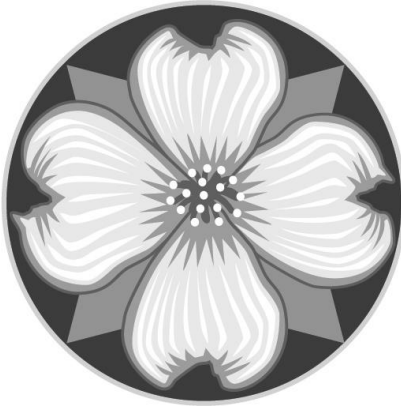




Regular Session

RS

Milwaukie City Council

COUNCIL REGULAR SESSION

City Hall Council Chambers
10722 SE Main Street
www.milwaukieoregon.gov

2281st Meeting**REVISED AGENDA****DECEMBER 4, 2018****(Revised November 30, 2018)**

Note: times are estimates and are provided to help those attending meetings know when an agenda item will be discussed. Times are subject to change based on Council discussion. **Page #**

1. CALL TO ORDER (6:00 p.m.)

A. Pledge of Allegiance

2. PROCLAMATIONS AND SPECIAL REPORTS**A. Christmas Ships – Proclamation (6:01 p.m.) 2**

Presenter: Dave Kaiser, Christmas Ships Vice President

B. Public Health Assessment for Precision Castparts – Report (6:06 p.m.) 3

Presenter: Oregon Health Authority (OHA) Representative, and
Natalie Rogers, Climate Action and Sustainability Coordinator

3. CONSENT AGENDA (6:36 p.m.)

Consent items are routine matters that are not discussed during the meeting; they may be approved in one blanket motion and any Councilor may remove an item from the Consent Agenda for separate consideration.

A. Approval of Council Meeting Minutes of: 158

1. November 6, 2018, Regular Session.

B. Certification of the November 6, 2018, Election Results – Resolution 161**~~C. Approval of the Ledding Library Project Guaranteed Maximum Price (GMP) Contract – Resolution~~ (removed from the agenda November 30, 2018)****D. City Manager Contract Approval – Resolution 174****4. AUDIENCE PARTICIPATION (6:40 p.m.)**

To address Council, complete a comment card and submit it to staff. The Mayor will call for comments regarding City business. Per the Milwaukie Municipal Code (MMC) only issues that are “not on the agenda” may be raised; issues that await a Council decision and for which the record is closed may not be discussed; “all remarks shall be directed to the whole Council, and the presiding officer may limit comments or refuse recognition.” The presiding officer may limit the time permitted for comments and may request that a spokesperson be selected for a group of persons wishing to speak. **The public is also invited to make comments in writing and may submit comments before the meeting, by mail, e-mail, or in person to City staff.**

5. PUBLIC HEARING

Public Comment will be allowed on items under this part of the agenda following a brief staff report presenting the item and action requested. The presiding officer may limit testimony.

A. None Scheduled.

6. OTHER BUSINESS

These items will be presented by staff or other individuals. A synopsis of each item together with a brief statement of the action requested shall be made by those appearing on behalf of an agenda item.

- A. Extension of the Housing Emergency – Resolution (6:45 p.m.)** **187**
Staff: David Levitan, Senior Planner
- B. Maintain Renter Protection Measures – Resolution (6:50 p.m.)** **193**
Staff: David Levitan, Senior Planner
- C. City Hall Facility – Update (6:55 p.m.)** **200**
Staff: Damien Farwell, Fleet and Facilities Supervisor
- D. Support for a County Vehicle Registration Fee – Letter (7:25 p.m.)** **205**
Staff: Kelly Brooks, Assistant City Manager, and
Dan Johnson, Clackamas County Department of Transportation

7. INFORMATION (7:35 p.m.)

The Council and City Manager will provide reports on City events, projects, and programs.

8. ADJOURNMENT (7:40 p.m.)

Executive Session (7:40 p.m.)

Following adjournment of the Regular Session, Council will meet in Executive Session pursuant to Oregon Revised Statute (ORS) 192.660 (2)(h) to consult with counsel concerning legal rights and duties regarding current litigation or litigation likely to be filed.

Americans with Disabilities Act (ADA) Notice

The City of Milwaukie is committed to providing equal access to all public meetings and information per the requirements of the ADA and Oregon Revised Statutes (ORS). Milwaukie City Hall is wheelchair accessible and equipped with Assisted Listening Devices; if you require any service that furthers inclusivity please contact the Office of the City Recorder at least 48 hours prior to the meeting by email at ocr@milwaukieoregon.gov or phone at 503-786-7502 or 503-786-7555. Most Council meetings are streamed live on the City's website and cable-cast on Comcast Channel 30 within Milwaukie City Limits.

Executive Sessions

The City Council may meet in Executive Session pursuant to ORS 192.660(2); all discussions are confidential and may not be disclosed; news media representatives may attend but may not disclose any information discussed. Executive Sessions may not be held for the purpose of taking final actions or making final decisions and are closed to the public.

Meeting Information

Times listed for each Agenda Item are approximate; actual times for each item may vary. Council may not take formal action in Study or Work Sessions. Please silence mobile devices during the meeting.



COUNCIL REGULAR SESSION

City Hall Council Chambers
10722 SE Main Street
www.milwaukieoregon.gov

2281st Meeting

MINUTES

DECEMBER 4, 2018

Mayor Mark Gamba called the Council meeting to order at 6:06 p.m.

Present: Council President Lisa Batey; Councilors Angel Falconer, Wilda Parks, Shane Abma

Staff: Assistant City Manager Kelly Brooks

City Attorney Justin Gericke

City Manager Ann Ober

City Recorder Scott Stauffer

Climate Action and Sustainability Coord. Natalie Rogers

Environmental Services Coordinator Jere Sonne

Fleet and Facilities Supervisor Damien Farwell

Planning Director Denny Egner

Public Works Director Peter Passarelli

1. CALL TO ORDER

Pledge of Allegiance.

2. PROCLAMATIONS, COMMENDATION, SPECIAL REPORTS AND AWARDS

A. Christmas Ships – Proclamation

Dave Kaiser, Christmas Ships Vice President, remarked on the 2018 sailing season. **Council President Batey** asked if the ships could do a loop around Milwaukie Bay as they passed and **Mr. Kaiser** said he would pass along the request. **Mayor Gamba** proclaimed 2018 Christmas Ships Days in Milwaukie.

Ms. Ober reported that approximately 10,000 people on Facebook had expressed interest in attending the City's Winter Solstice and Christmas Ships Viewing event.

B. Public Health Assessment for Precision Castparts – Report

Ms. Rogers introduced Gabriela Goldfarb and Susanna Wegner with the Oregon Health Authority (OHA) Public Health Division. She explained that they would present information related to air and contamination tests conducted around Precision Castparts Corp.'s (PCC) Portland/Milwaukie facility.

Ms. Goldfarb explained the role of the OHA, the Federal Environmental Protection Agency (EPA), and the Oregon Department of Environment Quality (DEQ) in reviewing and analyzing health data from industrial sites.

Ms. Wegner described what a public health assessment (PHA) is and how it is used. **Mayor Gamba** asked why the OHA had conducted a PHA around PCC. **Ms. Wegner** explained that although the community had asked for a health impact study, due to poor data quality the OHA was only able to conduct a PHA.

Ms. Wegner discussed how PHAs are conducted and explained that in this case the OHA was looking at increased cancer causes around the PCC facility. **Mayor Gamba** and **Ms. Wegner** noted average American cancer rates for men and women.

Ms. Wegner continued to explain why the OHA was unable to perform a health impact study and remarked on the potential public health benefits of conducting a PHA. She noted the United States Forest Service moss study and DEQ air quality monitoring that

had led the OHA to conducting a PHA around PCC. **Council President Batey** and **Ms. Wegner** commented on the data and conclusions drawn by the moss study.

Ms. Wegner provided historical information about PCC. She reviewed the PHA community engagement process and noted the sources of water, soil, and air data used in the PHA. The group noted that the City drinking water is tested regularly.

Ms. Wenger explained how the OHA analyzes the data to identify certain cancer-related chemicals to calculate health risks based on different levels of exposure. She noted that the final step in the PHA process was to take public comment on the initial findings. She reported the initial PHA findings around PCC found that the measured concentration of metals in the air and soil did not exceed harmful levels and were not likely to harm public health. **Council President Batey**, **Ms. Wegner**, and **Ms. Goldfarb** noted that samples had been taken from community gardens and Johnson Creek.

Ms. Wegner noted that the PHA had found that up to five crayfish from Johnson Creek could be safely eaten per month before harmful effects from metals and polychlorinated biphenyls (PCBs) would be detected. The group discussed eating crayfish and how the DEQ and EPA create fish eating advisories that are used in OHA safety reports. **Ms. Wegner** said that sample measurements from Johnson Creek had shown high levels of bacteria, like other urban creeks, that led the OHA to caution the public against making too much contact with the creek water.

Steven Myers, Portland resident, asked how he could address Council and Ms. Ober escorted him into the hall to provide a speaker registration card.

Ms. Wegner remarked on the data gaps and uncertainties in the PHA. She discussed how the OHA had come to the conclusions in the PHA given the unknown impacts of different life stages of the residents around PCC and the lack of monitoring data. She explained how the PHA was part of the Clean Air Oregon (CAO) rule-making process that would set new regulatory and reporting requirements. **Mayor Gamba**, **Ms. Wegner**, and **Ms. Goldfarb** commented on the differences between PHAs and the proposed CAO rules. They noted how much funding the State Legislature had approved for the CAO process and how DEQ and the OHA were developing the CAO program.

The group noted that PCC had previously offered to work with the City to invest in additional monitoring equipment. **Ms. Ober** reported that the non-profit organization who was pursuing that project had decided not to proceed with monitoring. She remarked that PCC may have conducted additional monitoring on its own.

Ms. Wegner noted the public could submit comments on the PHA by emailing ehap.info@state.or.us until January 15, 2019.

Councilor Abma and **Ms. Wegner** noted that the testing had been done along the border of the PCC facility and where concentrations had been detected by the monitoring data. **Ms. Wegner** added that Portland State University had also conducted monitoring in backyards and had not detected higher levels of metals. The group remarked on the approximate distances from the sample sites to the PCC facility.

Mayor Gamba remarked on the likelihood that contamination from PCC had reached groundwater, noting that the City cleaned trichlorethylene out its water system. **Ms. Wegner** and **Ms. Goldfarb** suggested they would refer the Mayor's question about groundwater infiltration to DEQ.

Mayor Gamba asked if people who are more vulnerable to contamination live within three blocks of the PCC facility. **Ms. Wegner** remarked on the variables to consider when determining where to live and suggested she would live in the area.

Mayor Gamba asked for confirmation that given the combined effects of all the samples the OHA was concluding, there was no significant health risk. **Ms. Wegner** commented on the PHA analysis process and confirmed that the OHA had found no evidence to suggest that there was a significant public health risk around the PCC facility. **Ms. Goldfarb, Mayor Gamba, and Ms. Wegner** remarked on the limitations of the available monitoring data.

Mayor Gamba asked if any agency was monitoring identified clusters of health issues. **Ms. Wegner and Ms. Goldfarb** replied that the OHA maintained a cancer registry that offers some statewide cluster data. They noted the purpose and challenges of drawing conclusions from cancer registry data. **Council President Batey** asked if the OHA had mapped out the cancer registry data. **Ms. Goldfarb** noted she would defer to the cancer registry staff regarding any mapping done with the data. **Ms. Wegner** reported that cancer registry data was confidential and suggested it would be impossible to detect elevated cancer levels in the neighborhoods around the PCC facility.

Council President Batey asked if any agency was looking at any increased cancer risk data from around Bullseye Glass in southeast Portland. **Ms. Goldfarb** reported that no agency was systemically looking at such data. She discussed how some agencies were working to respond to concerns about health risks by conducting PHAs. **Mayor Gamba and Ms. Goldfarb** noted the challenge of working with data from transitory populations.

Council President Batey and Ms. Wegner remarked on known cognitive effects and health risks of styrene chemicals.

The group noted that no one from PCC wished to address Council and that all comments regarding the PHA needed to be submitted to the OHA, not the City.

Steven Myers, Portland resident, commented on the studies that had been done by government agencies and journalists into the contamination found in the area around the PCC facility. He remarked on the chemicals he had been exposed to as a PCC employee and the impacts those chemicals had on his health. **Mayor Gamba** asked Mr. Myers to stop speaking and it was noted that Mr. Myers refused to stop talking.

Mayor Gamba recessed the Regular Session at 7:15 p.m. and reconvened the Regular Session at 7:23 p.m.

3. CONSENT AGENDA

It was moved by Councilor Parks and seconded by Council President Batey to approve the consent agenda as presented.

- A. City Council Meeting Minutes:**
 - 1. November 6, 2018, Regular Session.**
- B. Resolution 98-2018: A Resolution of the City Council of the City of Milwaukie, Oregon, certifying the results of the November 6, 2018 General Election.**
- C. ~~A resolution authorizing a Change Order establishing a Guaranteed Maximum Price with Swinerton Builders for the Ledding Library Improvement Project.~~**
(removed from the agenda)
- D. Resolution 99-2018: A Resolution of the City Council of the City of Milwaukie, Oregon, revising the existing City Manager employment agreement.**

Motion passed with the following vote: Councilors Falconer, Batey, Parks, and Abma and Mayor Gamba voting "aye." [5:0]

4. AUDIENCE PARTICIPATION

Mayor Gamba reviewed the Audience Participation procedures. Ms. Ober provided follow-up reports from the November 20, 2018, Audience Participation. She reported that the City was working to install a safety diverter at Linwood Avenue and Monroe Street. She noted that Council had previously discussed the prioritization of seeking funding for the Railroad Avenue path and the Monroe Street Neighborhood Greenway projects.

Vince Alvarez, Milwaukie resident, asked about the purpose of recent beach construction at Milwaukie Bay Park. Mayor Gamba explained that the beach work was to enhance water access for non-motorized boats. Mr. Alvarez suggested the work was gorgeous but would not provide increased access. He commented on the inclusion of a water feature in the park and suggested the park did not need a water future.

5. PUBLIC HEARING

A. None Scheduled.

6. OTHER BUSINESS

A. Extension of the Housing Emergency – Resolution

Ms. Ober explained the proposed resolution would extend the housing emergency. She noted the market indicators that trigger the emergency status and that staff recommended extending the emergency for six months.

Councilor Abma expressed support for extending the emergency for longer than six months and making the 90-day no cause eviction notice requirement permanent. The group discussed the likelihood that the State Legislature would address housing issues and what the City could do to address the housing emergency under existing laws.

Ms. Ober and Councilor Abma remarked on the market indicators used to trigger a housing emergency. Ms. Ober summarized that staff would report back to Council about what the City could do under current housing law.

It was moved by Council President Batey and seconded by Councilor Falconer to approve the Resolution extending the declared housing emergency for a period of six months, pursuant to Ordinance 2117. Motion passed with the following vote: Councilors Falconer, Batey, Parks, and Abma and Mayor Gamba voting "aye." [5:0]

Resolution 100-2018:

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF MILWAUKIE, OREGON, EXTENDING THE DECLARED HOUSING EMERGENCY FOR A PERIOD OF SIX MONTHS, PURSUANT TO ORDINANCE 2117.

B. Maintain Renter Protection Measures – Resolution

It was moved by Council President Batey and seconded by Councilor Falconer to approve the Resolution maintaining the renter protection measures in MMC 5.60, pursuant to Ordinance 2118. Motion passed with the following vote: Councilors Falconer, Batey, Parks, and Abma and Mayor Gamba voting "aye." [5:0]

Resolution 101-2018:**A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF MILWAUKIE, OREGON, MAINTAINING THE RENTER PROTECTION MEASURES IN MMC 5.60, PURSUANT TO ORDINANCE 2118.**

Councilor Abma asked if the City had received complaints about the 90-day eviction notice requirement. **Ms. Ober** reported that staff had received an increasing number of calls about the housing protections from people wanting to understand the rule. **Mayor Gamba** agreed that he had received calls about the 90-day rule.

C. City Hall Facility – Update

Mr. Farwell and **Tracy Orvis**, Architect with DiLoreto Architecture, provided an update on the work to convert the City Hall Fire Bay to Council Chambers. They reported that the Conference Room had been renovated to office space and that the Fire Bay would be reconstructed in early 2019. They presented cost estimates, work timelines, and drawings of the proposed Chambers.

Mayor Gamba and **Ms. Orvis** discussed the placement of Americans with Disabilities Act (ADA) accessible entrances in the new Chambers.

Council President Batey asked if the bathroom in the Fire Bay would be converted for ADA use in the new Chambers. **Ms. Orvis** noted that the new bathroom would be near where the old bathroom had been located.

Mayor Gamba, **Mr. Farwell**, and **Ms. Orvis** discussed how the new Chambers would include design elements meant to limit ceiling acoustical issues.

Mr. Farwell reported that the current Council dais would be resurfaced and used in the new Chambers. The group discussed the aesthetic upgrade the dais would receive.

Mayor Gamba asked where presentation monitors would be mounted and **Councilor Parks** asked where the audio/visual (AV) room would be located. **Mr. Farwell** noted where a new presentation projector and television monitors would be located. The group expressed concern about the placement of a projector that would shine a bright light into the eyes of those sitting at the dais.

Mr. Farwell and **Ms. Orvis** explained where the restroom and AV room would be in the new Chambers. The group expressed concern that AV staff would not be able to communicate efficiently from the AV room without a small window into Chambers.

Mayor Gamba asked where Council's office would be located. **Ms. Ober** noted that the Council office would be determined during the space analysis phase of the City Hall project.

Mr. Farwell explained that the goal was to make the new Chambers a meeting space that could hold up to 80 chairs. **Councilor Falconer**, **Mr. Farwell**, and **Ms. Ober** discussed where movable conference tables would be located. They noted the logistical challenges of placing the tables near the Fire Bay doors.

Mr. Farwell and **Ms. Orvis** presented and discussed the proposed color palette for the new Chambers. The group discussed the proposed color options and expressed concern about certain colors creating a glare on the dais.

Mr. Farwell discussed issues related to replacing the Fire Bay's windows. He noted the Planning Commission, Design and Landmark Committee (DLC), and State Historical Preservation Office (SHPO) review processes staff had been working through to get

approval of replacement windows. The group discussed efficiency and maintenance considerations in selecting new windows for homes and government facilities. **Ms. Orvis** and **Mr. Farwell** confirmed that the new windows would include storm windows and that the existing Fire Bay doors would be replaced with more efficient windows.

Councilor Abma and **Mayor Gamba** discussed the SHPO recommendation and Planning Commission decision to restore the original wood windows. **Mr. Farwell** and **Ms. Ober** noted the impacts of the Planning Commission's decision on the replacement of other windows at City Hall. The group noted that it was too late to appeal the Planning Commission's decision related to the Fire Bay windows.

Mr. Farwell provided an overview of the third phase of the City Hall project, noting staff space needs that would be considered through a space assessment. The group noted ongoing efforts to resolve heating, ventilation, and air conditioning (HVAC) issues at City Hall. **Mr. Farwell** noted staff would update Council as the project progressed.

Councilor Parks and **Ms. Ober** noted that the Municipal Court Judge would use the Council and Court Clerk's offices on Court days.

Mr. Farwell reviewed the City Hall project schedule. He noted issues to be resolved including the relocation of event materials, bike storage space, and a janitorial closet. He presented the possibility of building a new bike and storage shed outside City Hall.

D. Support for a County Vehicle Registration Fee – Letter

Ms. Brooks introduced Dan Johnson, Clackamas County Transportation and Development Department (TDD) Director, and Mike Bezner, TDD Assistant Director. She explained that Council was asked to consider supporting a countywide vehicle registration fee (VRF) by submitting a letter to the Board of County Commissioners.

Mr. Johnson explained that the VRF was part of an ongoing regional discussion about road funding. He noted the TDD's outreach efforts to cities and business groups and provided an overview of the County's road funding revenue sources. **Council President Batey** and **Mr. Bezner** remarked on how gas taxes are, and how a VRF would be, collected and distributed based on population.

Mr. Johnson continued to review the County's road funding sources, including grants, fees, urban renewal districts, and partner agencies. He compared the County's road funding sources to neighboring counties and **Councilor Abma** noted that the City of Portland operated many roads in Multnomah County.

Council President Batey and **Mr. Bezner** noted that Clackamas County had the most miles of roads to maintain in the area. The group discussed why the County had so many miles of roads to maintain.

Mr. Johnson talked about the importance of the state transportation funding package known as House Bill 2017 (HB2017). He discussed how the County had invested HB2017 revenue and the ongoing need for additional funding to address transportation issues. **Mr. Bezner** discussed the County's goal to have zero deaths or injuries on County roads by 2035 and how the TDD had been working to meet that goal.

Mr. Johnson reviewed the County's transportation needs and reported how the Clackamas County Coordinating Committee (C4), community, and business groups had responded to a proposal to create a strategic investment fund and a \$30 to \$54 a year VRF. He discussed how VRF revenue could be distributed to cities and invested in transportation projects. The group remarked on how VRF funds would be used on roads

that are partly owned by the County and partly owned by cities. They noted the possibility of cities annexing County roadways and the type of projects VRFs could fund.

Mr. Johnson discussed the financial impacts of a \$30 a year VRF on motorists and reported that he had heard some concern about the increased costs of registering vehicles. He reported that the Board of County Commissioners had asked cities to express their support for a VRF. It was noted that Ms. Brooks had used the example letter from the County in drafting the proposed letter for Council to support.

Councilor Abma and **Ms. Brooks** noted restrictions on how VRF and gas tax funds could be used to support recreation trail projects.

The group noted that staff needed Council consensus or a motion regarding the proposed letter of support to be sent to the Board of County Commissioners.

Council President Batey reported that she had attended the TDD's meeting about the VRF in Oak Grove and had heard concern from Community Planning Organizations (CPOs) that they had not been consulted enough about a VRF. **Mr. Johnson** remarked on the TDD's efforts to reach community groups and noted concerns about how representative the CPOs and C4 are of the entire county. He commented on CPO concerns about County funds being spent in unincorporated areas and how the TDD works to fund road projects throughout the County.

It was moved by **Councilor Parks** and seconded by **Councilor Abma** to approve staff sending a letter in support of a \$30 a year VRF, with revisions related to recreational trail projects, to the Board of County Commissioners. Motion passed with the following vote: **Councilors Falconer, Batey, Parks, and Abma** and **Mayor Gamba** voting "aye." [5:0]

7. INFORMATION

Clackamas Cities Association (CCA) Dinner – Discussion

Council President Batey expressed frustration that Council had not been consulted on the details of the January 2019 CCA dinner. She expressed support for holding the dinner in Downtown Milwaukie with a focus on Milwaukie Bay Park and/or the City's housing affordability work. The group discussed how CCA dinners were planned and scheduled, and noted that the City had requested to host every year in January.

