shall take precedence.

Unit Risk Factor. These factors describe the probability of developing excess cancers over a 70 year lifetime exposure to 1 ug/m^3 *of a given carcinogen. Unit Risk Factors Can Be Found in the Federal Register Vol. 56 No. 35 / Thursday February 21, 1991 / Rules and Regulations Appendix V. or listed on the Integrated Risk Information System (IRIS) of the U.S. Environmental Protection Agency or listed in the Health Effects Summary Tables promulgated* *by the U.S. Environmental Protection Agency Office of Health Effects Assessment and the Office of Air Quality Planning and Standards. In the absence of U.S. EPA accepted risk factors, risk factors under review by the EPA Carcinogen Risk Assessment Verification Endeavor (CRAVE) shall be used on an interim basis.*

IDAPA 16.01.01012, PROCEDURES AND REQUIREMENTS FOR PERMITS TO CONSTRUCT AND OPERATING PERMITS.

IDAPA 16.01.01012,02. *Permit to Construct. No owner or operator may commence construction ..., except that no permit to construct is required for* ~~*the following classes of equipment which have actual and allowable emissions of less than one hundred (100) tons per year of any air contaminant or*~~ *and* ~~*would not significantly increase the emissions of a major facility*~~ *sources which:*

a. *have actual and allowable emissions of less than one hundred (100) tons per year of any air contaminant*

and

b. *would not significantly increase the emissions of a major facility*

and

c. *will not have an ambient air concentration of any air contaminant that would, as demonstrated using Department-approved methods:*

   i. *cause or significantly contribute to a violation of an ambient air quality standard,*

   or

   ii. *cause an ambient concentration in excess of one percent of the Threshold Limit Value,*

   or

   iii. *cause a cancer-risk probability in excess of one in one million:*

and

list: including but not limited to.

d. which belong to one of the following classes of equipment:

i. Air conditioning or ventilating equipment not designed to remove air contaminants generated by or released from equipment;

ii. Air contaminant detectors or recorders, combustion controllers, or combustion shutoffs;

iii. Fuel burning equipment for indirect heating and for heating and reheating furnaces using gas exclusively with a capacity of less than fifty (50) million BTU's per hour input;

iv. Other fuel burning equipment for indirect heating with a capacity of less than one million (1,000,000) BTU's per hour input;

v. Mobile internal combustion engines, marine installations and locomotives;

vi. Stationary internal combustion engines in accordance with the following:

100 horsepower or less	-- unlimited hours of operation
101 to 200 horsepower	-- 450 hours per month
201 to 400 horsepower	-- 225 hours per month
401 to 600 horsepower	-- 150 hours per month

vii. Stationary internal combustion engines used exclusively for emergency power generation which burn an approved fuel and which operate less than 200 hours per year;

viii. Laboratory equipment used exclusively for chemical and physical analyses, including ventilating and exhaust systems for laboratory hoods;

ix. Environmental characterization activities including emplacement and operation of field instruments, drilling of sampling and monitoring wells, and any other activities specifically exempted by the Director;

x. Pilot or experimental plants located at least 1/4 mile from any recreational area or residence or other structure not occupied or used solely by the owner of the facility or the owner of the property upon which the facility is located; which operate less than one year; and that also meet one of the following conditions:

1. use a slip stream from an existing process stream not to exceed ten percent of that existing process stream, or

2. have actual uncontrolled emissions which are not significant;

xi. Any emission source or sources provided that the actual uncontrolled facility-wide emissions are not significant, and the uncontrolled emissions would not significantly contribute to ambient air quality concentrations;

xii. Any other class or size of equipment specifically exempted by the Director. A list of those sources unconditionally exempted by the Director will be maintained by the Department, and made available upon request.

IDAPA 16.01.01012,13. *<u>Procedure for Issuing Permits</u>*

a. General procedures ...

b. Additional procedures ... attainment or unclassifiable area ...

c. Additional procedures ... federal Class I area ...

d. Procedures for operating permits ...

e. The Department ... fluid model ...

f. Modification of permits ...

g. Additional procedures for demonstrating compliance with the toxic substances provision 01.01011,01.

i. For sources that can demonstrate, using Department-approved methods, that emissions of carcinogens contribute an ambient air cancer risk probability of less than 1:1,000,000 and that emissions of non-carcinogens contribute to an ambient air concentration less than one percent of the Threshold Limit Value, no additional procedures are needed.

ii. For sources not recognized by the Department as environmental remediation sources that cannot demonstrate, using Department-approved methods, that emissions of carcinogens contribute an ambient air cancer risk probability of less than 1:100,000 and that emissions of non-carcinogens contribute to an ambient air concentration of less than one percent of the Threshold Limit Value, a permit cannot be issued unless the source has achieved the greatest degree of emission reduction that has been adequately *demonstrated and declared acceptable by the Department's Division of Health.*

iii. For remediation sources that cannot demonstrate, using Department-approved methods, that emissions of carcinogens contribute an ambient air cancer risk probability of less than 1:10,000 and that emissions of non-carcinogens contribute to an ambient air concentration of less than ten percent of the Threshold Limit Value, a permit cannot be issued unless the source has achieved the greatest degree of emission reduction that has been adequately demonstrated and declared acceptable by the Department's Division of Health.

iv. Department-approved methods will consist of the following:

(a) Comparison of maximum potential emissions to the screening emission limits for carcinogens and non-carcinogens as documented in Appendix A1 or A2 of the Toxic Air Pollutant list as promulgated but the Division of Environmental Quality. Maximum potential emissions can be determined by actual emissions testing using U.S. Environmental Protection Agency approved methods subject to review and approval by the Division of Environmental Quality or estimates of the maximum potential emissions using standard scientific and engineering principals and practices subject to review and approval by the Division of Environmental Quality

The State is reviewing and approving EPA policy... this is redundant

We need to open up in that we want to be able to approve more than EPA approved ..

(b) Atmospheric dispersion modeling, using only U.S. Environmental Protection Agency (EPA) currently approved models, applied according to EPA's Guidelines on Air Quality Models, and as approved for the application by the Division of Environmental Quality.

average in what respect
— emission levels
— met conditions

1. For carcinogens, multiply the average hourly concentration by a persistence factor of 0.15 to convert the hourly average to an annual average The resulting product is then multiplied by the unit risk factor to obtain a an ambient air cancer risk probability.

or other long term model procedures allow better than factor 0.15

2. For non-carcinogens, multiply the average hourly concentration by persistence factor of 0.15 to convert the hourly average to an annual average The resulting product is then compared to one one hundredth (1/100 of the appropriate occupational exposure limit.

(c) Any other method approved by the Director.

TOXDEMN2.RUL

This language probably assumes use of T-SCREEN or something. We need to go more general?

We need to get model examples out to rest of group.