The group discussed whether other cities would be interested in the Park or the City's housing work, and the logistics of hosting an event in a park. **Ms. Ober** noted that the January dinner could be canceled but staff needed Council direction on how to proceed.

The group discussed Council's involvement in planning CCA dinners and the costs of putting on an event in a park. They noted that the current proposed dinner site, the Clackamas Community College Harmony Campus, would be annexed into the city in 2019.

Ms. Ober noted that in future years there would be more event venues in Downtown Milwaukie and the group noted the current lack of event spaces in the City. **Councilor Parks** remarked on the possibility of holding a dinner in January 2019 as planned and requesting a summer month in 2020 to show off projects in Downtown.

The group noted that staff had reached out to see if other cities would switch hosting months in 2019 and that other cities had declined. They noted when CCA dinners are held and remarked on the possibility of hosting a dinner in July 2019.

Councilor Falconer suggested Council wanted more robust conversations about future CCA dinners. The group discussed whether to proceed with hosting a CCA dinner in January 2019. **Council President Batey** and **Councilor Abma** expressed opposition to hosting a January dinner and agreed that Council would want to discuss future dinners.

The group continued to discuss whether to hold a dinner event in January versus a warmer month in a park, and noted the ramifications of canceling a planned event.

Mayor Gamba commented on the success of recent CCA legislative preview dinners the City hosted. He suggested there was no advantage to canceling the January dinner and noted the difficulty in finding event venues in City Limits. The group remarked on the benefits and purpose of using CCA dinners to showcase City issues and projects.

Ms. Ober noted staff needed direction on how to proceed with the dinner. The group discussed whether Council wished to cancel the January dinner and noted that Council had previously changed the dinner topic to housing. **Ms. Ober** summarized that Councilor Parks and Mayor Gamba were in favor of holding the dinner in January, and that Council President Batey and Councilors Falconer and Abma were opposed, and therefore the January 2019 CCA dinner would be canceled. She confirmed that staff would return to Council to discuss CCA dinner locations and topics in February 2019.

City Manager Updates

Ms. Ober provided a brief update on the installation of a new electric vehicle charging station in a City parking lot along McLoughlin Boulevard. She noted construction delays and that the project would be finished in a couple months.

Ms. Ober remarked on the how staff provided project updates to Council. She reported that City Manager Updates would be added to Council agendas in 2019.

Mayor's Announcements

Mayor Gamba announced upcoming events including the City's Housing Forum, winter celebrations at the Milwaukie Center and Milwaukie Museum, and the City's Winter Solstice and Christmas Ships Viewing event.

Councilor Parks reported that the North Clackamas Parks and Recreation District (NCPRD) would be proposing that the District Advisory Board (DAB) be restarted at an upcoming Board of County Commissioners meeting. She added that NCPRD would be holding community conversations in Oak Grove and Happy Valley.

Council President Batey thanked Jason Wachs, Community Programs Coordinator, for preparing the announcement presentation slide and noted an upcoming plant salvage event at Kronberg Park.

8. ADJOURNMENT

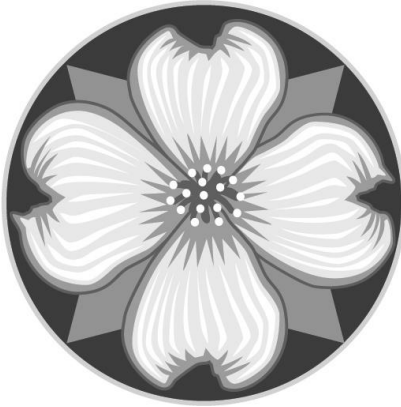
It was moved by Councilor Abma and seconded by Councilor Falconer to adjourn the Regular Session. Motion passed with the following vote: Councilors Falconer, Batey, Parks, and Abma and Mayor Gamba voting "aye." [5:0]

Mayor Gamba moved to adjourn the regular session at 9:59 p.m.

Respectfully submitted,



Scott Stauffer, City Recorder



RS Agenda Item

2

**Proclamations,
Commendations,
Special Reports,
& Awards**

PROCLAMATION

WHEREAS, the Christmas Ships Parade is a 64-year-old tradition; and

WHEREAS, the Christmas Ships will sail to destinations on the Columbia and Willamette Rivers between November 30th and December 20th, 2018; and

WHEREAS, the Christmas Ships will sail to Milwaukie Bay on December 5th, 7th, 12th, 14th, 15th, and 19th, 2018; and

WHEREAS, the City of Milwaukie's Winter Solstice and Christmas Ships Viewing event at Milwaukie Bay Park, featuring the Christmas Ships' combined Columbia and Willamette Fleets as they sail to-and-from George Rogers Park in Lake Oswego, will be held on Saturday December 15th, 2018.

NOW, THEREFORE, I, Mark Gamba, Mayor of the City of Milwaukie, a municipal corporation in the County of Clackamas, in the State of Oregon, do hereby proclaim November 30th through December 20th, 2018, as **Christmas Ships Days** in Milwaukie.

IN WITNESS WHEREOF, and with the consent of the City Council of the City of Milwaukie, I have hereunto set my hand on this 4th day of December 2018.

Mark Gamba, Mayor

ATTEST:

Scott Stauffer, City Recorder





DOWNTOWN
MILWAUKIE *in*
December



Many business will be open
extended hours after
Downtown Holiday Events!

RS 2. A.
12/4/18

Winter Solstice

Bonfire & Christmas Ships

SATURDAY 12/15

Christmas Ships Parade

Milwaukie Bay Park



WED & FRI 7PM
12/5-12/19

Happy Holidays!

GIFTS • FOOD • DRINK

for more information visit
milwaukieoregon.gov

COUNCIL STAFF REPORT

To: Mayor and City Council
Ann Ober, City Manager

Date Written: Nov. 15, 2018

Reviewed: Blanca Marston (as to form), Administrative Specialist, Alma Flores, Community Development Director, and
Peter Passarelli, Public Works Director

From: Natalie Rogers, Climate Action and Sustainability Coordinator

Subject: **Oregon Health Authority's Public Health Assessment of Precision Castparts Corporation's Large Parts Campus**

ACTION REQUESTED

Informational review of Oregon Health Authority's (OHA) Public Health Assessment (PHA) regarding Precision Castparts Corporation (PCC) Large Parts Campus.

HISTORY OF PRIOR ACTIONS AND DISCUSSIONS

In 2009, the Oregon Department of Environmental Quality (DEQ) developed an air pollution model to predict air pollutant concentrations throughout Portland. Between 2013 and 2015, the United States Forest Service (USFS) collaborated with DEQ in an experimental effort to locate unidentified sources of air toxics around the City of Portland by testing moss growing in trees for heavy metals. The study found the PCC Large Parts Campus located at 4600 SE Harney Drive had very high concentrations of nickel. With concerns regarding health risks associated with metals and contaminant emissions, the local community group South Portland Air Quality contacted The Oregon Health Authority Environmental Health Assessment Program (EHAP) on June 3, 2016, requesting a public health assessment (PHA) to be performed. OHA evaluated potential health risks from metals based on air monitoring and soil testing the DEQ performed in 2016 and 2017.

PCC has been a prominent business in the Milwaukie area since the PCC Large Parts Campus began operating in 1957, with community concerns about PCC air emissions existing prior to the OHA outreach in 2016. PCC is a large manufacturer of precision metal castings located in Portland, Oregon and Milwaukie, Oregon. PCC operates under several state and federal environmental permits limiting emissions by air, stormwater, and hazardous waste. The Air Contaminant Discharge Permit (ACDP) administered by DEQ sets PCC's allowable air emission rates. The permit requires PCC to report estimates of certain air emissions and perform emissions monitoring of hazardous air pollutants including, but not limited to, nickel, chromium, cobalt, hydrogen chloride, hydrogen fluoride, hexane, lead, and manganese. As of DEQ's review in 2016, PCC was operating in compliance with the conditions of its ACDP permit. The most recent EPA National Air Toxics Assessment identified the PCC Large Parts Campus among Portland facilities with the highest potential to contribute to cancer risk through air emissions. In May 2016, PCC voluntarily added high efficiency particulate air (HEPA) filters to control air emissions from several emission stacks. PCC also installed a new

stormwater filtration system to remove metals and polychlorinated biphenyls (PCBs) contaminants. In 2018 PCC began undertaking soil removal actions and operational facility upgrades and maintenance that will help reduce and control potential pollutant discharges to the onsite stormwater conveyance system.

The OHA PHA assessed health impacts using samples collected by DEQ after PCC implementation of emission-limiting infrastructure in 2016. DEQ performed air monitoring for metals at three sites surrounding the PCC facility from March 30, 2016, through October 2016. In addition, DEQ performed a full spectrum air toxics monitoring at one site near PCC for a year through May 2017. DEQ tested soil at multiple locations within one mile of the PCC facility in June 2016. Johnson Creek sediment and surface water monitoring was performed by Landau Associates on behalf of PCC, with individual samples collected between 2009 and 2015. Incremental sampling methods were also performed in 2017 to collect additional samples. In 2016, DEQ tested Johnson Creek sediment and crayfish samples collected near PCC.

ANALYSIS

The OHA EHAP allocated resources to perform the evaluation to the certification levels of The Agency for Toxic Substance and Disease Registry (ATSDR). The OHA EHAP convened a series of Community Advisory Committee meetings, comprised of residents who live and/or work within a half mile of PCC, to receive input, educate, develop relationships, and identify communication strategies and community concerns. Below are the OHA PHA six conclusions about the PCC Site:

1. **Measured concentrations of metals in the air near PCC are not likely to harm health.** Cumulative exposure to all metals detected in the air around PCC may be predicted to elevate lifetime cancer risk by as many as 20 additional cases of cancer per 1 million people exposed continuously for a lifetime. The OHA EHAP considers this to be very low risk. The estimated cancer risk is similar for current conditions and for conditions prior to PCC HEPA filter installation in 2016. These risk calculations are based on the cautious assumption that nickel detected in air monitoring is in its most toxic form. It is likely that nickel emissions from PCC are in an alloy form that may be less available to the body and, therefore, less carcinogenic.
2. **Measured concentrations of metals in soil from areas around the PCC facility are not likely to harm health.** DEQ sampled soil near the facility, including locations near residences and in community gardens. No soil concentrations exceeded comparison values.
3. **Measured concentrations of chemicals in surface water of Johnson Creek are not likely to harm health.** The levels of chemicals detected in surface water are below health-based comparison values designed to be protective of drinking water. Trichloroethylene was detected at a level slightly above the cancer comparison value in one sample in 2009, but was not detected in subsequent samples. Johnson Creek, like many urban streams, has high levels of bacteria that can make people sick. While bacteria in Johnson Creek was not a focus of the PHA and is not believed to be related to PCC, it has the potential to affect public health.
4. **Measured concentrations of polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs) in Johnson Creek's sediment near the storm water outfall are not likely to harm the health of people who regularly come in contact with it.** Weekly year-round exposure to sediment is not high enough to harm health. While

extremely frequent (daily year-round) contact with Johnson Creek sediment could result in a slight increased risk of both non-cancer and cancer health effects, the likelihood of this degree of contact is quite low. Risk calculations were based on cumulative exposure to maximum concentrations of all PCBs, PAHs, and metals of potential concern detected in the creek. Each exposure was assumed to involve full contact of hands, forearms, feet, and lower legs to sediment. The biggest health risk from this degree of contact with the creek is the potential for bacterial infections.

5. **Residents may safely eat crayfish from Johnson Creek in moderation.** Based on cumulative risk from metals and PCBs, residents can eat up to five meals of Johnson Creek crayfish each month without exceeding health-protective exposure guidelines.
6. **There is not enough known about past air emissions from PCC to calculate health risks before 2016.** No historical monitoring data are available to support a quantitative evaluation of potential health effects from previous exposures. Based on historical trends in emissions reported by PCC to EPA's Toxic Release Inventory, OHA cannot rule out the possibility that past air concentrations could have been high enough to harm health. Emissions reported to the Toxics Release Inventory since 1987 indicate that emissions of some chemicals may have been 10 and 100 times higher than current emissions during some periods of PCC's past operations. Historical emissions of trichloroethylene and tetrachloroethylene would have also contributed to past risks of cancer and developmental defects.

The OHA PCC Public Health Report was released for public comment on October 29, 2018, for public comment. The public comment period ends January 15, 2019. OHA scheduled a community meeting on November 29th to discuss the PHA report findings.

BUDGET IMPACTS

None.

WORKLOAD IMPACTS

None.

COORDINATION, CONCURRENCE, OR DISSENT

Not applicable.

STAFF RECOMMENDATION

None.

ALTERNATIVES

None.

ATTACHMENTS

1. [Oregon Health Authority Public Health Assessment Precision Castparts Corporation Public Release](#)
2. [Oregon Health Authority PCC Summary Factsheet](#)
3. [Portland Tribune Article](#)

Public comment release

>> Public Health Assessment

Precision Castparts Corporation (PCC)

PCC Structural Large Parts Campus
4600 SE Harney Drive
Portland, OR 97227
Oct. 29, 2018

Prepared by the
Environmental Health Assessment Program
Public Health Division
Oregon Health Authority
Under cooperative agreement with the
Agency for Toxic Substances and Disease Registry

Comment period end date: Jan. 15, 2019



PUBLIC HEALTH DIVISION
Environmental Health Assessment Program

Public comment version

This report is being released for public comment as an opportunity for anyone to review and provide feedback on this document. Comments submitted by the date indicated on the front cover will be addressed in the final version. To submit public comments, either submit them via email to ehap.info@state.or.us or via postal mail addressed to:

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Foreword

This report was supported in part by funding through a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), US Department of Health and Human Services. It was completed in accordance with approved methodologies and procedures existing at the time the Public Health Assessment was initiated. Editorial review was completed by the cooperative agreement partner.

The Oregon Health Authority (OHA), in cooperation with state and federal partners, prepared this Public Health Assessment (PHA). ATSDR and its Oregon cooperative agreement partner, OHA's Environmental Health Assessment Program (EHAP), conducts public health assessments to evaluate environmental data and community concerns. A PHA reviews available information about hazardous substances at a site and evaluates whether exposure to them might cause harm to people.

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Executive summary

Introduction

Through a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), the Oregon Health Authority Environmental Health Assessment Program's (EHAP) priority is to ensure that the community around a site with potential environmental exposures has the best information possible to protect its health.

In 2015, the United States Forest Service (USFS) analyzed moss samples collected around the city of Portland for concentrations of heavy metals. USFS found the highest concentrations of nickel in moss samples collected near the Precision Castparts Large Parts Campus at 4600 SE Harney Drive in Portland, Oregon.

Precision Castparts Corporation (PCC) is a large manufacturer of precision metal castings (known as “investment castings”), forged products and airframe parts based in Portland. PCC is in a mixed commercial, industrial and residential area. It sits on the border of Multnomah and Clackamas counties. The Oregon Department of Environmental Quality collected data on levels of metals and other contaminants in air, water, soil, sediment and crayfish tissue in the area around PCC.

A community group asked EHAP to perform this public health assessment (PHA) to evaluate the potential public health risks of contaminants detected near PCC. A PHA reviews available information about hazardous substances at a site and evaluates whether exposure to them might cause harm to people. PHAs do not determine whether specific environmental exposures caused existing health issues in people.

Limitations of the PHA include the lack of historical sampling data, uncertainties around how well the available monitoring data represent typical ongoing exposures, the inability to differentiate between PCC emissions and emissions from other sources, and uncertainties about potential effects on sensitive populations.

Conclusions

Based on currently available science, monitoring data and guidance from federal agencies, EHAP reached six conclusions about the Precisions Castparts site:

Conclusion 1

Measured concentrations of metals in air near PCC are not likely to harm health.

Cumulative exposure to all metals detected in the air around PCC may be predicted to elevate lifetime cancer risk by as many as 20 additional cases of cancer per 1 million people exposed continuously for a lifetime. EHAP considers this to be very low risk. The estimated cancer risk is similar for current conditions and for conditions prior to HEPA filter installation. These risk calculations are based on the cautious assumption that nickel detected in air monitoring is in its most toxic form. It is likely that nickel emissions from PCC are in an alloy form that may be less available to the body and, therefore, less carcinogenic.

Conclusion 2

Measured concentrations of metals in soil from areas around the PCC facility are not likely to harm health.

DEQ sampled soil near the facility, including locations near residences and in community gardens. No soil concentrations exceeded comparison values.

Conclusion 3

Measured concentrations of chemicals in surface water of Johnson Creek are not likely to harm health.

The levels of chemicals detected in surface water are below health-based comparison values designed to be protective of drinking water. TCE was detected at a level slightly above the cancer CV in one sample in 2009 but was not detected in subsequent samples. Johnson Creek, like many urban streams, has had high levels of bacteria that can make people sick. While bacteria in Johnson Creek is not a focus of this PHA and is not believed to be related to PCC, it has the potential to affect public health.

Conclusion 4

Measured concentrations of PCBs and PAHs in Johnson Creek's sediment near the storm water outfall are not likely to harm the health of people who regularly come in contact with it.

Weekly year-round exposure to sediment is not high enough to harm health. While extremely frequent (daily year-round) contact with Johnson Creek sediment could result in a slight increased risk of both non-cancer and cancer health effects, the likelihood of this degree of contact is quite low. Risk calculations were based on cumulative exposure to maximum concentrations of all PCBs, PAHs and metals of potential concern detected in the creek. Each exposure was assumed to involve full contact of hands, forearms, feet and lower legs with sediment. The biggest health risk from this degree of contact with the creek is the potential for bacterial infections.

Conclusion 5

Residents may safely eat crayfish from Johnson Creek in moderation.

Based on cumulative risk from metals and PCBs, residents can eat up to five meals of Johnson Creek crayfish each month without exceeding health-protective exposure guidelines.

Conclusion 6

There is not enough known about past air emissions from PCC to calculate past health risks before 2016.

No historical monitoring data are available to support a quantitative evaluation of potential health effects of previous exposures. Based on historical trends in emissions reported by PCC to EPA's Toxic Release Inventory, we cannot rule out the possibility that past air concentrations could have been high enough to harm health. Emissions reported to TRI since 1987 indicate that emissions of some chemicals may have been 10 and 100 times higher than current emissions during some periods of PCC's past operations. Historical emissions of trichloroethylene and tetrachloroethylene would have also contributed to past risks of cancer and developmental defects.

For more information

If you have questions about this report, you can contact EHAP by calling 971-673-0977 or toll free 1-877-290-6767 or by emailing ehap.info@state.or.us.

Abbreviations and acronyms

As	arsenic
ATSDR*	Agency for Toxic Substances and Disease Registry
BW	body weight
CAC	community advisory committee
Cd	cadmium
CDC	Centers for Disease Control and Prevention
COC	contaminant of concern
Cr	chromium
Cr6+	hexavalent chromium
CREG	cancer risk guide
CSF	cancer slope factor
CTE	central tendency exposure
CV*	comparison value
DEQ	Oregon Department of Environmental Quality
ED	exposure duration
EHAP	Oregon Environmental Health Assessment Program
EJ	environmental justice
EMEG*	environmental media evaluation guide
EPA*	US Environmental Protection Agency
CALEPA	California Environmental Protection Agency
HEPA	high-efficiency particulate air
HQ	hazard quotient
HVOC	halogenated volatile organic compound
IARC	International Agency for Research on Cancer
IR*	ingestion rate
IRIS	Integrated Risk Information System
IUR	inhalation unit risk

* Abbreviations with an asterisk are defined in the glossary (Appendix H).

LOAEL	lowest observed adverse effect level
MCL	maximum contaminant level
mg/kg*	milligrams per kilogram
MRL	minimal risk level
Ni	nickel
ND	not detected
ng/m ³	nanograms per cubic meter
NOAEL*	no observed adverse effect level
NPDES	National Pollutant Discharge Elimination System
OHA	Oregon Health Authority
OSHA	Occupational Safety and Health Administration
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PCC	Precision Castparts Corp.
PCE	perchloroethylene
PHA*	public health assessment
ppb	parts-per-billion
ppm	parts-per-million
REL	recommended exposure level
RfC	reference concentration
RfD*	reference dose
RME	reasonable maximum exposure
RSL	regional screening level
SPAQ	South Portland Air Quality
TCE	trichloroethylene
TRI	Toxics Release Inventory
UCL	upper confidence limit
USFS	United States Forest Service
µg/L	microgram per liter
VOC	volatile organic compound

* Abbreviations with an asterisk are defined in the glossary (Appendix H).

Purpose

This public health assessment (PHA) was prepared in response to a request by a neighborhood advocacy group, the South Portland Air Quality (SPAQ), on June 3, 2016. This PHA addresses the potential public health effects of contaminants detected around the Precision Castparts Corp. Large Parts Campus straddling the border between Portland, Oregon, and Milwaukie, Oregon, in Multnomah and Clackamas counties, respectively. The assessment was informed by input from a community advisory committee and focuses on the potential health effects for residents of the nearby Portland neighborhoods of Brentwood-Darlington, Woodstock and Eastmoreland, and the Milwaukie neighborhoods of Lewelling and Ardenwald.

Background

Site description

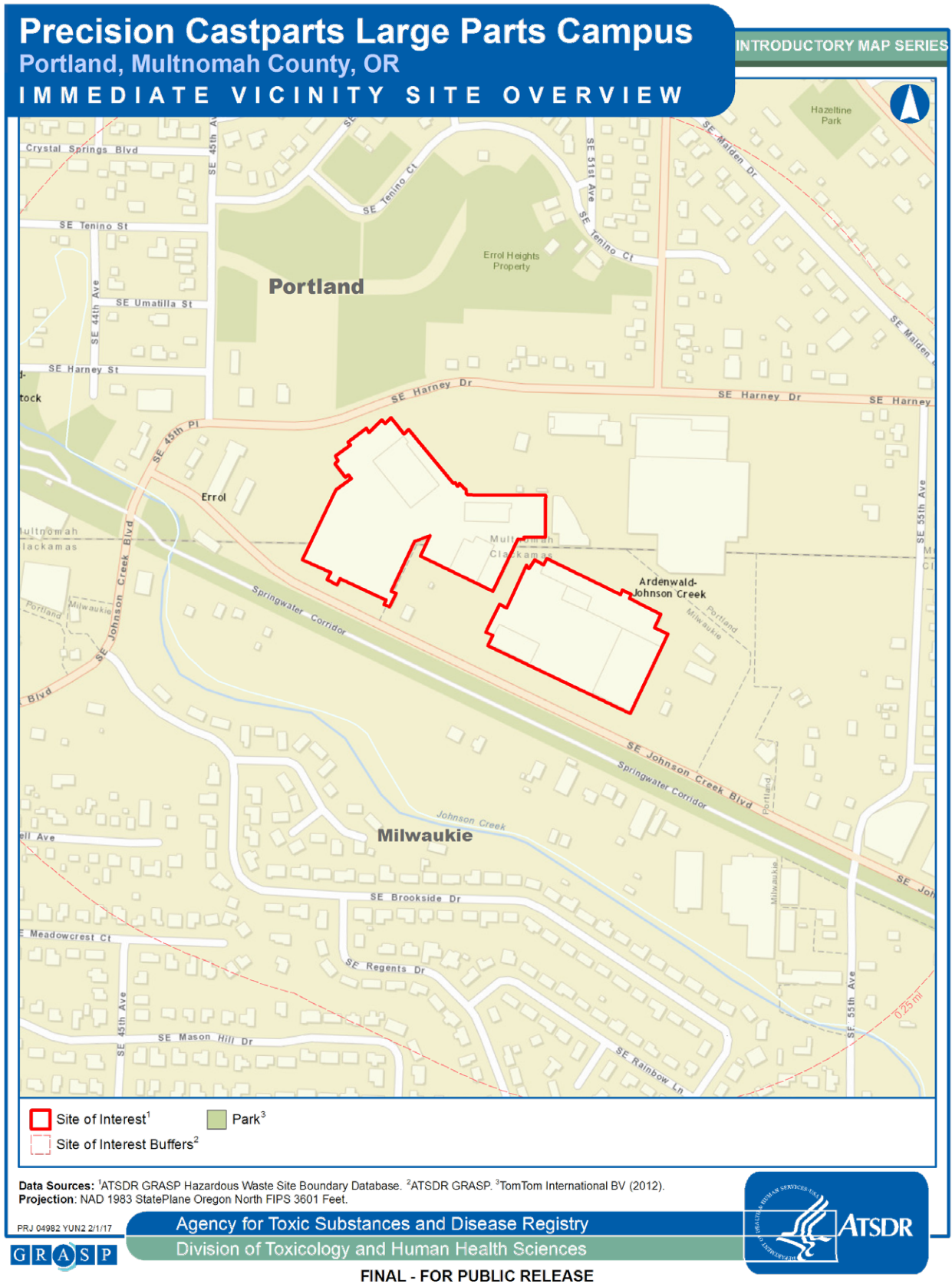
Precision Castparts Corporation (PCC) is a large manufacturer of precision metal castings (known as “investment castings”), forged products and airframe parts based in Portland, Oregon. It ranked 282 on the Fortune 500 list in 2016 (1) and has 162 plants worldwide with multiple manufacturing locations in Oregon (2). PCC is a subsidiary of Berkshire Hathaway (3).

The focus of this public health assessment (PHA) is the PCC Structural Large Parts Campus located at 4600 SE Harney Drive in Portland, Oregon. The Large Parts Campus (referred to as ‘PCC’ throughout this document) is PCC’s original manufacturing site. At this location, PCC uses investment casting to manufacture parts for a wide range of applications, including aircraft engines, airframes, gas turbines, military armaments and medical devices. The campus houses a stainless-steel casting foundry that uses nickel and cobalt-based alloys and a titanium casting foundry that uses titanium alloys.

PCC is in a mixed commercial, industrial and residential area (Figure 1). It sits on the border of Multnomah and Clackamas counties, with addresses of different buildings on site in both counties. Several small businesses and industrial sites, private residences, Errol Heights City Park, the multi-use Springwater Corridor trail, and Johnson Creek surround the facility. All storm water that falls on the PCC campus is collected in the onsite conveyance system and is treated by a storm water treatment facility that PCC installed in 2016. The treated storm water discharges to a city storm water pipe that drains into a U-shaped bend in Johnson Creek, northwest of the facility. PCC is also near Milwaukie’s drinking water aquifer.

PCC began operation at this site in 1957. In addition to PCC, other industrial facilities have operated at this location. The building that currently houses PCC’s titanium operations was originally constructed in 1950 for the Oregon Saw Chain Corporation (the original parent company of PCC). In the 1970s the building was used by Code-A-Phone, an electronic communications equipment manufacturer (4).

Figure 1. Area map of the PCC Large Parts Campus and its surroundings



Environmental permits at PCC

PCC operates under several environmental permits that limit emissions allowed from the facility. An Air Contaminant Discharge Permit (ACDP) (5) administered by Oregon Department of Environmental Quality (DEQ) sets PCC's allowable air emissions rates. A National Pollutant Discharge Elimination System (NPDES) permit for storm water discharge, administered by Portland, regulates how the facility directs storm water that falls on facility grounds. As a hazardous waste generator, PCC is also subject to inspections from the Environmental Protection Agency (EPA) and DEQ for hazardous waste treatment, storage and disposal. The DEQ website provides a history of permitting, inspections, penalties and cleanup activities (6). Worker health and safety at the facility is regulated by the federal Occupational Safety and Health Administration (OSHA) in coordination with Oregon OSHA. Records of state and federal OSHA activity at PCC are available online (7).

PCC's ACDP sets a limit on emissions allowed from the facility. The permit requires PCC to report estimates of certain air emissions and perform emissions monitoring. Under this permit, PCC reports air emissions of hazardous air pollutants (including but not limited to nickel, chromium, cobalt, hydrogen chloride, hydrogen fluoride, hexane, lead and manganese) emitted during each 12-month period. As of DEQ's review in 2016, PCC was operating in compliance with the conditions of its permit. However, the most recent EPA National Air Toxics Assessment identified the PCC Large Parts Campus among the facilities in the Portland region with the highest potential to contribute to cancer risk through its air emissions (8). As of the date of this PHA, DEQ is actively working to review PCC's ACDP.

Several additional contaminants — including perchloroethylene (PCE), trichloroethylene (TCE), polychlorinated biphenyls (PCBs) and trace levels of radioactive thorium (9) — were used at the site historically but have since been phased out. While PCC no longer reports use of these chemicals, some have remained in the surrounding environment. Recent monitoring (2009–2015) detected TCE and PCE in groundwater beneath the site and PCBs in solids accumulated in storm water catch basins on site and in Johnson Creek sediment. DEQ's cleanup program initially included thorium, a naturally occurring radioactive substance, among chemicals included in monitoring at the site. Analyses for thorium were discontinued after determining the environmental levels were consistent with naturally occurring background levels. Thorium on site remains regulated by the Oregon Health Authority, under Radioactive Material License No. ORE-90354 (currently Amendment 54, with expiration date April 30, 2022). The license is for natural thorium and is for “possession only of residual contamination in, on, and under facilities, equipment, and surfaces.”

Cleanup activities at PCC

In 2008, PCC entered into a voluntary cleanup agreement with DEQ (10). Under this agreement PCC completed extensive soil, storm water, Johnson Creek sediment and groundwater monitoring. PCC recently took several steps to reduce pollution from the facility. In May 2016, PCC added high efficiency particulate air (HEPA) filters to control air emissions from several emissions stacks. PCC also installed a new storm water filtration system to remove metals and PCBs from storm water. In addition, PCC cleaned both the onsite storm water conveyance system and the city storm water lines to the discharge point at Johnson Creek to remove any remaining chemicals that might contribute to ongoing contamination. During 2018, PCC is undertaking soil removal actions and operational facility upgrades and maintenance that will help reduce and control potential pollutant discharges to the onsite storm water conveyance system. DEQ expects to complete its overall site investigation documentation in 2019. The site investigation documentation will comprehensively describe conditions on site and next steps to complete DEQ's regulatory oversight of cleanup activities.

Air toxics concerns in Portland

Some of the recent interest in metal emissions from PCC originated from broader agency efforts to better characterize air pollution sources throughout Portland. In 2009, DEQ developed an air pollution model to predict concentrations of air pollutants at different locations around the city (11). DEQ based the model on several sources of data, including air emissions reported by permitted industrial facilities. DEQ performed air monitoring to evaluate the model. While the model performed well in predicting concentrations of many air pollutants, it underestimated cadmium concentrations. This inconsistency between modeled concentrations and measured air concentrations indicated there were unidentified sources of cadmium emissions in the Portland metropolitan area.

To locate unidentified sources of air toxics in Portland, the US Forest Service and DEQ collaborated in an experimental effort to measure heavy metals in tree moss samples collected throughout the city (12). Moss growing in trees is thought to be a promising indicator of potential air pollution because without contact with soil, contact with air contaminants is the only source of moss exposure to pollution. The moss study identified several locations where metal concentrations in moss were elevated relative to the other locations in Portland (13) (14). These moss study results identified previously unregulated sources of air toxics and ultimately led the Governor to initiate an overhaul of Oregon's industrial air toxics rules (15).

The moss study results brought public attention to elevated concentrations of several metals, including nickel, cobalt, chromium and arsenic in moss samples collected from neighborhoods around PCC. In response, DEQ performed air monitoring (16) to better characterize air pollution around the facility. The study also raised community concerns about potential for metals from air emissions to deposit in soil in nearby neighborhoods' soil. DEQ performed extensive soil sampling to evaluate metal concentrations in soil near PCC (17).

History of community concerns

Community members raised concerns about PCC air emissions prior to 2016. In 2011 a power failure at PCC resulted in the release of a large orange plume of nitrogen oxide from the facility. In response to this emergency, the fire department advised neighbors within a half mile of the facility to stay indoors. Local schools were cancelled for a day to avoid exposure. While PCC has taken steps to avoid similar events in the future, the incident contributed to community concerns around the safety of PCC's operations. In 2013, *The Oregonian* (18) reported PCC topped a "Toxic 100 Air Polluters Index" produced by the University of Massachusetts (19), prompting neighborhood association and other community calls for the company to move or reduce emissions. After the early 2016 revelations about metals in moss near PCC, in July 2016, six residents of SE Portland filed two separate class-action lawsuits against PCC, stating that toxic air emissions from the PCC facility have harmed their health and affected property values. A new neighborhood advocacy group that formed in 2016, the South Portland Air Quality (SPAQ), has focused on air quality concerns related to PCC. Community meetings on PCC were well attended by SPAQ members, PCC workers, residents, neighbors, gardeners, parents and Springwater Corridor path users. They all voiced concerns about short-term and long-term health effects of facility emissions to air, land and water. In June 2016 SPAQ asked OHA to prepare a public health assessment of PCC emissions.

Potentially affected communities

Residences. PCC is located near several residential neighborhoods, including Brentwood-Darlington, Woodstock and Eastmoreland in Portland (Multnomah County), and Lewelling and Ardenwald in Milwaukie (Clackamas County). The 2010 census reported 2,144 homes and 5,167 residents within one-half mile of the PCC campus (Appendix A).

Small businesses. Immediately neighboring PCC are several small businesses. These firms' employees breathe air near PCC throughout the work day. Businesses at the corner of SE 45th Avenue and SE Harney Drive include a maid service, an equipment rental supplier, restaurants, a carwash, a bakery outlet and a coffee shop with a walk-up window.

Recreation. There are several recreational sites neighboring PCC where people may be exposed to any contaminants present in air, water or soil.

- Errol Heights City Park is north of the facility across Harney Drive (Figure 1). The park is more than 14 acres and contains unpaved walking paths. The Errol Heights Community Garden at the north end of the park holds 28 garden plots (20). Park users may be exposed to air emissions near PCC. Ongoing restoration and park improvement efforts (21) may put workers and volunteers in direct contact with soil in the park and sediment in Errol Creek and associated wetlands. In December 2016, the Portland Parks commissioner announced \$5.3 million of funding to support additional park improvement efforts (22) that may temporarily result in additional work crew exposure to local air and soil, and potentially increased park use subsequent to construction.

- Johnson Creek flows along the southern border of the facility (Figure 1). An oxbow in the creek winds northwest of the facility and is the location of the city storm water outfall that releases storm water from PCC. Residents report wading, swimming and collecting crayfish in various spots along the creek. This oxbow is the subject of substantial habitat restoration and erosion control work completed by Portland, which owns the property, during July and August 2018. This work changed the sediment, gravel and cobble surface of the stream bed and added woody debris to the stream to reduce winter water velocities and provide improved fish habitat. A consortium of state and federal agencies with jurisdiction, in consultation with DEQ, required and approved the city work.
- The Springwater Corridor Trail is a multi-use trail that runs along the southern border of the PCC campus (Figure 1). Residents and visitors who frequently bicycle, walk and run along the trail may have higher exposure to air emissions as they breathe more heavily during exercise.

Schools and child care facilities. There are no schools immediately neighboring the PCC campus. One daycare is located just under one-half mile away from PCC. There are five other childcare facilities and six schools within one mile of the facility (Appendix A). Small, informal childcare operations, not registered as business operations, may also be present. Depending on the distance traveled by emissions from PCC, children attending these schools and daycare facilities may have some exposure.

Demographics

The communities neighboring PCC are similar to many communities in Oregon in terms of racial, ethnic and economic makeup. The 2010 census counted 5,167 people living within one-half mile of the facility. Among those, 87% were white. The Hispanic or Latino population more than doubled between 2000 and 2010 and makes up 7.8% of the total population. The median household income (\$55,284) is roughly the same as the median income across Portland as a whole (\$55,003).

Environmental justice

Low-income communities and communities of color often face disproportionately high levels of exposure to pollution where they live and work (23). These same communities may also be more susceptible to the health effects of environmental exposures (24) (25) due to social stressors, lack of access to health care, nutritional factors and other conditions in which people are born, grow, live, work and age (26). Limited time and resources and language barriers prevent some communities from becoming meaningfully involved in environmental decisions. To highlight potential environmental justice concerns, EHAP identifies groups that may be more exposed or more susceptible to disease, or face barriers to participation in public decision-making processes.

There are some groups and individuals in the community around PCC who may be sensitive to the health effects of pollution due to economic and psychosocial factors (e.g., stress), age and preexisting health conditions, such as asthma. Data from EPA's EJScreen tool (27) indicate people living within one-half mile of PCC have a greater risk of exposure to various environmental risk factors (e.g., exposure to fine particulate matter and ozone) when compared to the state average. Data from the American Community Survey also show a slightly higher than average percentage of children under 5 (7%), and adults 65 years and older (14%) residing in the surrounding neighborhood, compared to the Portland metro area. Other environmental justice demographic indicator values are below Portland metro area and state averages.

Exposure and health analysis

Data sources

This section describes the data EHAP considered in evaluating whether people's health may be harmed by chemical contaminants detected around PCC. All environmental sampling data used for health effects evaluation in this PHA were obtained using EPA-approved methods and technology by certified professionals and technicians. Some supporting data described below helped define the extent of potential contamination and provide additional context but could not be used for quantifying potential health effects.

Data used for health effects evaluation

Air monitoring (performed by DEQ)

DEQ performed air monitoring at three locations (Appendix B) surrounding the PCC facility from March 30, 2016, through October 2016 (28). This monitoring effort captures one month of monitoring data prior to PCC's installation of additional pollution controls and more than six months of data collected under current conditions. All three monitors measured heavy metal concentrations at 24-hour intervals through October 2016. In addition to metals, one of the three monitors measured volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs) and other air toxics. This full spectrum monitor operated for a year, through May 2017 (16). A nearby meteorological station collected data on wind speed and direction throughout the monitoring period.

Soil monitoring (performed by DEQ)

DEQ tested soil for metals at several locations within one mile of the PCC facility in June 2016 (17). DEQ used incremental sampling methods in which multiple samples were analyzed from a single site. This approach ensures that results accurately reflect average concentrations at sites of interest.

Johnson Creek sediment and surface water monitoring (performed by Landau Associates on behalf of PCC)

Since 2009, Landau Associates has monitored Johnson Creek surface water and Johnson Creek sediment samples both upstream and downstream of the city storm water outfall used by PCC. Between 2009 and 2015, Landau Associates collected individual samples at numerous locations in the oxbow portion of Johnson Creek. During this time, surface water and sediment monitoring collected data on a diverse range of chemicals, including

metals, PCBs, PAHs and VOCs. In 2017, additional sampling was performed using an incremental sampling method in which numerous samples taken from an area are combined to determine average concentrations of metals and PCBs in sediment in that area.

Johnson Creek sediment and crayfish monitoring (performed by DEQ)

As part of its statewide toxics monitoring program in 2016, DEQ tested sediment in Johnson Creek both upstream and downstream from the city storm water outfall used by PCC. A composite sediment sample, in which multiple sediment samples were combined for analysis, was tested for metals and PCBs. In addition, a composite sample of eight crayfish collected downstream of the storm water outfall was tested for metals (29).

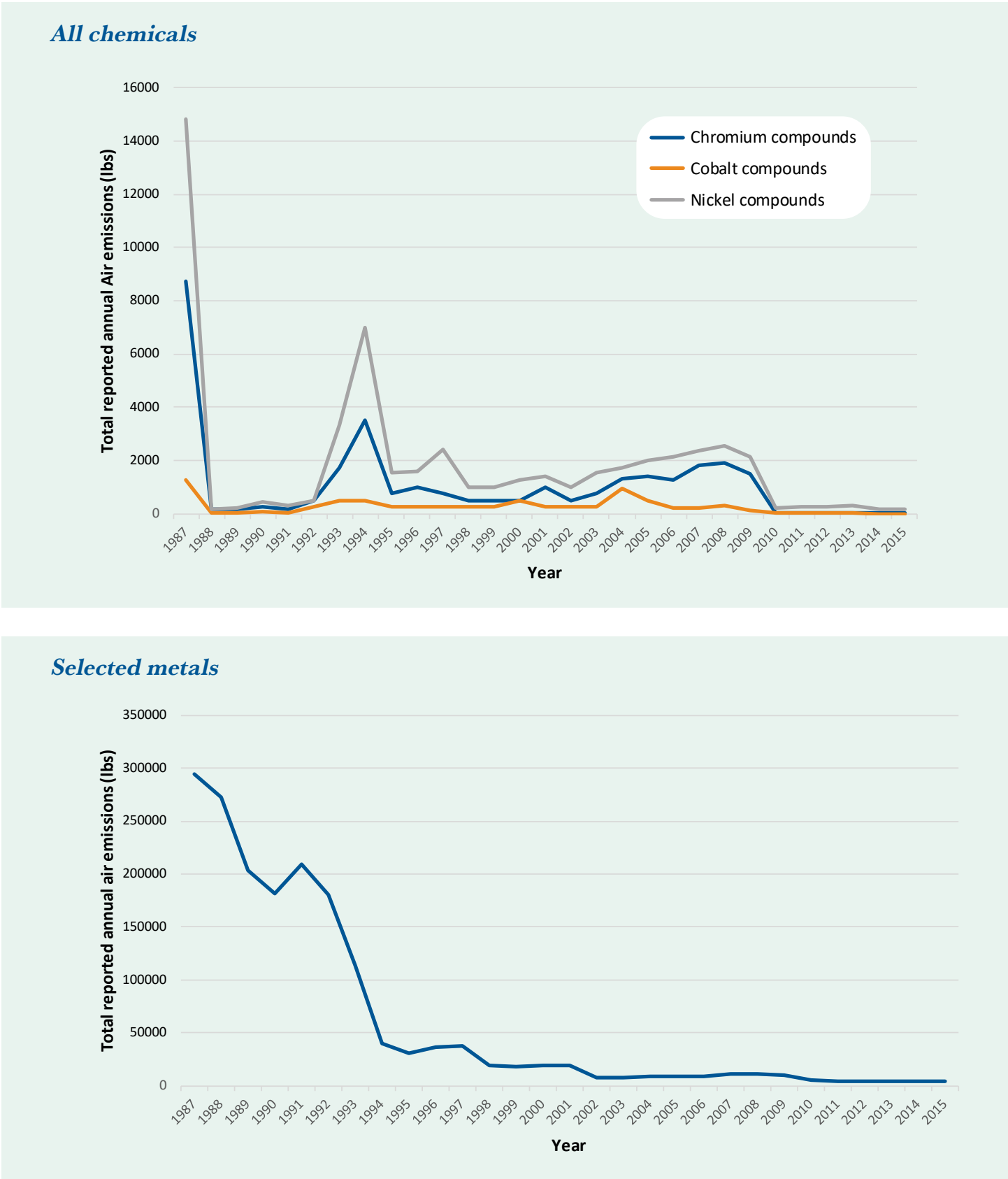
Supporting data (these data are referenced, but not used as the basis for any risk calculations)

Air emissions reported to the Toxics Release Inventory (submitted by PCC to EPA)

The PCC Large Parts Campus has reported its estimated annual air emissions to EPA's Toxics Release Inventory (TRI) annually since the program began in 1987 (30). The historical emissions trends captured in TRI provide qualitative information about potential historical exposures. PCC emissions reported to TRI indicate that overall air emissions have decreased substantially since 1987 (Figure 2A). In 2015, PCC reported air emissions of aluminum, chromium, cobalt, copper, hydrogen fluoride, nickel and nitric acid. Total reported air releases of nickel, chromium and cobalt compounds have decreased substantially over time (Figure 2B). Trichloroethylene and tetrachloroethylene air emissions were reported historically but were phased out in the early 1990s.

There is uncertainty around emissions reported to TRI. Emissions are estimated based on chemical use and are not confirmed by monitoring data. The methods used to estimate emissions have not been consistent across time, so some changes in emissions reported to TRI simply reflect changes in record keeping. Furthermore, there may be incentive to overestimate reported emissions when those reported emissions are also used to determine emissions limits enforced in permits. Because of these uncertainties, data must be interpreted with caution. TRI data were not used as the basis for risk calculations in this PHA. Additional discussion of appropriate interpretation of TRI data is available on the EPA website (31).

Figure 2. Total estimated air emissions (stack and fugitive emissions of all chemicals) reported to TRI by PCC for all chemicals and for selected metals over time



Metals detected in moss (performed by USFS in collaboration with DEQ)

The US Forest Service (USFS) measured concentrations of heavy metals in moss collected throughout Portland in October 2015 (12). There were no sampling locations neighboring PCC, but moss sampling sites closest to the facility had the highest nickel concentrations in the city (Appendix C). While moss data were useful in identifying areas in need of further air monitoring, the relationship between metal concentrations detected in moss and concentrations detected in air is not understood. Moss data provided an indication of elevated air concentrations but required confirmation from air monitoring.

PCC storm water (performed by both Landau Associates and the city of Portland)

Landau Associates, Inc. as well as Portland have directly monitored storm water from the city storm water pipe used by PCC. Past storm water data provide evidence that PCBs may have entered the creek from the storm water outflow. Since installation of its new storm water treatment system, PCC has analyzed storm water samples collected after treatment but prior to entering the city pipes. According to results submitted by PCC to the city of Portland, under the DEQ issued National Pollution Discharge Elimination (NPDES) permit, no PCBs or PAHs were present at detectable levels in treated storm water samples in 2016 or 2017. While storm water data provide some information about the extent to which storm water from PCC may have increased contamination in Johnson Creek, there is no direct human contact with the storm water itself. Johnson Creek surface water and sediment monitoring data are the focus in this PHA because they represent the potential points of human exposure.

Exposure pathways

For a chemical contaminant to harm human health, there must be a way for people to come into contact with the chemical. An “exposure pathway” describes how a chemical moves from its source and comes into physical contact with people. An exposure pathway has five elements:

- A contaminant source or release
- A way for the chemical to move through the environment to a place where people could come into contact with it
- A place where people could contact the contaminant
- A route of exposure to a contaminant (breathing it, swallowing it, absorbing it through skin, etc.)
- A population that comes in contact with the contaminant

An exposure pathway is considered “completed” if all five of the elements are known to be in place and occurring. If one or more of the elements is unknown, then the exposure pathway is considered a “potential” pathway. If it is known that one of the five elements does not occur, that pathway is “eliminated.”

With input from the community advisory committee, EHAP identified four complete exposure pathways (Table 1) and several potential and eliminated pathways (Table 2 and Table 3). In this PHA, we considered potential health effects of contact with chemicals through completed and potential exposure pathways. Eliminated exposure pathways are not evaluated for health effects because no exposure is occurring.

Table 1. Completed exposure pathways

Environmental media	Contaminants measured	Potential source of exposure	Potential point of exposure	Exposure route	Potential exposure population	Notes
COMPLETE EXPOSURE PATHWAYS						
AIR	Metals, historical VOC emissions	Air releases from PCC and neighboring sources	Air at nearby households, workplaces, schools, daycare facilities, etc.	Breathing the air	Adults and children living, working and going to school nearby	DEQ air monitoring at three locations around the facility captures one month prior to and > six months following installation of new pollution controls. There is no historical air monitoring data on emissions of metals and TCE.
SOIL	Metals, PCBs, halogenated and non-halogenated VOCs	Soil deposition of air emissions from the facility and direct releases to soil onsite	Soil in yards, residential and community gardens, nature parks (e.g., Errol Heights Nature Park), playgrounds, schoolyards, and construction sites and road paving sites near the PCC facility	Ingestion of soil and produce grown in soil, skin contact with soil, dust inhalation	Adults and children living, playing and gardening nearby; outdoor work/volunteer crews	DEQ has measured metals in soil offsite to determine how air emissions may have affected soil. PCC has monitored onsite soil for PCBs and VOCs to determine occupational risks of onsite exposures to excavation workers. Recently announced nature park restoration efforts raised concerns about exposures during the restoration and tree planting efforts.
SURFACE WATER (Johnson Creek near the storm water outflow)	Metals and solvents; solvents include PCE and TCE	PCC storm water outflow and other upstream sources	Surface water from Johnson Creek downstream from storm water outfall	Ingestion of water and skin contact with water	Adults and children in contact with Johnson Creek for recreation and restoration efforts	Community members report that people come into contact with Johnson Creek water and sediment (wading, fishing, garden irrigation, etc.).
SEDIMENT (Johnson Creek)	PCBs, PAHs, metals	PCC storm water run-off and storm water outfall into Johnson Creek. Runoff from streets to city conveyance	Sediment in creek, at or downstream from the PCC outfall, or places downstream (where sediment has been transported)	Ingestion of sediment and skin contact with sediment	Adults and children in contact with Johnson Creek for recreation and restoration	Community members report that people come into contact with Johnson Creek water and sediment (wading, fishing, etc.).

Table 2. Potential exposure pathways

Environmental media	Contaminants measured	Potential source	Potential point of exposure	Exposure route	Population	Notes
POTENTIAL EXPOSURE PATHWAYS						
INDOOR AIR	Metals	Air releases from PCC and neighboring sources that enter homes and nearby businesses	Air and dust inside nearby households, workplaces, schools, daycare facilities, etc. (Indoor air has not been tested.)	Breathing the air and dust	Adults and children living, working and going to school nearby	There is no monitoring data available for indoor air near PCC. We do not know the extent to which outdoor emissions travelled indoors. Risk calculations in this health assessment assume that people living nearby were exposed to concentrations measured outdoors continuously.
AIR	Metals	Air releases from PCC and neighboring sources that enter homes and nearby businesses	Air at nearby households, workplaces, schools, daycare facilities, etc.	Skin contact with air and dust (Degree of exposure through skin is unknown.)	Adults and children living, working and going to school nearby	The degree of exposure to metals in air through skin is unknown and the potential health effects of exposure through skin are generally not well known.
SOIL	Metals	Soil deposition of air emissions from the facility and direct releases to soil onsite	Locally grown produce	Ingestion of water and skin contact with water	Adults and children in contact with Johnson Creek for recreation and restoration efforts	Community members report that people come into contact with Johnson Creek water and sediment (wading, fishing, garden irrigation, etc.).

Table 3. Eliminated exposure pathways

Environmental media	Contaminants measured	Potential source	Potential point of exposure	Exposure route	Population	Notes
ELIMINATED EXPOSURE PATHWAYS						
AIR (vapor intrusion)	Halogenated VOCs, including TCE and PCE	Ground water (migration to soil) or soil (migration from particles into soil gas)	Indoor air from soil gas migration into nearby household or other building (vapor intrusion)	Breathing the air	Adults and children	DEQ continues to monitor potential for TCE and PCE vapor intrusion through remedial investigation as part of the voluntary cleanup agreement (10). While there is some uncertainty about the potential for migration of soil gas onsite to neighboring properties, DEQ has concluded that the solvent concentrations detected in monitoring wells are below levels that would indicate a concern for vapor intrusion offsite.
GROUND WATER	TCE and PCE	Residential wells and community aquifers (Milwaukie drinking water source)	Tap water (from well or community water source), vapors from a shower or hot water use (from well), indoor air (vapor intrusion) at nearby residence or other building	Ingestion, dermal contact and inhalation	Neighboring adults and children on private wells and Milwaukie residents	TCE has been detected in ground water monitoring wells operated by PCC under the voluntary cleanup agreement with DEQ. DEQ has concluded that the plume is not currently at risk of contaminating nearby registered wells or drinking water. All neighboring residents are on public water systems, though it is conceivable that some residents also use unregistered wells that DEQ and OHA are not aware of existing. Milwaukie monitors treated drinking water annually for 300 chemicals, including TCE and PCE. It is in compliance with state and federal law (32).

Screening: Identifying contaminants of concern

To identify contaminants of concern (COCs) that require further evaluation, maximum chemical concentrations detected in air, soil, water and sediment around PCC were evaluated against health-based comparison values (CVs). CVs are chemical concentrations in air, water or soil at which exposure is not expected to harm health. The Agency for Toxic Substances and Disease Registry (ATSDR) and other federal and state government agencies established CVs through a scientific peer-review process based on the health effects data available for each chemical as well as information about how frequently adults and children come in contact with air, water and soil. For each chemical, there are typically several different types of CVs that provide reference concentrations for cancer risk and non-cancer health risks. Reference concentrations also include long-term (chronic) and short-term (acute) exposures, for children and adults. To the extent possible with existing data, CVs are designed to be protective of sensitive health effects in susceptible individuals with frequent exposure.

EHAP screens environmental monitoring data using CVs developed by several different agencies:

- ATSDR cancer risk reevaluation guides (CREG)
- ATSDR environmental media evaluation guides (EMEG)
- ATSDR reference dose media evaluation guides (RMEG)
- ATSDR minimal risk levels (MRL)
- EPA regional screening levels (RSL)
- California Environmental Protection Agency (CALEPA) reference exposure levels (REL)
- Oregon DEQ ambient benchmark concentrations (ABC) and action levels for drinking water
- EPA maximum contaminant levels (MCL) and action levels for drinking water for drinking water
- EPA National Ambient Air Quality Standards (NAAQS)

When more than one CV is available for a chemical, EHAP selects CVs according to ATSDR's general hierarchy and best professional judgment (Appendix E). For this screening step, EHAP uses CVs intended to be health-protective of frequent long-term exposures for sensitive populations.

A chemical detected at concentrations above a CV does not necessarily mean harmful health effects will occur. Rather, it indicates the need for closer evaluation of potential risks. In this screening step, chemicals present at concentrations above comparison values are identified as COCs for further evaluation in the "Health effects evaluation" section of this PHA. Chemicals at concentrations below comparison values are not likely to cause health effects, and EHAP/ATSDR does not evaluate them further.

Chemicals detected at concentrations exceeding the selected CV were also compared to alternate CVs for short-term (acute) exposures and for other types of health risks (i.e., cancer vs. non-cancer risks) to ensure that all relevant health effects are evaluated.

What is a CV?

Comparison values (CVs) are screening tools to identify contaminants of concern at a site. CVs represent the contaminant levels in air, soil or water that people could be exposed to every day and not experience harmful health effects. CVs are not environmental clean-up levels, and chemicals that exceed their CVs will not necessarily pose health risks.

Contaminants of concern

Chemicals present at concentrations above health-based comparison values in any media were identified as contaminants of concern requiring closer analysis in the "Health effects evaluation" section of this PHA. Health effects that may be associated with each chemical of potential concern and the sources of health-based comparison values used for screening are described in Appendix F. Contaminants of concern in this PHA include:

- Arsenic
- Cadmium
- Hexavalent chromium
- Nickel
- Polychlorinated biphenyls (PCBs)
- Polycyclic aromatic hydrocarbons (PAHs)

Air screening

Arsenic, cadmium, and hexavalent chromium and nickel are identified as contaminants of concern for cancer risk in air emissions and are evaluated in depth in this PHA. Nickel concentrations detected prior to installation of HEPA filters also exceed non-cancer CVs and are, therefore, evaluated for potential effects on non-cancer health risk.

Concentrations of metals in air detected at DEQ's three daily monitors stationed around PCC were compared to health-based comparison values for each of the metals. Monitoring performed prior to installation of HEPA filters on some PCC emissions stacks was evaluated separately to capture higher metals concentrations that may have been present in the absence of the additional pollution controls (Table 4). There was a decreasing trend in nickel and cobalt concentrations detected after HEPA filter installation (Table 5). Average cadmium concentrations were higher in monitoring performed after filter installation, though the significance of and reason for this increase are unknown. Concentrations of other chemicals didn't change significantly.

Before the installation of HEPA filters, maximum nickel, hexavalent chromium and arsenic concentrations were above CVs based on cancer risk (Table 5; more detailed tables in Appendix E). Maximum nickel concentrations also exceeded the ATSDR MRL (90 ng/m³), a non-cancer comparison value derived from effects on respiratory health. Under current conditions, the maximum concentrations of nickel, hexavalent chromium, arsenic and cadmium exceed comparison values based on cancer risk but are below CVs for non-cancer health endpoints (Table 5; more detailed tables in Appendix E).

Table 4. Air concentrations prior to HEPA filter installation (measured by DEQ March 30–May 16, 2016)

Chemical	Average concentration detected ^A ng/m ³	Maximum concentration detected ^B ng/m ³	Comparison value ng/m ³	Comparison value source (sensitive health endpoint)	Chemical of potential concern?
Arsenic	0.876	5.03	0.23	ATSDR CREG (cancer)	yes
Beryllium	0.007	0.018	0.42	ATSDR CREG (cancer)	no
Cadmium	0.166	0.45	0.56	ATSDR CREG (cancer)	no
Chromium	42.025	60.3	<i>See hexavalent chromium</i>		
Cobalt	3.353	36.3	100	ATSDR chronic MRL (respiratory function)	no
Hexavalent chromium	0.306	1.16	0.052	ATSDR CREG (cancer)	yes
Lead	2.260	5.39	150	Oregon ambient benchmark concentration/NAAQS (brain development)	no
Manganese	9.564	31.6	300	ATSDR chronic MRL (neurological function)	no
Nickel^C	22.279	131	4	EPA Residential RSL (cancer)	yes
Selenium	0.742	1.12	20,000	EPA RSL (selenosis)	no

Contaminants of concern (detected at concentrations exceeding the comparison value) are highlighted in grey.

^a Highest of average concentrations detected at each of the three monitors

^b Maximum concentration detected at any of the three monitors

^c The maximum nickel concentration also exceeds non-cancer comparison values (ATSDR MRL =90ng/m³) based on risk of respiratory effects from chronic exposure.

Table 5. Air concentrations under current conditions (measured by DEQ after installation of HEPA filters; May 17, 2016–Jan. 22, 2017)

Chemical	Average concentration detected ^A ng/m ³	Maximum concentration detected ^B ng/m ³	Comparison value ng/m ³	Comparison value source (sensitive health endpoint)	Chemical of potential concern?
Arsenic	0.663	5.48	0.23	ATSDR CREG (cancer)	yes
Beryllium	0.006	0.018	0.42	ATSDR CREG (cancer)	no
Cadmium	0.683	9.19	0.56	ATSDR CREG (cancer)	no
Chromium	33.554	63.2	<i>See hexavalent chromium</i>		
Cobalt	1.181	13.1	100	ATSDR chronic MRL (respiratory function)	no
Hexavalent chromium	0.330	1.7	0.052	ATSDR CREG (cancer)	yes
Lead	1.877	8.65	150	Oregon ambient benchmark concentration/NAAQS (brain development)	no
Manganese	8.807	39.1	300	ATSDR chronic MRL (neurological function)	no
Nickel	9.502	51	4	EPA Residential RSL (cancer)	yes
Selenium	0.729	3.56	20,000	EPA RSL (selenosis)	no

Contaminants of concern (detected at concentrations exceeding the comparison value) are highlighted in grey.

^a Highest of average concentrations detected at each of the three monitors

^b Maximum concentration detected at any of the three monitors

Soil screening

No metals exceed ATSDR health guidelines for soil. Therefore, no further analysis is performed on health risks from contact with soil.

The highest metal concentrations detected in DEQ soil samples were compared to health-based CVs for soil. DEQ detected low concentrations of several metals in soil sampling performed near PCC, but none exceeded health-based CVs recommended for use by ATSDR (Table 6). The ATSDR cancer risk guide (CREG) for arsenic is a very conservative (health-protective) value that is below natural background concentrations of arsenic found in soil across the country. For that reason, ATSDR recommends using the environmental media evaluation guide (EMEG) based on chronic child exposures as a comparison value for public health assessment. While arsenic detected in soil near PCC is above ATSDR's CREG for lifetime cancer risk, it is still below ATSDR's recommended EMEG comparison value and within natural background levels typical of Oregon (Table 6).

There is no comparison value available for total chromium in soil. For screening in this PHA, total chromium concentrations were compared to CVs for trivalent chromium. In the absence of independent monitoring for hexavalent chromium, EHAP estimated hexavalent chromium concentrations by multiplying concentrations of total chromium detected in soil near PCC

by 2.2%, the proportion of chromium that EPA and ATSDR estimate will be emitted in the hexavalent format specialty/steel production facilities (33). This EPA estimate is consistent with the air monitoring data near PCC, where average concentrations of measured hexavalent chromium are approximately 1% of average total measured chromium concentrations (Table 4 and Table 5). Using this approach, neither form of chromium exceeded its corresponding comparison value for soil. It should be noted that the hexavalent chromium analyses performed by DEQ did not detect any hexavalent chromium in soil. Therefore, the estimates of 2.2 % may be conservative.

In the absence of a CV for titanium in soil, we used a CV for the more toxic titanium tetrachloride for screening. Maximum concentrations of titanium detected in soil near PCC are below this CV.

Table 6. Soil concentrations (measured by DEQ in June 2016)

Chemical	Average concentration mg/kg (ppm)	Maximum concentration mg/kg (ppm)	Comparison value mg/kg (ppm)	Comparison value source (sensitive health endpoint)	Chemical of potential concern?
Arsenic	4.76	10.9	17	ATSDR chronic child EMEG and RMEG (dermal effects)	no
Beryllium	0.54	0.662	110	ATSDR chronic child EMEG and RMEG (gastrointestinal effects)	no
Cadmium	0.28	0.82	5.7	ATSDR chronic child EMEG (kidney function)	no
Chromium total	53.4	239	86,000	ATSDR child chronic RMEG for trivalent chromium	no
Chromium, hexavalent^A	1.17	5.26	51	ATSDR chronic child EMEG (intestinal effects)	no
Cobalt	20.17	81	570	ATSDR intermediate child EMEG (blood effects)	no
Iron	27,736.7	36,600	55,000	EPA residential RSL (gastrointestinal effects)	no
Lead	34.17	91.8	400	EPA residential RSL standard for bare soil in children's play areas (brain development)	no
Manganese	706.7	1,030	2,900	ATSDR chronic child RMEG (neurological function)	no
Nickel	123.4	776	1,100	ATSDR chronic child RMEG (decreased body weight)	no
Selenium	0.171	0.36	290	ATSDR chronic child EMEG and RMEG (selenosis)	no
Titanium	1,795	2,680	140,000	EPA residential RSL for titanium tetrachloride; no CVs are available for titanium alone	no
Zinc	100	213	17,000	ATSDR chronic child EMEG (copper deficiency)	no

Contaminants of concern (detected at concentrations exceeding the comparison value) are highlighted in grey.

^A Estimated by adjusting average and maximum concentrations of total chromium in soil with EPA's estimate that 2.2% of total chromium will be in the hexavalent form (33)

Johnson Creek surface water screening

Trichloroethylene (TCE) was the only chemical detected in Johnson Creek surface water above health-based comparison values for drinking water. However, because it was only detected in a single sample taken in 2009, there is insufficient information to calculate potential long-term risk.

Johnson Creek surface water and sediment monitoring data collected for PCC by Landau Associates are evaluated in this PHA because they represent the potential points of human exposure through water. Landau Associates tested surface water for many chemicals, including metals, pesticides, PAHs, PCBs and solvents. Maximum chemical concentrations detected in Johnson Creek surface water at any point between 2009 and 2013 were compared to health-based CVs for drinking water that are designed to be protective of young children. This is a very health-protective comparison because it is unlikely that children drink from or bathe in Johnson Creek as much as they come into contact with drinking water.

Among chemicals detected in Johnson Creek surface water (Table 7), TCE was the only chemical detected above any drinking water CV. Of 12 samples collected in Johnson Creek between 2009 and 2013, TCE was only detected in one set of duplicate samples taken in 2009. TCE was not detected in any samples collected in later years. The level of TCE detected in the 2009 sample was slightly above the drinking water CV for lifetime cancer risk but was below the CV for non-cancer effects on fetal development and the immune system. Cancer risk comparison values are designed to identify levels of contaminants that increase cancer risk over a lifetime of exposure through drinking water. It is not possible to estimate potential long-term exposures from the results of a single surface water sample. Because it is not possible to estimate the potential long-term exposures that would be necessary to calculate cancer risk, no further analysis was done. The failure to detect TCE in subsequent samples means it is unlikely that TCE has been consistently present in Johnson Creek surface water at levels above the drinking water CV.

Water quality monitoring has also detected high concentrations of bacteria in Johnson Creek. *E. coli* concentrations frequently exceed concentrations of concern for health (34) (35). Risk of bacterial infections is beyond the scope of this PHA, but people who come in contact with the creek should be aware that *E. coli* in the water does have the potential to make them sick.

Storm water monitoring that detected PCBs indicates that PCBs may have entered the creek from the storm water outflow. However, this data will not be evaluated for human health effects because direct human contact with storm water is expected to be very minimal. No PCBs were detected in storm water analyzed in 2017 following the installation of the new storm water treatment plant.

Groundwater data were not evaluated in this screening analysis because there are no complete exposure pathways through which neighbors would come in contact with groundwater at the onsite locations being monitored by PCC (Table 1, Table 2, Table 3).

Through the voluntary cleanup agreement, DEQ is working with PCC to ensure that existing groundwater contamination does not threaten drinking water sources. Milwaukee performs treatment and monitoring (32) of drinking water fed by the nearby aquifer, providing additional data to confirm that community drinking water is protected.

Table 7. Chemical concentrations in Johnson Creek surface water (measured by Landau Associates 2009–2013)

Chemicals detected	Maximum concentration detected (ppb)	Drinking water comparison Value (ppb)	Comparison value source (sensitive health endpoint)	Chemical of potential concern?
Acetone	1,200	6,300	ATSDR child chronic RMEG (kidney function)	no
Chromium, total	2.3	100	EPA MCLG and EPA MCL (skin reactions)	no
cis-1,2-Dichloroethene	1.4	14	ATSDR child chronic RMEG (kidney weight)	no
Copper	6.8	70	ATSDR child intermediate EMEG (gastrointestinal effects)	no
Lead	1.8	15	EPA action level (brain development)	no
Nickel	2.4	140	ATSDR child chronic RMEG (decreased body weight)	no
Tetrachloroethene	2.66	56	ATSDR child EMEG (color vision impairment)	no
Trichloroethene	1.17	0.43	ATSDR CREG (cancer)	yes
Zinc	20	2,100	ATSDR child EMEG (copper deficiency)	no

Johnson Creek sediment screening

Total PCBs and total PAHs in sediment are evaluated for combined cancer risk.

Nickel in sediment is also evaluated for potential non-cancer endpoints.

Maximum concentrations of all chemicals detected in Johnson Creek sediment by Landau Associates and DEQ were compared to soil comparison values. Soil comparison values are designed to be protective of children who play often in contaminated soil in their yard. This is a health-protective comparison. Children are not likely to come in contact with Johnson Creek sediment as much as the soil comparison values assume. Several chemicals have been detected in Johnson Creek sediment at concentrations above soil comparison values (Table 8 and Table 10). These include PCBs, PAHs and nickel.

There are many chemicals that fall in the category of PCBs. Because different PCBs can contribute to the same health effects, the potential health effects for total PCBs are considered both individually and together. Maximum concentrations of total PCBs detected in sampling performed by Landau Associates between 2009 and 2015 were above soil comparison values for cancer risk (Table 8). These PCB concentrations were below non-cancer comparison values designed to be protective of effects on the immune system from PCBs. All PCB concentrations detected by Landau Associates in 2017 were below both cancer and non-cancer comparison values (Table 9).

Like PCBs, PAHs are a class of chemicals that may contribute to the same health effects. The potential health effects of PAHs are, therefore, considered both individually and together. In sampling performed by Landau Associates during 2009–2015, maximum concentrations of total PAHs exceeded soil comparison values for cancer risk. Maximum concentrations of the PAH benzo(a)pyrene were below non-cancer comparison values designed to be protective of neurodevelopmental effects. PAHs were not included in sediment monitoring performed by DEQ in 2016 or by Landau Associates in 2017.

In monitoring performed by Landau Associates during 2009–2015 and by DEQ in 2016, maximum concentrations of nickel in sediment exceeded soil comparison values based on the non-cancer health effects associated with chronic oral exposure (Table 8 and Table 10). In monitoring performed by Landau Associates in 2017, concentrations of nickel and all other metals were below soil comparison values (Table 9).

Table 8. Chemical concentrations detected in Johnson Creek sediment (discrete samples measured by Landau Associates 2009–2015)

Chemicals detected	Max concentration detected (ppm)	Soil comparison value (ppm)	Comparison value source (sensitive health endpoint)	Chemical of potential concern?
Antimony	0.66	23	ATSDR child chronic RMEG (blood glucose and cholesterol regulation)	no
Arsenic	6.56	17	ATSDR child chronic EMEG (dermal effects)	no
Barium	1.05	11,000	ATSDR child chronic EMEG (kidney function)	no
Beryllium	0.41	110	ATSDR child chronic EMEG (gastrointestinal effects)	no
Cadmium	0.67	5.7	ATSDR child chronic EMEG (kidney function)	no
Chromium, Total	1000	86,000	ATSDR chronic child RMEG for trivalent chromium	no
Chromium, Hexavalent^A	22	51	ATSDR chronic child EMEG (intestinal effects)	no
Copper	100	570	ATSDR child intermediate EMEG (gastrointestinal effects)	no
Lead	61.8	400	EPA residential RSL standard for bare soil in children's play areas (brain development)	no
Mercury	0.20	17	ATSDR child chronic EMEG for methylmercury (brain development)	no
Nickel	2,500	1,100	ATSDR child chronic RMEG (decreased body weight)	yes
Zinc	260	17,000	ATSDR child chronic EMEG (copper deficiency)	no
Total PCB^B	0.48	0.19	ATSDR CREG (cancer)	yes
Total PAH^B	0.336	0.12	ATSDR CREG for benzo(a)pyrene (cancer)	yes

Contaminants of concern (detected at concentrations exceeding the comparison value) are highlighted in grey.

^A Estimated by adjusting maximum concentrations of total chromium in soil with EPA's estimate that 2.2% of total chromium will be in the hexavalent form (33)

^B Reflects the maximum sum of PCB or PAH concentrations detected in any individual sediment sample. Total PAH concentrations are the sum of 'benzo(a)pyrene equivalent' concentrations (the detected concentration multiplied by EPA's chemical-specific relative potency factor) for all PAHs detected in each sample. Complete summaries of individual PAH and PCB (aroclor) concentrations are in Appendix E.

Table 9. Chemical concentrations detected in Johnson Creek sediment (incremental samples measured by Landau Associates in 2017)

Chemicals detected	Max concentration detected (ppm)	Soil comparison value (ppm)	Comparison value source (sensitive health endpoint)	Chemical of potential concern?
Antimony	<0.5 ^B	23	ATSDR child chronic RMEG (blood glucose and cholesterol regulation)	no
Arsenic	2.57	17	ATSDR child chronic EMEG (dermal effects)	no
Beryllium	0.478	110	ATSDR child chronic EMEG (gastrointestinal effects)	no
Cadmium	<0.5 ^B	5.7	ATSDR child chronic EMEG (kidney function)	no
Chromium, total	23.3	75,000	ATSDR chronic child RMEG for trivalent chromium	no
Chromium, hexavalent^A	0.51	51	ATSDR chronic child EMEG (intestinal effects)	no
Copper	30.7	570	ATSDR child intermediate EMEG (gastrointestinal effects)	no
Lead	27.9	400	EPA residential RSL standard for bare soil in children's play areas (brain development)	no
Mercury	0.0657 ^C	17	ATSDR child chronic EMEG for methylmercury (brain development)	no
Nickel	49.8	1,100	ATSDR child chronic RMEG (decreased body weight)	no
Selenium	<1 ^B	290	ATSDR child chronic EMEG and RMEG (selenosis)	no
Silver	<0.5 ^B	290	ATSDR child chronic RMEG (dermal effects)	no
Thallium	<0.5 ^B	NA	NA	no
Zinc	197	17,000	ATSDR child chronic EMEG (copper deficiency)	no
Total PCB	0.1299 ^C	0.19	ATSDR CREG (cancer)	no

NA indicates comparison values are not available.

^A Estimated by adjusting average and maximum concentrations of total chromium in soil with EPA's estimate that 2.2% of total chromium will be in the hexavalent form (33)

^B The chemical was not detected above the sample quantitation limit shown. These chemicals will not be included in further analysis.

^C Concentration was estimated because the chemical was detected, but it is below the level that can be accurately quantified.

Table 10. Chemical concentrations detected in Johnson Creek sediment (collected by DEQ in 2016)

Chemical	Result (mg/kg)	Soil comparison value (ppm)	Comparison value source	Chemical of potential concern?
Aluminum, total	16,900	57,000	ATSDR child chronic EMEG (motor function)	no
Antimony, total	0.39	23	ATSDR child chronic RMEG (blood glucose and cholesterol regulation)	no
Arsenic, total	2.27	17	ATSDR child chronic EMEG (dermal effects)	no
Barium, total	114	11,000	ATSDR child chronic EMEG (nerve function)	no
Cadmium, total	0.22	5.7	ATSDR child chronic EMEG (kidney function)	no
Chromium, total	476	75,000	ATSDR child chronic RMEG for trivalent chromium	no
Chromium, hexavalent ^A	10.5	51	ATSDR chronic child EMEG (intestinal effects)	no
Cobalt, total	131	570	ATSDR child intermediate EMEG (blood effects)	no
Copper, total	42.4	570	ATSDR child intermediate EMEG (gastrointestinal effects)	no
Lead, total	42.3	400	EPA residential RSL standard for bare soil in children's play areas (brain development)	no
Manganese, total	268	2,900	ATSDR child chronic RMEG (brain effects)	no
Mercury, total	<0.040 ^B	17	ATSDR child chronic EMEG for methylmercury (brain development)	no
Nickel, total	1,600	1,100	ATSDR child chronic RMEG (decreased body weight)	yes
Selenium, total	<1.99 ^B	290	ATSDR child chronic EMEG and RMEG (selenosis)	no
Silver, total	<0.10 ^B	290	ATSDR child chronic RMEG (dermal effects)	no
Thallium, total	<0.10 ^B	NA	NA	no
Zinc, total	179	17,000	ATSDR child chronic EMEG (copper deficiency)	no

Contaminants of concern (detected at concentrations exceeding the comparison value) are highlighted in grey.

NA indicates comparison values are not available.

^A Estimated by adjusting average and maximum concentrations of total chromium in soil with EPA's estimate that 2.2% of total chromium will be in the hexavalent form (33)

^B The chemical was not detected above the reporting limit shown.

Johnson Creek crayfish screening

Arsenic, chromium, cobalt, mercury, nickel, zinc and PCBs were all detected in crayfish samples from Johnson Creek. Levels of these contaminants were considered in calculating the number of Johnson Creek crayfish meals that people can safely eat each month.

DEQ measured metal and PCB concentrations in a combined sample of eight crayfish caught in Johnson Creek downstream of the city storm water outfall used by PCC. There are no screening values available for crayfish. Therefore, all chemicals that were detected in crayfish (Table 11) are included in a more thorough analysis of potential exposures from eating crayfish.

Table 11. Chemical concentrations measured in crayfish collected in Johnson Creek (collected by DEQ in 2016; analyzed in 2017)

Chemical	Concentration in crayfish
Arsenic, total	0.28
Cadmium, total	< 0.03 ^A
Chromium, total	0.63
Cobalt, total	0.26
Mercury, total	0.019
Nickel, total	1.08
PCB, total	0.033
Selenium, total	< 0.59 ^A
Titanium, total	11.8
Zinc, total	24.1

^A The chemical was not detected above the sample quantitation limit shown. These chemicals will not be included in further analysis.

Health effects evaluation

To assess whether environmental contaminants at a specific site could harm health, EHAP estimates how much of each contaminant could get into people's bodies. In toxicology, this is referred to as the "dose." EHAP uses a process similar to EPA's human health risk assessment to calculate the exposure doses people might get from contact with chemicals at a site. In the screening step of this PHA, EHAP identified COCs in air under current and past conditions and in sediment at Johnson Creek. Here we evaluate potential health effects by calculating exposure doses for each of the COCs and comparing calculated doses to health-based guidelines for cancer and non-cancer related health risk.

EHAP calculated exposure doses for a set of exposure scenarios designed to capture worst case scenarios in which people are exposed consistently over long periods of time (Table 12). EHAP also identified exposure scenarios for which there is insufficient data to calculate health risks (Table 13). EHAP considered input from local residents on specific exposure scenarios and assumptions that may occur near PCC. We evaluated potential for cancer and non-cancer health effects based on exposure doses calculated from these worst-case exposure scenarios. In cases where multiple chemicals affect the same health outcomes, EHAP evaluated the cumulative risks of all relevant chemicals across all pathways.

This section describes how doses were calculated for each scenario and how they were compared with cancer and non-cancer health guidelines to determine potential risk. It then summarizes the health implications for people in each of the three exposure scenarios.

Table 12. Exposure scenarios evaluated in health risk calculations (for each complete exposure pathway containing COCs)

Exposure scenario	Exposure routes	Rationale
1. Long-term residents exposed to air concentrations measured in 2016 prior to HEPA filter installation (59 years including childhood) ^{A,B}	Inhalation	Residents who were born, grew up as children and lived as adults around the PCC facility and were exposed to air concentrations measured prior to HEPA filter installation in 2016 for up to 59 years. ^B This hypothetical scenario assumes that 2016 monitoring data would be an accurate reflection of all historical exposures.
2. Long-term residents exposed to current air concentrations, after HEPA filter installation (78 years including childhood) ^A	Inhalation	Residents who are born, grow up as children, and will live as adults around the PCC facility may be exposed to emissions at concentrations measured following HEPA filter installation for up to 78 years.
3. Long-term, frequent recreational contact with Johnson Creek sediment (78 years including childhood) ^A	Ingestion and dermal contact with sediment	Community members raised concerns about potential health effects of contact with contaminants in Johnson Creek. Long-term residents may be exposed over the course of a 78-year lifetime.
4. Long-term, frequent fishing from Johnson Creek	Ingestion of crayfish	Community members raised concerns about potential health effects of eating crayfish from Johnson Creek. The number of crayfish meals that can be safely consumed each month is calculated based on non-cancer risks.

^A Risk from exposure over a 78-year lifetime was calculated assuming that the first 21 years reflect exposure as a child. Where appropriate, risks of exposure during childhood were adjusted to reflect differences in children's exposure factors (such as frequency or body weight). Risk from early childhood exposure to mutagenic chemicals was weighted as described further in Appendix G.

^B PCC has been in operation since 1957, so 59 years is the maximum number of years a person may have been exposed to pre-HEPA filter concentrations.

^C Emissions reported to EPA's Toxics Release Inventory were higher in the past (see pages 20–21 of this assessment).

Table 13. Exposure scenarios for which there is insufficient information to calculate health risks

Exposure scenario	Exposure routes	Rationale
5. Long-term residents exposed to unknown past air concentrations (59 years including childhood) ^{A,B}	Inhalation	Residents who were born, grew up as children, and lived as adults around the PCC facility were exposed to unknown historical levels of air emissions for up to 59 years. ^B Historical exposures were likely higher than what was measured in 2016 air monitoring based on required company reports to the EPA Toxics Release Inventory showing a decline in the use of COCs over time. ^C There is insufficient information to quantify those past risks.

^A Risk from exposure over a 78-year lifetime was calculated assuming that the first 21 years reflect exposure as a child. Where appropriate, risks of exposure during childhood were adjusted to reflect differences in children's exposure factors (such as frequency or body weight). Risk from early childhood exposure to mutagenic chemicals was weighted as described further in Appendix G.

^B PCC has been in operation since 1957, so 59 years is the maximum number of years a person may have been exposed to pre-HEPA filter concentrations.

^C Emissions reported to EPA's Toxics Release Inventory were higher in the past (see pages 20–21 of this assessment).

Approach to dose calculation

To calculate a dose, we determined the frequency and duration with which people come into contact with the COCs through each exposure pathway. Wherever possible, EHAP uses site-specific information, but when that information is unavailable, we use default values established by ATSDR or the EPA. Where default values are unavailable, EHAP uses best professional judgment. For the complete list of the exposure assumptions and formulas used to calculate doses of COCs in this report, see Appendix G.

To calculate long-term doses in this PHA, EHAP used health-protective assumptions to estimate potential chemical concentrations that people may be exposed to in air consistently over many years. This helps to account for uncertainties around how well monitoring data collected over a limited period reflect what is typically in the air (average concentration). Health protective estimates of average concentrations were calculated by defining a range that we can have 95% confidence will include the true average. The high end of this range is the upper confidence limit. EHAP used EPA's ProUCL software to identify upper confidence limits for average air concentrations based on available monitoring data at each location (resulting UCLs are included in air screening tables in Appendix D). In risk calculations, EHAP used the upper confidence limits identified in ProUCL to represent potential average long-term exposures to air contaminants. To calculate long-term doses to contaminants detected in sediment we use the maximum concentrations detected because there is not enough data at each sampling location to define confidence limits.

Approach to estimating cancer risk

There is no threshold below which cancer-causing chemicals are considered completely safe. Every additional exposure, no matter how small, has the potential to contribute toward lifetime risk of getting cancer. Cancer risk from a specific exposure is, therefore, expressed as a probability, which can be thought of in terms of additional cancer cases in a population. Cancer risk from a particular environmental exposure is considered in addition to the background risk of developing cancer over a lifetime. The American Cancer Society estimates that one in three women and one in two men will develop some type of cancer over the course of their life (36). These background cancers are attributed to a combination of genetic mutations, inherited conditions (traits that are passed on to children), tobacco use, lifestyle factors, common environmental exposures and

What is an ATSDR MRL?

Minimal risk levels (MRLs) are estimates of daily human exposure to a hazardous substance. They represent the amount of a substance that is not expected to cause non-cancer health effects. Exposure doses that are greater than MRLs do not necessarily mean that people will experience the associated adverse effects.

ATSDR develops MRLs for acute (14 days or less), intermediate (between 15 and 364 days) and chronic (one or more years) exposure durations.

occupational exposures. The contributions of each factor to the incidence of cancer in individuals and communities is difficult to predict or quantify.

Cancer risk is generally expressed in terms of chances in a million (1×10^{-6} or 0.000001). For example, a one-in-a-million cancer risk means that for every 1 million people with the same site-specific exposure for the same period, one additional person will develop cancer due to that exposure at some point in their lifetime. This one-in-a-million increase of cancer is in addition to the roughly 400,000 people out of 1 million (approximate background rate for men and women) that would be expected to get cancer from all causes combined. It is not possible to determine which one of the 400,001 cancer cases is the additional case due to a site-specific exposure. In a community of 10,000 people, a one-in-a-million cancer risk means that less than one additional cancer case would be expected.

Cancer risk that falls between one additional case of cancer per million people (1×10^{-6}) and one additional case per 10,000 people (1×10^{-4}) is generally considered low. It is important to know that this range is *in addition* to the one out of three women or one out of two men who will develop cancer over their lifetime from all causes combined.

To calculate lifetime cancer risk, EHAP uses cancer slope factors (CSF) identified by EPA for each cancer-causing chemical. Cancer slope factors (or in the case of air exposures, inhalation unit risk) describe the increased cancer risk associated with each additional unit of exposure based on the best available data. Cancer risk is estimated by multiplying the calculated dose by the cancer slope factor (Appendix G). In this PHA, when more than one chemical contributed to cancer risk in a given exposure scenario, the risks from all chemicals were added together for an estimate of cumulative cancer risk.

Approach to estimating non-cancer risk

For many non-cancer health effects, there is thought to be a threshold of exposure below which no health effects are expected. Federal health guidelines are intended to identify a daily dose of a chemical that is below this threshold for each chemical and, therefore, unlikely to harm health. To calculate risks for non-cancer health outcomes, EHAP compares the daily doses calculated for each exposure scenario with health guideline doses at which no health effect is anticipated for that chemical.

What is a hazard quotient?

Hazard quotients (HQs) summarize potential risk of non-cancer health effects. They are calculated by dividing the estimated exposure by a health guideline (such as an ASTDR MRL or an EPA reference dose).

An HQ less than one means that estimated exposure is below health guidelines and no non-cancer health effects are expected.

An HQ greater than one means that estimated exposure exceeds health guidelines and further analysis is needed to determine whether health could be harmed.

In this PHA, EHAP used the health guidelines established by ATSDR, called minimal risk levels (MRLs), whenever available. When a specific chemical does not have an appropriate MRL, EHAP uses a reference dose (RfD) or, in the case of inhalation exposures, a reference concentration (RfC) established by the EPA. Appendix F describes the potential health effects and derivation of MRLs and RfDs for each of the COCs identified in this PHA. No contaminants of concern were detected at concentrations high enough to indicate potential acute or intermediate health risks. We evaluated potential long-term health risks by comparing chronic MRLs or RfDs to doses calculated based on long-term exposures.

EHAP divides calculated doses by the health guideline for each chemical (Appendix G). The resulting number is called the hazard quotient (HQ). An HQ greater than 1 indicates that potential exposures exceed the MRL or RfD. When an HQ is less than or equal to 1, the exposure is lower than or equal to the health guideline, and it is unlikely that non-cancer health effects will occur. If it is greater than 1, the exposure is higher than the health guideline and a more in-depth analysis is needed to determine whether an exposed person could experience adverse health effects that are not cancer. In this PHA, nickel was the only chemical evaluated for non-cancer health endpoints because it was the only chemical to exceed non-cancer comparison values for air or sediment concentrations.

Results of risk calculations

Exposure Scenario 1: Long-term residents with hypothetical exposure to air concentrations assumed to constantly be at levels measured in 2016 prior to HEPA filter installation

This hypothetical scenario reflects risks that would occur if people were exposed to concentrations detected prior to HEPA filter installation in 2016 for as long as the facility has been in operation. Because PCC has only been operating since 1957, total lifetime exposures under pre-HEPA filter conditions cannot exceed 59 years of lifetime exposure. It is important to note that in the absence of historical monitoring data, risk estimates calculated in this scenario only reflect risk of long-term exposure to levels of metals detected in 2016 monitoring prior to HEPA filter installation. They do not reflect risks from higher rates of emissions reported historically (described in Exposure Scenario 5 on page 40).

Risk associated with air concentrations detected in 2016 prior to installation of HEPA filters was calculated for levels detected at each of the three air monitoring locations. Exposure doses were calculated based on the upper confidence limit of average air concentrations calculated for each location (Appendix G). Exposure was assumed to be constant for 24 hours a day, 365 days a year over 59 years, including childhood.

Cancer risk

Cancer risk was evaluated cumulatively for all metals detected in air under pre-HEPA filter conditions. Cadmium was not identified as a COC on its own but was included in the cumulative evaluation to ensure that all potential cancer risk was fully accounted for. The maximum cumulative lifetime cancer risk calculated for any monitoring location was 20 in 1 million (Table 14). EHAP considers this to be a very low cancer risk (see discussion on page 36). ***EHAP concludes that levels of metals measured in air in 2016 prior to HEPA filter installation pose very low cancer risk to long-term residents exposed as both children and adults.***

Non-cancer risk

Under pre-HEPA filter conditions, long-term nickel exposure concentrations calculated in this section were below the ATSDR chronic MRL designed to be protective against respiratory health effects (Table 14). This produced a hazard quotient less than 1, which EHAP considers too low to affect public health. ***EHAP concludes that measured concentrations of metals in air prior to HEPA filter installation were too low to harm the respiratory health of long-term residents exposed as both children and adults.***

Table 14. Chronic risks calculated for each air monitoring location (before HEPA filters were installed)

Monitoring location	Scenario	Exposure assumptions	Cumulative cancer risk of Ni ^A , As, Cd, Cr 6+	Hazard quotient for non-cancer risk from Ni
Milwaukie Johnson Creek	Lifetime	Constant exposure from birth to age 59	20 in 1,000,000	0.4
S.E. 45th and Harney Drive	Lifetime	Constant exposure from birth to age 59	7 in 1,000,000	NA
S.E. Harney Drive	Lifetime	Constant exposure from birth to age 59	9 in 1,000,000	NA

^A Assuming nickel is present in the most toxic form

Exposure Scenario 2: Long-term residents exposed to air under current conditions

This scenario assumes that long-term residents may continue to be exposed to concentrations of metals detected in air after HEPA filter installation in 2016 over a lifetime. Health risks associated with air concentrations of COCs detected after HEPA filter installation were calculated separately for each of the three air monitoring locations. At each location, exposure doses were calculated based on the upper confidence limit of average air concentrations (Appendix G). Exposure was assumed to be constant for 24 hours a day, 365 days a year over a 78-year lifetime including childhood.

Cancer risk

Cancer risk for all four COCs in air under current conditions was evaluated cumulatively; that is, the analysis estimated the combined cancer risk of the COCs taken together.

Nickel was assumed to be present in its most toxic form, an insoluble particulate such as refinery dust. Because hexavalent chromium causes cancer through gene mutations, early childhood exposures may disproportionately increase lifetime cancer risk. Exposures to hexavalent chromium during childhood were, therefore, given additional weight in the risk calculation, consistent with ATSDR guidance. The maximum cumulative lifetime cancer risk calculated for any monitoring location was 10 in 1 million (Table 15). EHAP considers this to be a very low cancer risk (see discussion on page 42). ***EHAP concludes that metals in air under current conditions pose very low cancer risk to long-term residents exposed as both children and adults.***

Non-cancer risk

None of the metals detected in air under current conditions were present at concentrations high enough to be of concern for non-cancer health risks. ***EHAP concludes that concentrations of metals in air under current conditions are too low to harm the respiratory health of long-term residents exposed as both children and adults.***

Table 15. Risks calculated for each air monitoring location (under current conditions)

Monitoring location	Scenario	Exposure assumptions	Cumulative cancer risk of Ni ^A , As, Cd, Cr 6+	Hazard quotient for non-cancer risk from Ni
Milwaukie Johnson Creek	Lifetime	Constant exposure from birth to age 78	10 in 1,000,000	NA
S.E. 45th and Harney Drive	Lifetime	Constant exposure from birth to age 78	6 in 1,000,000	NA
S.E. Harney Drive	Lifetime	Constant exposure from birth to age 78	10 in 1,000,000	NA

^A Assuming nickel is present in the most toxic form

Exposure Scenario 3: Long-term frequent recreational contact with Johnson Creek sediment via both ingestion and skin contact

Exposure to chemicals in sediment may occur through skin (dermal) contact as well as through incidental ingestion of sediment. Because methods and locations of sediment sampling efforts vary, data are not directly comparable. Therefore, the data can't be integrated to confidently predict average concentrations across sampling efforts. Potential exposure doses were calculated based on maximum levels of PCBs, PAHs and nickel detected in Johnson Creek sediment sampled by Landau Associates or DEQ. Exposure doses were calculated assuming a high frequency of contact with creek sediment. Substantial contact with creek sediment was assumed to occur weekly, year-round (equivalent to four

days a week in the summer months only) between ages 1 and 21 years and for 33 years as an adult (this is ATSDR's default residential occupancy period). These exposure scenarios use conservative assumptions. Dermal exposure is assumed to occur with sediment in direct contact with hands, forearms, feet and lower legs; high rates of absorption are assumed. Oral ingestion was calculated based on the assumption that children may swallow 200mg and adults swallow 100mg of sediment each day they come in contact with the creek. These estimates are derived from EPA's upper bound estimates for soil ingestion rates (37).

In response to community advisory committee members' requests for exposure scenarios that reflect an extreme worst case, EHAP also considered an alternate extreme exposure scenario in which the same high degree of contact with sediment occurred daily all year-round (Appendix G). This scenario used the same assumptions as above about the extent of dermal contact and ingestion that occurs with each exposure. While we are not aware of any individuals with this amount of contact, this extreme scenario provides an upper limit for potential risk.

Cancer risk

To calculate cancer risk from exposure to COCs in sediment, risks from exposure through skin contact and through ingestion were considered cumulatively. Cumulative cancer risk was calculated for total PCBs and total PAHs across both exposure pathways. Because some PAHs cause cancer through gene mutations, early childhood PAH exposures may disproportionately increase lifetime cancer risk. Exposures to total PAHs during childhood were, therefore, given additional weight in the risk calculation, consistent with ATSDR guidance. No cancer risk values are available for oral exposure to nickel and hexavalent chromium and were, therefore, not included (Table 16). Cumulative cancer risk of total PCBs and total PAHs over a lifetime of weekly exposure through both pathways was estimated to be 40 in 1 million, which EHAP considers to be a very low cancer risk (see discussion on p.36). In an extreme exposure scenario of daily year-round exposure, cumulative lifetime cancer risk was estimated to be 3 in 10,000. EHAP considers this to be a low increased cancer risk. However, EHAP is not currently aware of any individuals at risk of coming in contact with Johnson Creek sediment with anywhere near this frequency. ***EHAP concludes that PCBs and PAHs in Johnson Creek sediment pose very low lifetime cancer risk for anyone with frequent (weekly year-round) contact.***

Non-cancer risk

Risk of non-cancer health effects of nickel was calculated based on ingestion of soil only because nickel is not readily absorbed through skin. Assuming weekly year-round contact with sediment, non-cancer risk of nickel for all age groups was below a hazard quotient of 1 (Table 16). In an extreme exposure scenario of daily year-round contact, hazard quotients for most age groups in this scenario were below 1. For the 1–2 year-old age group, the hazard quotient associated with daily year-round exposure was 2, indicating the potential for daily exposure to exceed the health-based comparison value for chronic health effects. It is important to note that

there is still a substantial amount of caution built in to this chronic comparison value, making it unlikely that daily exposure at that level would result in health effects. Furthermore, EHAP is not currently aware of any individuals at risk of coming in contact with Johnson Creek sediment with daily frequency. ***EHAP concludes that maximum concentrations of nickel detected in Johnson Creek sediment are too low to have non-cancer health effects for anyone with frequent (weekly year-round) contact.***

Table 16. Cancer risk associated with contact with weekly year-round exposure to PCBs and PAHs at maximum concentrations detected in sediment

Exposure period	Cumulative cancer risk from skin contact and ingestion of PCBs and PAHs in sediment	Hazard quotient for ingestion of nickel in sediment
Child 6 wks to < 1 yr ^A	0	0
Child 1 to < 2 yr ^A	5 in 1,000,000	0.3
Child 2 to < 6 yr ^A	6 in 1,000,000	0.2
Child 6 to < 11 yr ^A	6 in 1,000,000	0.1
Child 11 to <16 yr ^A	5 in 1,000,000	0.1
Child 16 to <21 yr	3 in 1,000,000	0.05
Cumulative child 0–21 years	30 in 1,000,000	NA
Adult for 33 years (95% residential occupancy period) ^B	20 in 1,000,000	0.02
Lifetime (21 years of childhood exposure plus 33 years of adult exposure) ^{A,B}	40 in 1,000,000	NA

^A Cancer risks calculated for exposure to PAHs incorporate age-adjustment factors that give more weight to early childhood exposures due to the mutagenic mode of action of some PAHs (described in more detail in Appendix G).

^B 33 years is the default duration of residential exposures used by ATSDR based on the 95% residential occupancy period.

Exposure Scenario 4: Long-term, frequent consumption of crayfish from Johnson Creek

Health risks associated with eating crayfish caught in Johnson Creek were evaluated using the same method used in Oregon Health Authority’s fish advisory program (38). The concentrations of metals and PCBs detected in crayfish collected from Johnson Creek were used to calculate the number of Johnson Creek crayfish meals that can be safely eaten in a month.

Cancer risk

Fish advisories in Oregon are not based on small increases in cancer risk because the small increased risk of cancer needs to be balanced by the health benefits of eating fish. Among the chemicals DEQ detected in Johnson Creek crayfish, arsenic and PCBs are the only chemicals associated with increased risk of cancer when exposure occurs through ingestion.

Non-cancer risk

The concentrations of metals and PCBs detected in crayfish were used to calculate the amount of crayfish that could be eaten in a month without exceeding non-cancer comparison values for oral exposure to those contaminants (Appendix G). The health risks of all contaminants detected in the crayfish are considered for each chemical alone as well as for combined risk from chemicals that affect the same organ system (Table 17). Based on cumulative risk from metals and PCBs, residents can safely eat up to five meals of Johnson Creek crayfish each month. Crayfish caught in Johnson Creek by DEQ weighed between 9 and 19 grams. The average weight was 13.3 grams, or approximately one-half ounce. This means that, on average, an eight-ounce crayfish meal would consist of approximately 20 whole crayfish (including shells) or many more crayfish if only meat is consumed. Meal portion size is proportional to body weight and the calculation methods are designed to protect sensitive populations. The recommended limit on crayfish meals that should be consumed by children is the same as for adults. ***EHAP concludes that residents can safely eat up to five meals of Johnson Creek crayfish each month.***

Table 17. Estimated number of crayfish meals that are safe to eat each month based on potential metal and PCB exposures

Basis for fish consumption recommendations	Number of crayfish meals that can be eaten each month without exceeding exposure guidelines ^A
Cumulative risk from all chemicals that target brain development (mercury and PCBs)	5 eight-ounce meals
Cumulative risk from all chemicals that target the immune system (zinc and PCBs)	5 eight-ounce meals
Cumulative risk from all chemicals that target skin (arsenic and PCBs)	5 eight-ounce meals
Cumulative risk from all chemicals that target blood (zinc, chromium and cobalt)	12 eight-ounce meals
Risk from total PCBs ^B	6 eight-ounce meals
Risk from arsenic alone ^C	100 eight-ounce meals
Risk from chromium alone ^D	13.4 eight-ounce meals
Risk from cobalt alone	361 eight-ounce meals
Risk from mercury alone ^E	148 eight-ounce meals
Risk from nickel alone	174 eight-ounce meals
Risk from zinc alone	117 eight-ounce meals

^A Higher number of meals indicates lower health risks. Meal size is based on adults.

^B Based on cumulative risk from the sum of all PCB congeners

^C Assumes that 10% of the arsenic detected is in its more toxic, inorganic form. The consensus in the scientific literature is that approximately 10% of the arsenic typically found in the edible parts of fish and shellfish is inorganic arsenic (39).

^D Based on the unlikely but health-protective assumption that 100% of chromium detected is in the more toxic, hexavalent form

^E Based on the health-protective assumption that 100% of mercury detected is in the more toxic, methylmercury form

Analysis of exposure scenarios with insufficient information

Exposure Scenario 5: Long-term residents with exposure to unknown past air concentrations

There is not enough data to support a quantitative evaluation of health effects of historical exposures that occurred before any monitoring was conducted. Emissions reported by PCC to EPA's Toxic Release Inventory (30) indicate that historical emissions for some COCs may have been between 10 and 100 times higher than recent emissions. The presence of additional chemicals, which have since been phased out, would have also contributed to past risk. However, given the limitations and uncertainties of the Toxics Release Inventory, no quantitative conclusions can be drawn. ***EHAP concludes that there is insufficient data to determine whether exposure to historical air emissions near PCC may have harmed health.***

Uncertainties and data gaps

In any public health assessment there are uncertainties and limitations. Calculating and interpreting risk requires the use of assumptions, judgments and limited data sets. This section summarizes potential sources of uncertainty and data gaps and the extent to which they were addressed in this analysis. Estimated risks presented in this PHA should be interpreted in the context of these limitations.

Characterization of toxicity. The health guideline comparison values used to assess toxicity (i.e., MRLs and RfDs) pass through a rigorous scientific peer-review process. However, there is uncertainty in health effects data used to generate these guideline values. For example, health effects of a chemical can vary across species, life stages and individuals in a population. There may also be gaps in the health effects data used to generate health-based comparison values. Typically, these uncertainties are addressed by incorporating a margin of safety into comparison values. To calculate CVs, chemical doses at or below the point where health effects were observed in people or animals are divided by uncertainty factors ranging from 10 to 1,000 to account for remaining uncertainties, sensitive populations and data gaps.

Current CVs may not reflect all the latest evidence or protect against potential health effects that have not yet been well characterized. The chemical-specific comparison values used in this PHA reflect the latest peer-reviewed conclusions of federal scientists and scientific advisory panels based on the weight of evidence from the scientific literature. However, new evidence is continually reshaping our understanding of potential health effects of environmental exposures. For example, in this PHA, non-cancer risk of nickel is evaluated based on an ATSDR chronic MRL derived from studies on respiratory effects in rats. Since the ATSDR MRL was published in 2005, there have been several additional studies finding a correlation between nickel concentrations in air and asthma symptoms in children

(discussed in Appendix F). These studies suggest the potential for nickel to contribute to asthma symptoms at concentrations comparable to what has been detected near PCC. However, these studies alone do not provide conclusive evidence that nickel causes these asthma symptoms and cannot be used to support quantitative health effects analysis in this PHA. Generally, findings from new studies must be replicated and corroborated by other studies with different designs, settings and populations before previously established guidelines or standards can be updated.

Toxicity can also vary with the specific form a chemical takes. In this PHA, there is uncertainty around which specific forms of nickel are present in air. PCC uses nickel alloys that are thought to be less bioavailable and, therefore, less carcinogenic than other forms of nickel (40). However, because monitoring data do not distinguish between the different forms of nickel, we cannot confirm that nickel emitted from PCC remains in an alloy form. We also do not know whether all the nickel present came from PCC. In this PHA we calculate potential health effects based on the health-protective assumption that all nickel detected near the facility may be in the most toxic form.

Risk to sensitive populations. Some groups of people may be particularly sensitive to contaminants of concern identified near PCC. Emerging research has demonstrated that several factors influence our susceptibility to the health effects of environmental exposures. Comparison values are designed to be protective of sensitive populations, but we are not yet able to clearly quantify the role each of these factors plays in influencing risk and how they interact.

- ***Genetic variability.*** Genetic variation may make some individuals particularly susceptible to the health effects of metals. For example, variants in genes involved in processing chemicals mean that some people may be slower to process and excrete chemicals in their bodies than other people (41). Genetic differences can put some people at higher risk of disease, including respiratory disease (42) and cancer (43).
- ***Epigenetic programming.*** Epigenetic factors that influence how genes are turned on and off in our bodies also have an important effect on health and susceptibility (44). Epigenetic gene regulation can be influenced by a range of factors including nutrition, stress, previous chemical exposures and even exposures that occurred during gestation (45) or in previous generations (46).
- ***Sensitive life stages.*** Children, developing fetuses, pregnant women and the elderly may be particularly susceptible to environmental exposures due to differences in how their bodies process and respond to chemicals (47).
- ***Preexisting disease.*** Some people may be more susceptible to the effects of chemical exposure due to preexisting diseases. For example, people with preexisting respiratory conditions such as asthma or chronic obstructive pulmonary disease may be more sensitive to exposures that affect respiratory health (48).

- **Cumulative chemical exposures.** Multiple chemicals from a variety of sources at home and at work may act cumulatively to produce the same health outcomes (49) (50).
- **Social determinants of health.** Social factors such as poor nutrition and stress may interact with chemical exposures to magnify health effects (25) (26).

Characterization of exposure. There are two main sources of uncertainty in calculating human doses to environmental contaminants based on environmental monitoring data. First, there is uncertainty in environmental monitoring data used to determine the chemical concentrations in air, water and soil with which people may come in contact. Monitoring data may not adequately capture the most contaminated samples or may not include all contaminants that are present. Second, there is uncertainty around the amount of contact people have with contaminated air, water and soil. In this PHA we calculated risk based on health-protective assumptions. We assume that some people may be continuously exposed (24 hours/day) to air concentrations at the upper confidence limit of average monitored air concentrations. We also assume a high frequency of contact with contaminated water, sediment or soil containing the maximum chemical concentrations detected in monitoring efforts.

There is some additional uncertainty around how far air emissions travel and the extent to which they deposit in soil. In this PHA we assume that air monitors located near the facility capture the highest level of emissions because emissions tend to disperse with distance. Dispersion dynamics vary depending on the height of the emissions stack, the temperature of what is emitted and the rate of flow from the stack. Additional emissions modeling that takes these factors into account could better define the geographic area most affected by emissions.

A lack of historical emissions monitoring data means that there is also uncertainty around the extent of historical exposures. This is particularly true of incidents that resulted in short-term elevated emissions. In this PHA we do not calculate risks from historical emissions because there is too much uncertainty around the extent of those exposures. It is possible that high past exposures make some long-term residents more susceptible to ongoing exposures, but there is insufficient information to be able to quantify that effect in this PHA.

Source of the contamination. The air, soil, water and sediment monitoring data used in this PHA determine concentrations of chemicals present in the environment, but they do not identify the source of these chemicals. Other nearby industrial facilities may contribute to total air emissions, and many of the contaminants detected in Johnson Creek may be from upstream sources. This PHA evaluates the potential health effects of all chemicals detected in the environmental monitoring, regardless of source.

Health outcome data

Evaluations of health outcome (i.e., mortality and morbidity) data (HOD) in public health assessments are done using specific guidance in ATSDR's Public Health Assessment Guidance Manual (51). The main requirements for evaluating HOD are the presence of a completed human exposure pathway; high enough contaminant levels to result in measurable health effects; sufficient number of people in the completed pathway for health effects to be measured; and a health outcome database in which disease rates for the population of concern can be identified (51).

This site does not meet the requirements for including an evaluation of HOD in this public health assessment. Although completed human exposure pathways exist at this site, the geographic area and, therefore, the exposed population are not sufficiently defined. In addition, a registry does not exist to track the type of health effects evaluated in the PHA (e.g., respiratory symptoms).

Children's health

EHAP and ATSDR recognize that infants and children may be more vulnerable to exposures than adults in communities faced with contamination of their air, water, soil or food. This vulnerability is a result of the following factors:

- Children's developing body systems can sustain permanent damage if toxic exposures occur during critical growth stages.
- Children are more likely to play outdoors and bring food into contaminated areas.
- Children are shorter, resulting in a greater likelihood to breathe dust, soil and heavy vapors close to the ground.
- Children are smaller and breathe more rapidly, resulting in higher doses of chemical exposure per body weight.
- Children are more likely to swallow or drink water during bathing or when playing in and around water.
- Children are more prone to mouthing objects and eating non-food items such as toys and soil.
- Children's bodies are often different than adults' bodies in their ability to process and remove chemicals to which they are exposed.

Children depend on adults for risk identification and management decisions. The health-based screening values EHAP used for air, soil, water and sediment in this PHA were derived from health guidelines that incorporate a high level of protectiveness for children and other sensitive individuals.

To the extent possible with existing evidence, this PHA considers the special vulnerabilities of children. Children were identified as the most vulnerable to health problems caused by metals in the air and by PCBs and PAHs in Johnson Creek sediment. In each exposure scenario evaluated, EHAP used body weights and ingestion rates that are specific for children at different ages. EHAP also addressed special concerns around childhood exposures to carcinogens. Early childhood exposures to mutagenic carcinogens (those that cause genetic mutations in cells of the body) such as hexavalent chromium and PAHs were given extra weight because those early life exposures may have greater effect on lifetime cancer risks.

Conclusions

Based on currently available science, monitoring data and guidance from federal agencies, EHAP concludes:

Conclusion 1: Measured concentrations of metals in air near PCC are not likely to harm health.

Cumulative exposure to all metals detected in the air around PCC may be predicted to elevate lifetime cancer risk by as many as 20 additional cases of cancer per 1 million people exposed continuously for a lifetime. EHAP considers this to be very low risk. The estimated cancer risk is similar for current conditions and for conditions prior to HEPA filter installation. These risk calculations are based on the cautious assumption that nickel detected in air monitoring is in its most toxic form. It is likely that nickel emissions from PCC are in an alloy form that may be less available to the body and, therefore, less carcinogenic.

Conclusion 2: Measured concentrations of metals in soil from areas around the PCC facility are not likely to harm health.

DEQ sampled soil near the facility, including locations near residences and in community gardens. No soil concentrations exceeded comparison values.

Conclusion 3. Measured concentrations of chemicals in surface water of Johnson Creek are not likely to harm health.

The levels of chemicals detected in surface water are below health-based comparison values designed to be protective of drinking water. TCE was detected at a level slightly above the cancer CV in one sample in 2009 but was not detected in subsequent samples. Johnson Creek, like many urban streams, has had high levels of bacteria that can make people sick. While bacteria in Johnson Creek is not a focus of this PHA and is not believed to be related to PCC, it has the potential to affect public health.

Conclusion 4: Measured concentrations of PCBs and PAHs in the sediment of Johnson Creek near the storm water outfall are not likely to harm health of people who regularly come into contact with it.

Weekly year-round exposure to sediment is not high enough to harm health. While extremely frequent (daily year-round) contact with Johnson Creek sediment could result in a slight increased risk of both non-cancer and cancer health effects, the likelihood of this degree of contact is quite low. Risk calculations were based

on cumulative exposure to maximum concentrations of all PCBs, PAHs and metals of potential concern detected in the creek. Each exposure was assumed to involve full contact of hands, forearms, feet and lower legs with sediment. The biggest health risk from this degree of contact with the creek is the potential for bacterial infections.

Conclusion 5: Residents may safely eat crayfish from Johnson Creek in moderation.

Based on cumulative risk from metals and PCBs, residents can eat up to five meals of Johnson Creek crayfish each month without exceeding health-protective exposure guidelines.

Conclusion 6: There is insufficient information about historical air emissions of metals and solvents at PCC to calculate past health risks.

No historical monitoring data are available to support a quantitative evaluation of potential health effects of previous exposures. Based on historical trends in emissions reported by PCC to EPA's Toxic Release Inventory, we cannot rule out the possibility that past air concentrations could have been high enough to harm health. Emissions reported to TRI since 1987 indicate that emissions of some chemicals may have been 10 and 100 times higher than current emissions during some periods of PCC's past operations. Historical emissions of trichloroethylene and tetrachloroethylene would have also contributed to past risks of cancer and developmental defects.

Recommendations

Based on this analysis of the available information, this report does not identify any levels of exposure that are expected to harm public health and, therefore (in accordance with ATSDR guidance), EHAP does not currently have any recommendations to reduce health risks.

Public health action plan

A public health action plan describes the specific actions EHAP has taken and will take with the goal of preventing and reducing people's exposure to hazardous substances in the environment. EHAP has implemented or will implement the actions listed below in collaboration with community members and partner agencies.

Completed public health actions

Between the spring of 2016 and fall of 2018, EHAP:

- Collaborated with Oregon DEQ on soil sampling plans and placement of air monitors following identification of elevated concentrations of some metals in moss around PCC to ensure that data would be representative of public health
- Convened a community advisory committee to identify the health concerns and help guide the questions addressed in the PHA and met periodically with the committee to provide updates and receive feedback
- Attended and participated in several community meetings organized by DEQ, community advocates and PCC to convey what we knew and didn't know about health risks of air toxics around PCC at the time
- Hosted a webinar to help residents understand when and how different types of public health investigations are used
- Held a public "SoilSHOP" event to screen community members' soil from their gardens and provide guidance on best health practices when gardening in urban areas
- Provided healthy gardening resources to residents concerned about safety of gardening in potentially contaminated soil.

Planned public health actions

In the future, EHAP will:

- Review results of ongoing or future air monitoring by DEQ, Portland State University and PCC to evaluate the potential for health effects
- Continue working with DEQ on the statewide Cleaner Air Oregon effort that aims to implement regulations that ensure that all industrial facility emissions are below levels that may harm public health
- Ensure this public health assessment is made available to all interested community members and stakeholders
- Solicit comments on the draft PHA from community members and stakeholders and update the PHA in response to public comment.

Report preparation

This public health assessment was prepared by the Oregon Environmental Health Assessment Program (EHAP) under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with the approved agency methods, policies and procedures existing at the date of publication. The document was reviewed by Oregon DEQ partners.

This publication was made possible by Grant Number NU61TS000292 from the Agency for Toxic Substances and Disease Registry. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the Agency for Toxic Substances and Disease Registry or the Department of Health and Human Services.

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Endnotes

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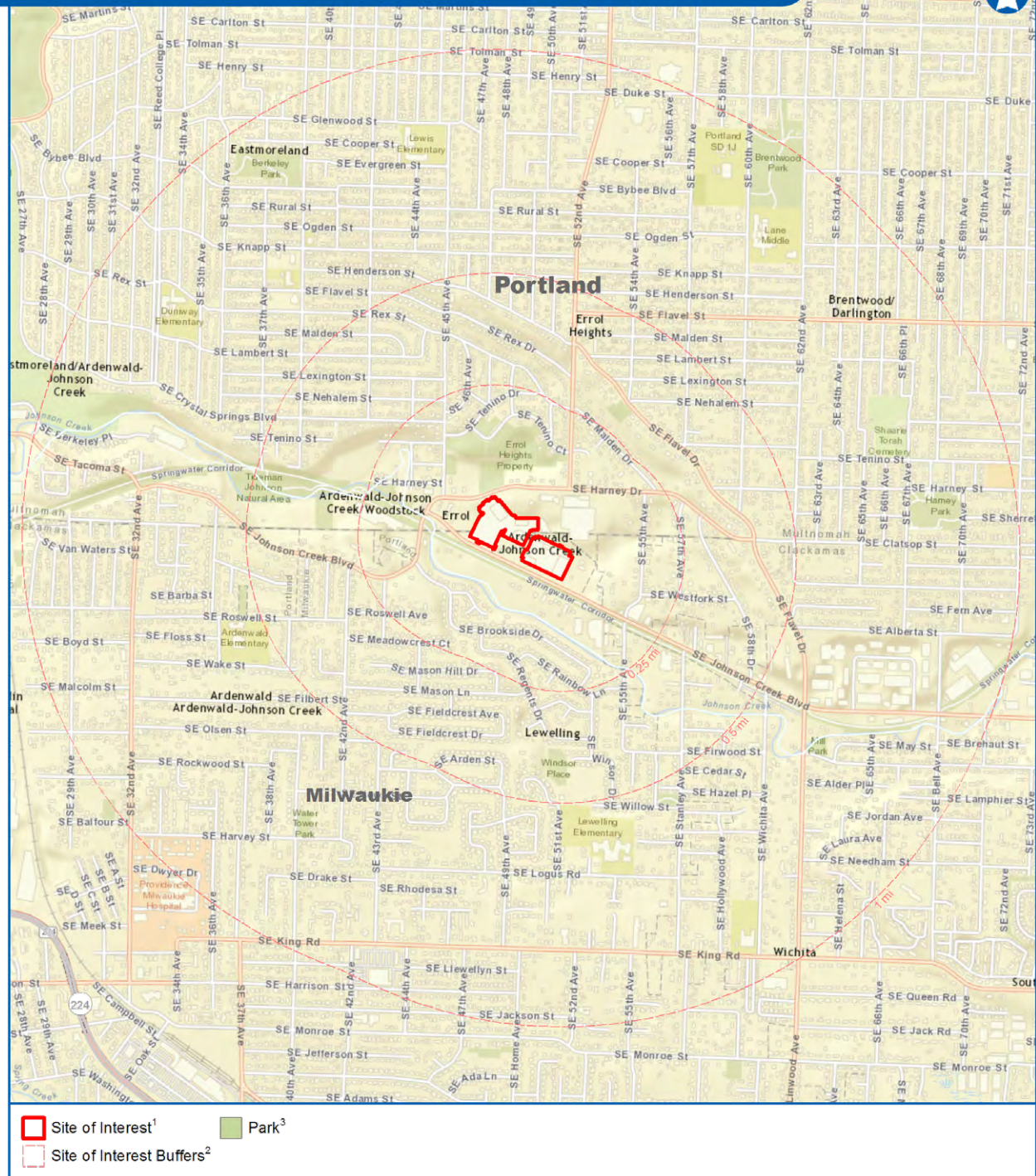
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Appendix A. Area maps

Precision Castparts Large Parts Campus Portland, Multnomah County, OR GENERAL VICINITY SITE OVERVIEW

INTRODUCTORY MAP SERIES



PRJ 04982 YUN2 2/1/17

Agency for Toxic Substances and Disease Registry
Division of Toxicology and Human Health Sciences



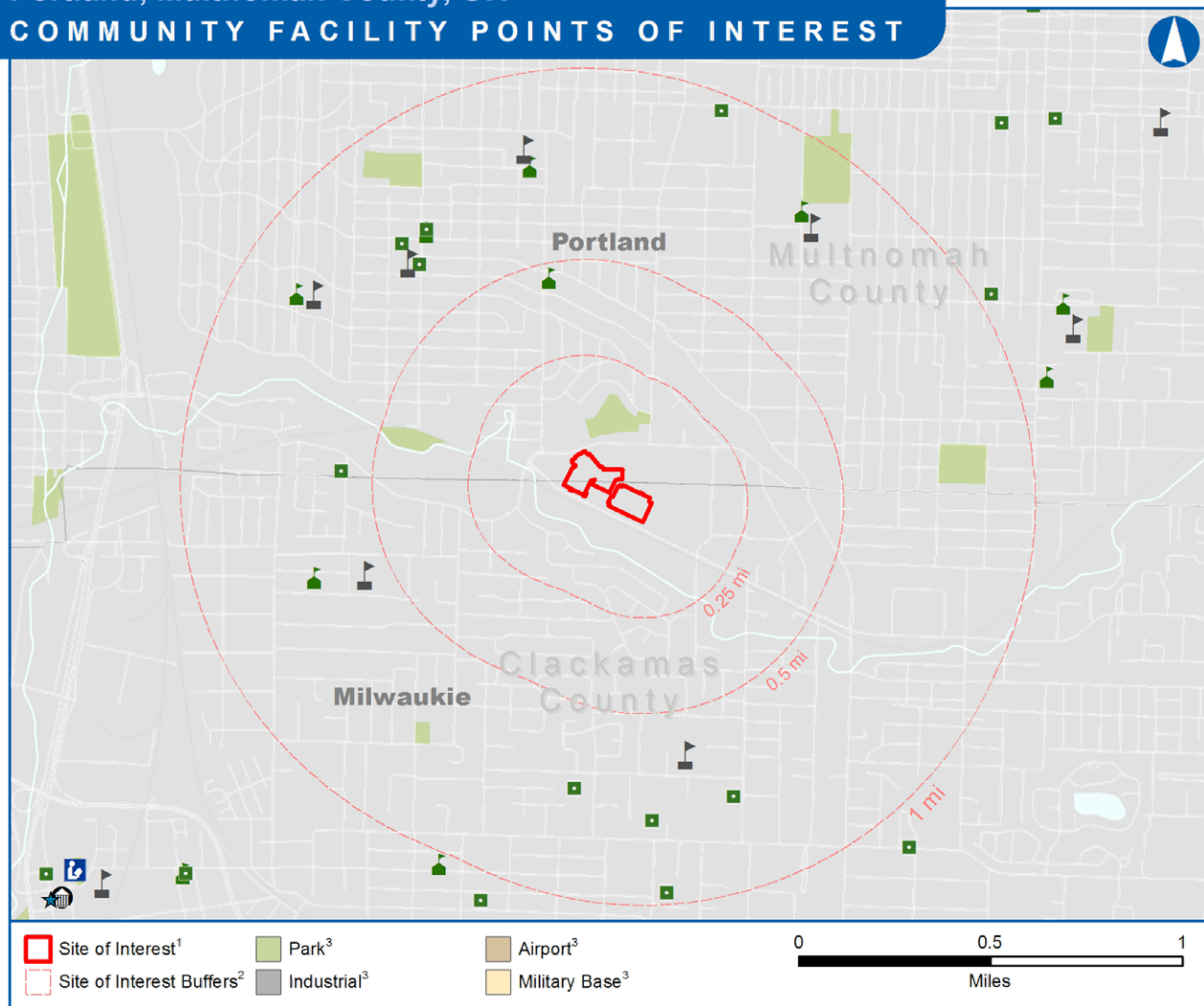
FINAL - FOR PUBLIC RELEASE

Precision Castparts Large Parts Campus

Portland, Multnomah County, OR

COMMUNITY FACILITY POINTS OF INTEREST

INTRODUCTORY MAP SERIES



The **Community Facility Points of Interest Map** depicts the site of interest and community gathering centers in the local area. Information on number, type, and distribution of these facilities is important to efforts to communicate findings to the local population.

Within a **5-mile buffer** of this site are located **702** community gathering centers of which **37%** are designated as places of worship.

Community Facility Points of Interest

Within specified distance of site boundary. Not all buffers may be shown on map

Facility	0.25 mile	0.5 mile	1 mile	3 miles	5 miles
Libraries ³	0	0	0	6	17
Schools ⁴	0	0	6	57	147
Colleges/Universities ⁴	0	0	0	3	16
City Halls ⁵	0	0	0	1	5
Civic Centers ³	0	0	0	3	25
Court Houses ³	0	0	0	1	8
Places of Worship ³	0	0	9	101	265
Day Care Centers ⁴	0	1	6	37	128
Parks ³	1	1	4	31	91

Data Sources: ¹ATSDR GRASP Hazardous Waste Site Boundary Database. ²ATSDR GRASP. ³TomTom International BV (2015).

⁴Homeland Security Infrastructure Program 2015. ⁵NAVTEQ 2012 Q1 data

Projection: NAD 1983 StatePlane Oregon North FIPS 3601 Feet.

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Agency for Toxic Substances and Disease Registry

Division of Toxicology and Human Health Sciences

GRASP



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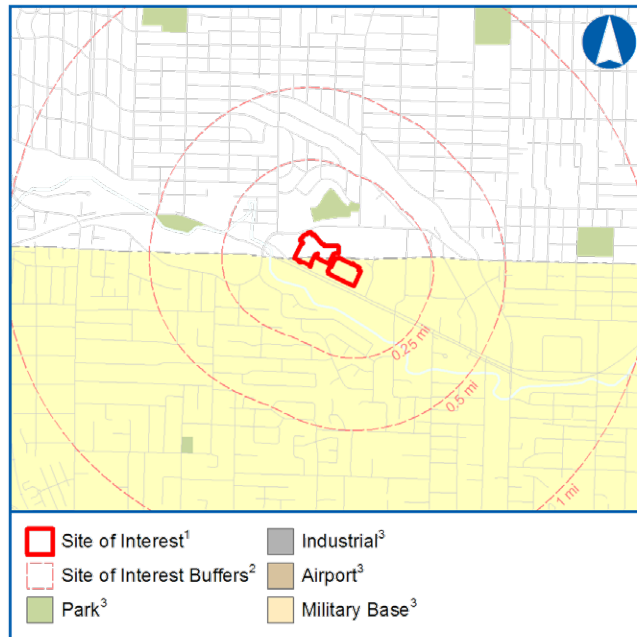
Precision Castparts Large Parts Campus

Portland, Multnomah County, OR

DEMOGRAPHIC SITE PROFILE

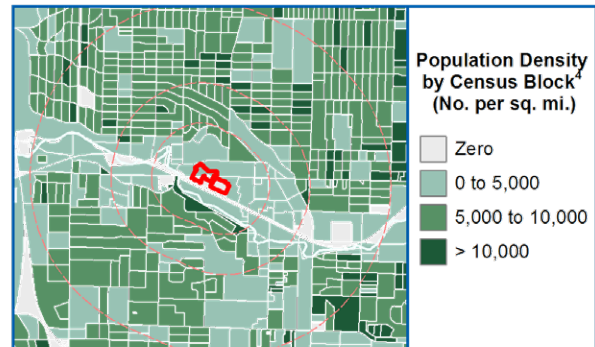
INTRODUCTORY MAP SERIES

Site Vicinity Map

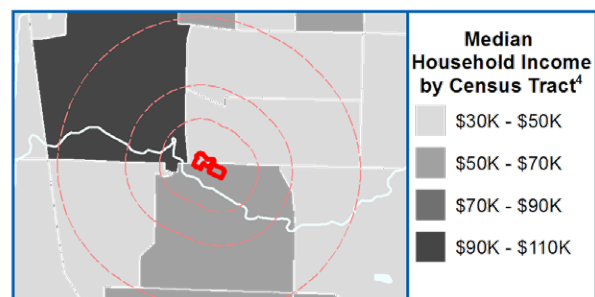
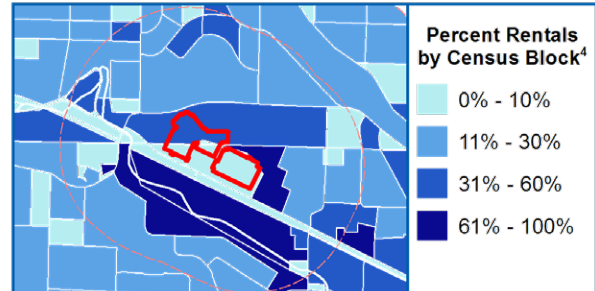
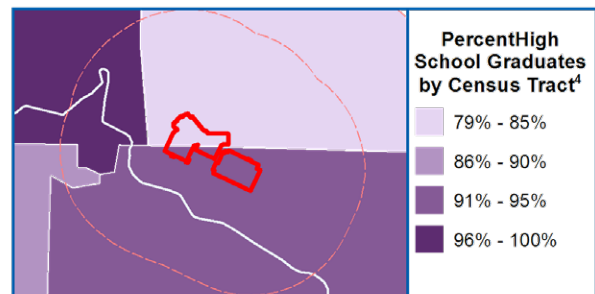


The **General Site Profile Map** depicts the hazardous waste site of interest, along with any airport, industrial, military, or park land uses. It also provides community demographic and housing statistics.

General Population Density



Demographic Indicators



Demographic Statistics^{4,5}

Within 0.5 Miles buffer of site boundary, in Portland, and in Oregon

Measure	0.5 miles	Portland	Oregon
Total Population	5,167	566,686	3,939,233
White Alone	86.6%	72.9%	77.2%
Black Alone	1.3%	6.2%	1.8%
Am. Indian & Alaska Native	1.5%	0.7%	0.9%
Asian Alone	3.5%	7.1%	3.9%
Native Hawaiian & Other Pacific Islander Alone	0.3%	0.6%	0.4%
Some Other Race Alone	2.4%	0.2%	0.1%
Two or More Races	4.4%	3.6%	3.3%
Hispanic or Latino ⁶	7.6%	8.8%	12.3%
% High School Graduate	88.2%	88.9%	88.6%
% Bachelor's Degree	26.4%	42.2%	28.6%
% Renters	17.9%	43.6%	37.8%
Median Household Income	\$55,284	\$55,003	\$49,260

Data Sources: ¹ATSDR GRASP Hazardous Waste Site Boundary Database. ²ATSDR GRASP. ³TomTom International BV (2012). ⁴US Census 2010. **Notes:** ⁵Calculated using area-proportion spatial analysis method. ⁶Individuals identifying origin as Hispanic or Latino may be of any race.

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Agency for Toxic Substances and Disease Registry

Division of Toxicology and Human Health Sciences

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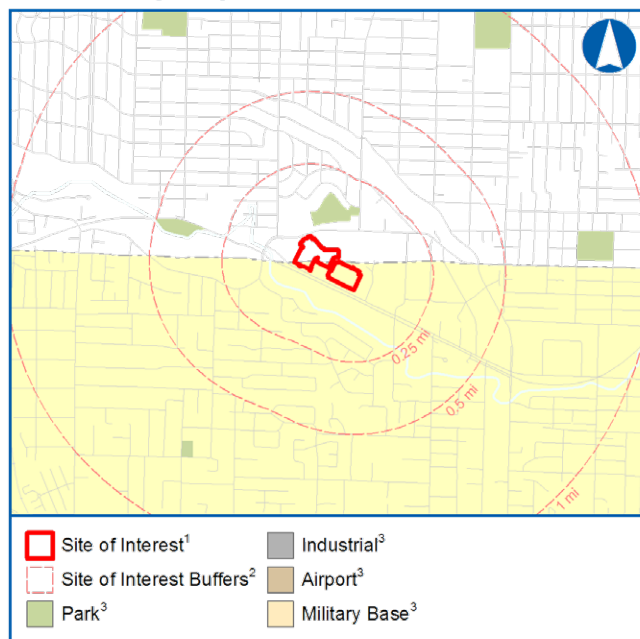
Precision Castparts Large Parts Campus

Portland, Multnomah County, OR

POPULATION SITE PROFILE

INTRODUCTORY MAP SERIES

Site Vicinity Map



The **General Site Profile Map** depicts the hazardous waste site of interest, along with any airport, industrial, military, or park land uses. It also provides community demographic and housing statistics.

Demographic Statistics^{4,5}

Within 0.5 Miles buffer of site boundary

Measure	2000	2010	Change
Total Population	5,082	5,167	+1%
White Alone	4,503	4,476	+0%
Black Alone	36	67	+86%
Am. Indian & Alaska Native	67	77	+14%
Asian Alone	235	182	-22%
Native Hawaiian & Other Pacific Islander Alone	16	14	-12%
Some Other Race Alone	81	123	+51%
Two or More Races	140	227	+62%
Hispanic or Latino ⁶	184	393	+113%
Children Aged 6 and Younger	479	433	-9%
Adults Aged 65 and Older	592	561	-5%
Females Aged 15 to 44	1,088	1,146	+5%
Housing Units	2,093	2,144	+2%
Housing Units Pre 1950	1,734	929	-46%

Data Sources: ¹ATSDR GRASP Hazardous Waste Site Boundary Database. ²ATSDR GRASP. ³TomTom International BV (2012). ⁴US Census 2010. **Notes:** ⁵Calculated using area-proportion spatial analysis method. ⁶Individuals identifying origin as Hispanic or Latino may be of any race.

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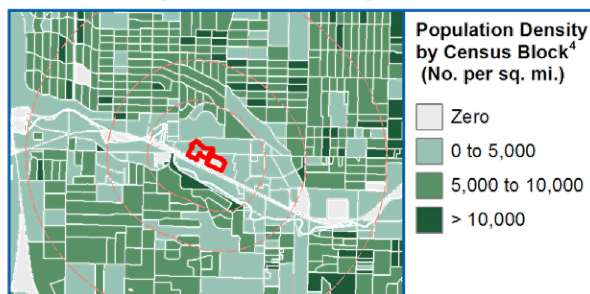
Agency for Toxic Substances and Disease Registry

Division of Toxicology and Human Health Sciences

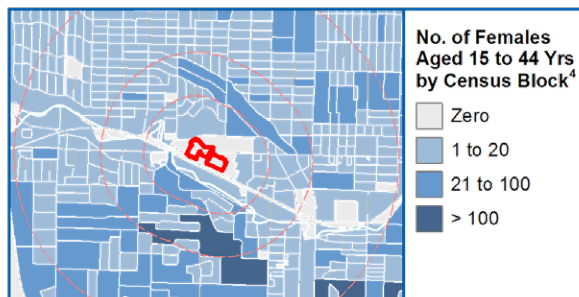
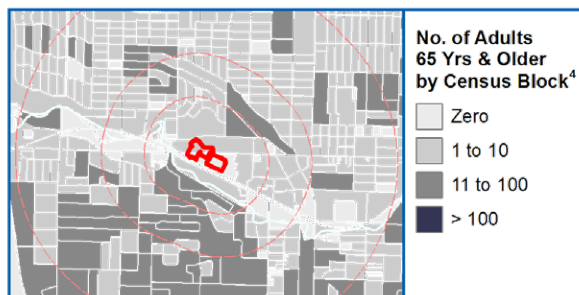
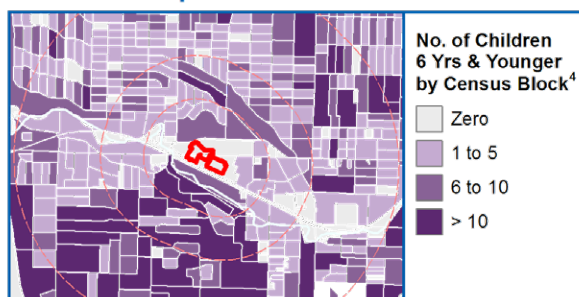
GRASP

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General Population Density



Sensitive Populations



Appendix B. DEQ monitoring locations

Figure B1. Map of DEQ air monitoring locations (courtesy of DEQ). Locations of three metal particulate monitors are labeled MJC, PFH and PHD. MJF is the meteorological monitoring location. Monitoring details available in the sampling and analysis plan (16).

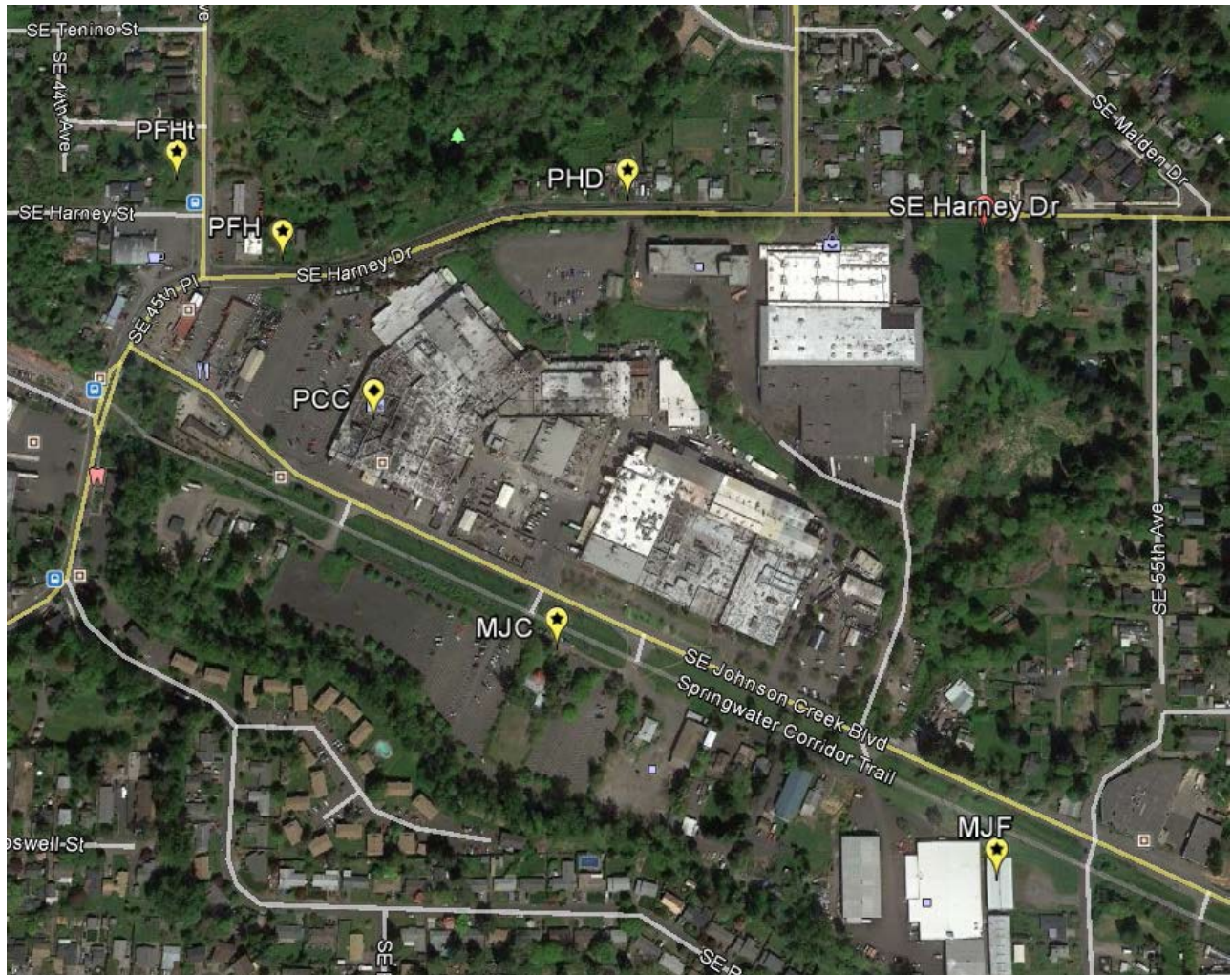
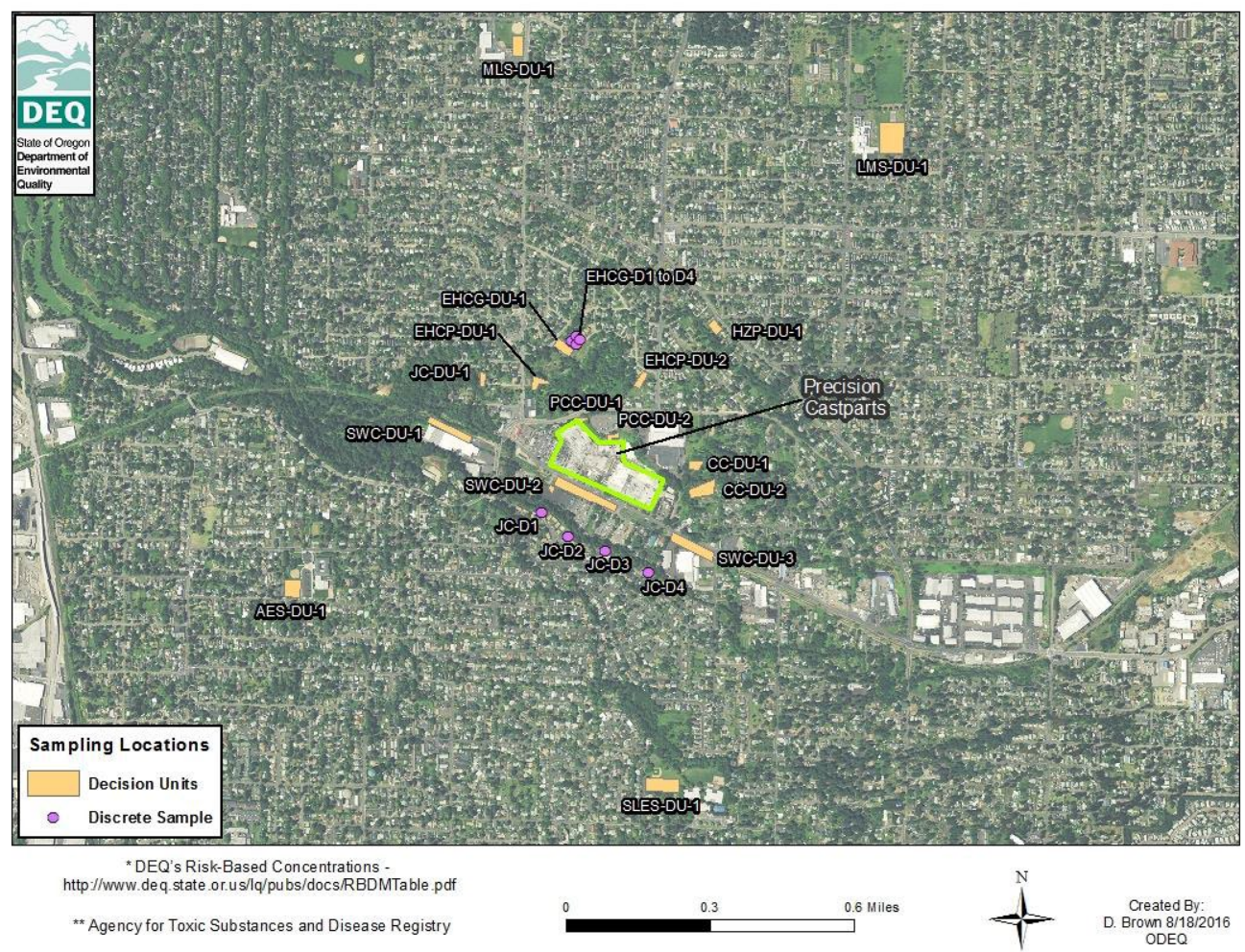


Figure B2. Map of DEQ soil sampling locations (courtesy of DEQ). Details of sampling and analysis methods available in the soil sampling report (17).



Appendix C. Moss sampling results near PCC

Figure C1. Map of approximate US Forest Service moss sampling locations (screenshot from <https://usfs.maps.arcgis.com/apps/webappviewer/index.html?id=14766acdb73e4eb194ba3ada0ce8539d>).

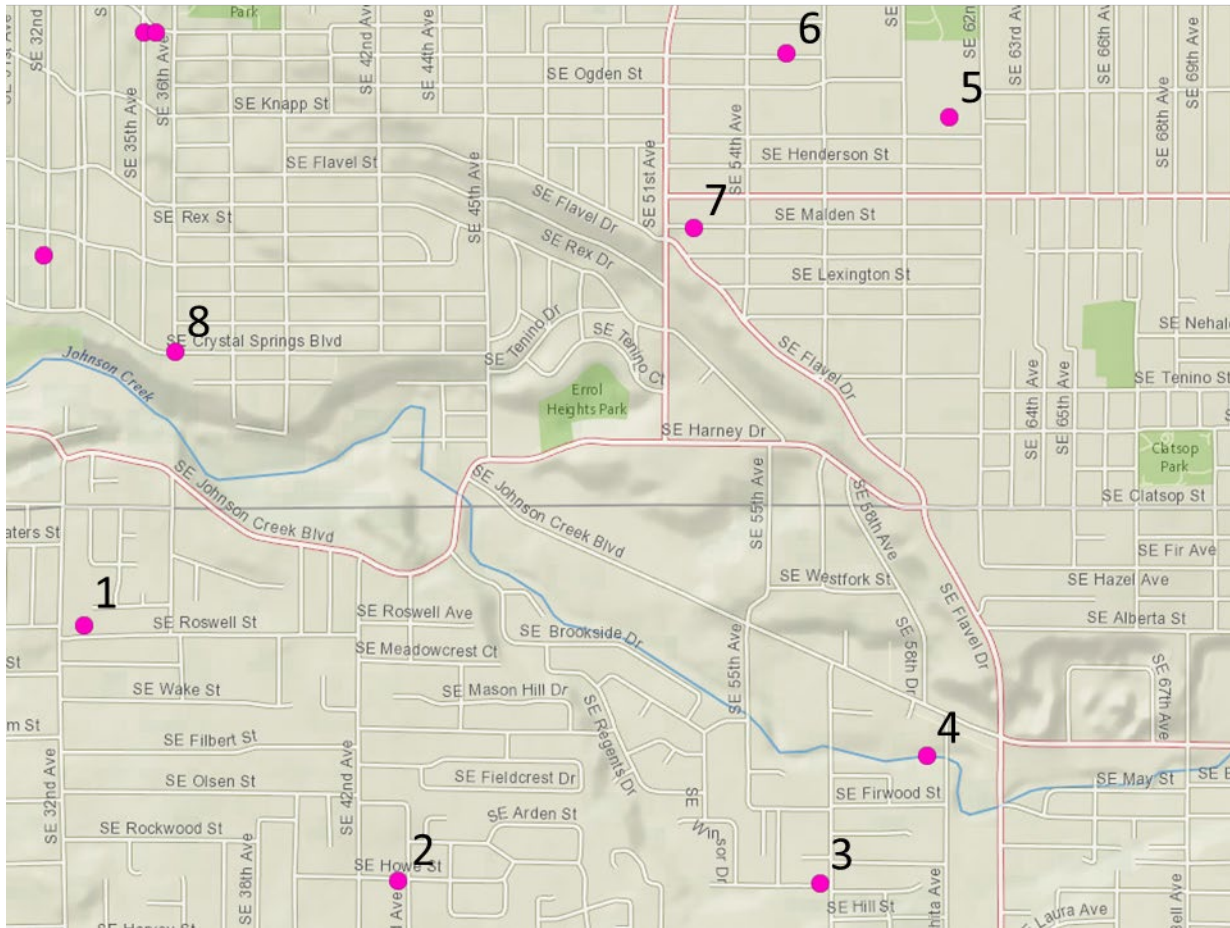


Table C1. Percent rank of moss concentrations for selected metals detected near PCC in comparison with concentrations at all other Portland moss sampling locations Percent ranks closer to 100 indicate higher concentrations relative to moss tested at other locations in Portland

Approximate Location	Nickel	Chromium	Cobalt	Arsenic	Lead
1. 32nd and Roswell	94%	56%	53%	<1%	24%
2. 43rd and Howe	98%	51%	66%	ND	16%
3. SE Stanley	99%	72%	84%	ND	13%
4. SE Wichita Ave	95%	37%	81%	ND	12%
5. SE Knapp and 62nd	96%	62%	82%	96%	62%
6. SE Rural and 57th	100%	88%	95%	90%	47%
7. SE Malden and 52nd	100%	99%	100%	99%	67%
8. Crystal Springs and 36th	95%	85%	91%	24%	68%

ND - Not Detected

Appendix D. Community involvement in the PHA

Community participation helped identify public health concerns, define the scope of the PHA, check assumptions used in risk calculations, and provide guidance on communication strategies for reaching the broader public. EHAP has taken the following steps to ensure meaningful community involvement throughout the PHA process:

Convened a community advisory committee (CAC).

- **Recruitment and composition:** EHAP prioritized residents living in close proximity to the site (within 0.5-mile radius) and populations most sensitive and vulnerable to the effects of exposure to air emissions of metals. EHAP:
 - a. Created targeted CAC recruitment materials,
 - b. Visited several community locations as part of an in-person outreach strategy, including: Roswell Market, 52nd Coin Laundry, Sparkles Laundromat, Impact NW at the Brentwood Darlington Community Center, Wichita Feed Store, Johnson Creek Market, Brookside Apartments, Brentwood Community Gardens, Lane Middle School and Ardenwald School,
 - c. Issued a press-release announcing the CAC recruitment,
 - d. Recruited 13 CAC members representing diverse perspectives, including parents of young children, long-time residents of the neighborhood, residents with autoimmune and chronic health conditions, gardeners, and small business owners.
- **CAC meeting logistics:** EHAP convened three formal CAC meetings. To remove barriers for participation, EHAP held meetings outside of daytime work hours at a neighborhood location, served food for participants, and allowed children. Meetings were held in the evening over the span of dinner mealtime hours (from 6:00 PM to 8:00 PM). EHAP leveraged resources beyond the Agency for Toxic Substances and Disease Registry (ATSDR) Cooperative Agreement to provide food at every meeting. EHAP was not able to provide childcare at meetings. EHAP did not translate materials or directly target non-English speaking residents due to the limitations imposed by a tight timeline, funding, and staff constraints.
- **CAC meeting content:** The CAC meetings were structured to provide the opportunity for meaningful participation¹. EHAP used evidence-based strategies for effective presentations and adult education (52). The content and training explained the PHA process. The presentations, interactive activities, handouts and visual displays were informed by learning objectives with the goal of increasing participants' understanding of the PHA process. This allowed the PHA-CAC members to make

¹ "Meaningful participation" means engaging a diverse group of stakeholders who are representative of the communities that policies and programs will affect, not only in consultative roles to provide input, but also to co-plan or lead program development efforts, have access to data and resources to make informed decisions, have decision-making authority, and participate in the analysis of data and program effect efforts.

informed decisions when advising EHAP on specific elements of the PHA process. Every meeting included time for community advisors to make suggestions, ask questions, and share concerns. EHAP compiled list of CAC concerns, questions and advice and provided responses with resources. This information is summarized within the “Community concerns” section of this PHA.

- **Ongoing dialogue with CAC members:** Informal meetings and conversations have continued with some CAC members who have requested additional information. In addition, EHAP has kept CAC members apprised of timeline changes, PHA updates, opportunities for additional input, and other relevant events (webinars, workshops, etc.).

Attended and Participated in Public Forums. Alongside local partners, EHAP participated in several public forums to learn more about community concerns and to communicate about the PHA process. These public meetings ranged in attendance from 30-200 people and occurred in 2016 and 2017.

Provided online communication. To keep the public informed, EHAP created a webpage for the PCC Larger Parts Campus PHA at www.healthoregon.org/ehap. The page links to relevant documents, other PHAs and contact information for EHAP. It will continue to be updated as needed.

Responded to phone and email contact. EHAP had direct phone and email contact with several individuals through a dedicated phone line, personal contact with EHAP staff, and the EHAP program e-mail.

Community concerns

ATSDR developed its PHA protocols specifically to address community concerns related to environmental health. OHA follows these protocols under the terms of its ATSDR cooperative funding agreement that funds OHA’s Environmental Health Assessment Program. Through the PCC Community Advisory Committee (CAC), public forums, and phone and email communication with individuals, EHAP identified a set of environmental health concerns shared by community members. These concerns and responses from EHAP are summarized below.

Specific Exposure Scenarios

Community members wanted to understand risks associated with several specific exposure scenarios, including breathing the neighborhood air, gardening and eating local produce, playing in Johnson Creek, and children’s exposures at nearby schools and daycares. Community members also asked EHAP to consider the effects to volunteer workers in the park and creek.

This PHA evaluates the potential health risks of contact with air, water, soil, and sediment measured around the PCC facility. To evaluate risk, EHAP used ‘worst-case’ scenario assumptions about the frequency and intensity of exposure.

To evaluate risk of exposure to emissions currently in the air, EHAP assumed neighbors of PCC are exposed to concentrations detected immediately surrounding the facility, 24 hours a day for a lifetime. Cancer risk of all air contaminants was evaluated cumulatively. Using these health-protective assumptions, EHAP concluded that current air emissions are not expected to harm health. Because air emissions generally decrease with distance from the source, this also means that there is little risk expected from air at homes, schools, and parks farther away from PCC.

To evaluate risk from contact with contaminants in Johnson Creek sediment, EHAP assumed weekly year-round contact (or 4 times a week in the summer months only) that resulted in sediment containing the maximum chemical concentrations detected at any point in monitoring covering lower legs and feet, hands, and forearms. Using these health-protective assumptions, EHAP concluded that the occasional contact with chemical contaminants in Johnson creek water and sediment that occurs during recreation and volunteering is not expected to pose a health risk. EHAP also considered an extreme exposure scenario assuming daily contact with sediment year-round. This extreme exposure scenario slightly increased lifetime cancer risk and non-cancer effects of nickel exposure, but EHAP is not aware of any individuals that come in contact with the Creek frequently enough for this to be a public health concern. Concentrations of contaminants detected in Johnson Creek surface water were below comparison values for water and are therefore not expected to harm health.

Concentrations of metals detected in soil surrounding PCC were below health-based comparison values for soil. These comparison values are designed to be protective of gardeners and children playing in the soil. EHAP concluded that exposure to soil through gardening, eating local produce, and playing in dirt is not expected to harm health. For those concerned about contaminants in soil, resources for safe gardening are available at www.healthoregon.org/gardening.

Exposure pathways and risk calculations are described in greater detail in the “Health effects evaluation” section of this PHA and in Appendix G.

Historical Exposures

Community members want more information on historical exposures (including emergency releases of hazardous materials) that may have affected health.

There is very limited information on the historical exposures to emissions from PCC. The “Health effects evaluation” section of this PHA includes a discussion of the potential for historical emissions to harm health based on emission rates reported by PCC to the EPA since 1987. However, the data have limitations and only provides information about general emissions trends. Based on reported emissions rates, it is possible that historical air emissions were high enough to harm health. However, there is no historical air monitoring data available. EHAP concludes there is insufficient data to support a quantitative assessment.

Similarly, there is limited information about the amount of exposure that may have occurred during accidental releases that occurred in the past. Emergency releases can result in high, short-term exposures. However, EHAP does not have information about exposures during these past events. EHAP is not able to address risks of accidental short-term exposures in this assessment.

Environmental monitoring data

Community members wanted to know whether monitoring station locations were appropriate for identifying the maximum concentrations people may be exposed to and whether there are any additional types of data that would help to inform potential health risks. They also wanted to know how monitoring distinguishes between different forms of nickel.

DEQ selected air monitor locations (16) to capture metals concentrations near the source on three sides of the facility (Appendix B). The locations were selected based on information about emissions, wind directions, and access to properties where monitors could be placed. Nearby weather stations collected data on wind direction and wind speed. Some community members expressed concern that DEQ's monitoring locations were very close to PCC and may not adequately capture 'worst case' air concentrations if emissions spread farther through air before falling to the ground. Researchers at Portland State University also performed monitoring at additional locations farther away from the facility, on nearby residents' properties that may provide more information about air concentrations near homes. Once it is available, this information will be available from the PSU Sustainable Atmospheres Research (STAR) lab website: <https://star.research.pdx.edu/PNAQ.html>.

Different species of nickel have different degrees of toxicity. However, the air monitoring data that are available around PCC report total nickel concentrations and do not distinguish between different species. To make assumptions that protect health, EHAP calculated potential health risks under the assumption that all the nickel detected is in a more toxic form.

Health outcomes

Community members expressed concerns about cancer rates in the neighborhood and asked about the availability of additional health outcome data. They also asked if other health outcomes in the neighborhood such as immune disorders, autism, and other neurodevelopment conditions are related to air emissions.

Health outcome data (i.e., incidence of health outcomes such as cancer) can sometimes help identify increased risk of disease among people affected by environmental exposures. Use of health outcome data in PHAs is determined based on specific guidance in ATSDR's *Public Health Assessment Guidance Manual* (53). The main requirements for evaluating health outcome data are the presence of a completed human exposure pathway, contaminant levels high enough to

result in measurable health effects, a sufficient number of people in the completed pathway for health effects to be measured, and a health outcome database in which disease rates for the population of concern can be identified (53). When these requirements are not met, a health outcome study is unlikely to be able to detect health effects in a community even if they are present.

SPAQ made a formal request for a cancer analysis to be done using the Oregon State Cancer Registry (OSCaR). OHA denied the request because the situation does not meet its criteria for a cancer investigation. As described in OHA's formal response to SPAQ's request:

"The purpose of the Oregon State Cancer registry is two-fold: 1) to provide opportunities for Oregonians diagnosed with cancer to participate in scientific research projects aimed at improving the quality of cancer treatment; and 2) to monitor overall rates and trends in cancer in the population to target and evaluate prevention efforts. Its purpose is not to analyze cancer data to examine rates in small areas (neighborhoods) because such analyses do not yield useful information that assists in identifying environmental contaminants that people may be exposed to."

OHA only conducts cancer investigations when all the following criteria are met: the cancer(s) of interest are rare, no environmental contaminants have already been identified as potential risk factors for cancer in the community, a defined geographic area is affected, and the time period of concern for cancer diagnoses can be established. In this case, the cancers associated with the chemicals of concern are not rare and the contaminants of concern are defined (the chemicals emitted from PCC). In addition, a lack of information about the extent of individuals' exposure would make it difficult to identify the specific population that should be included in the cancer analysis. We cannot determine how much carcinogen exposure a person near PCC may have had and are not able to control for other exposures that people farther from PCC may have had. Finally, the small population size of the communities around PCC would make it very difficult to detect increased cancer rates. If cancer rates in the community were higher than average, the cancer investigation would not be able to determine the cause; many different factors may contribute to cancer risk and cancer registry data cannot explain what caused any individual cancer case.

Cancer analysis is a public health tool that is helpful for estimating incidence of cancer across a large population. In contrast, health assessments that compare toxicology data to chemical concentrations detected in the environment are often a more sensitive tool for detecting potential health risks when changes in health outcomes are not yet detectable in the population. By comparing chemical concentrations in air, water, soil, and sediment with health-protective concentrations identified by toxicologists, EHAP can estimate very low cancer risks (on the scale of 1 in 1 million). It would not be possible to detect these relatively small increases in cancer risk in a small population.

There is no state registry to report diseases such as autoimmune disorders, autism, and other neurodevelopmental problems to OHA. Therefore, it is not possible to determine if rates found in this neighborhood are more or less or the same as expected.

In this PHA, we also explored recent scientific literature linking exposure to specific contaminants of concern at PCC with specific health outcomes of concern for community members. The potential health effects that have been identified for each chemical are described in Appendix F.

Biological Testing

Some community members expressed confusion about whether they should get their blood or urine tested and what the results would mean for their health.

OHA did not recommend that community members seek medical testing. Blood and urine measurements are not accurate predictors of long-term exposure to several of the metals of concern around PCC (e.g. arsenic, chromium, and nickel) because they do not stay in the body over long periods of time. Also, little is known about what specific concentrations of these metals in blood or urine mean for an individual's health. However, OHA, along with Multnomah County Health Department, developed a clinician guidance document (available at <http://www.oregon.gov/oha/ph/newsadvisories/Documents/se-portland-metals-emissions-physician-guidance.pdf>) to increase the likelihood that if a heavy metal medical test is performed, it is done correctly. This guidance also provides clinicians with information about how to interpret test results. The Northwest Pediatric Environmental Health Specialty Unit (NW PEHSU) can also help with interpretation, available at 206-221-8671 or visit the NW PEHSU website at www.depts.washington.edu/pehsu.

Sensitive Populations

Community members wanted to know how factors that influence susceptibility (such as epigenetics) and sensitive populations (elderly, children, and developing fetuses) would be addressed in the PHA.

Many factors influence how an individual processes and responds to chemicals in the environment. Genetics, epigenetics (changes in how genes are expressed that can be passed down through generations), life-stage, cumulative chemical exposures, nutrition, stress, pre-existing disease, and other factors can all interact in complex ways to influence our health. For example, children and developing fetuses can be particularly sensitive to chemical exposures because chemicals can change the way their bodies develop.

To the extent possible with existing science, the health effects evaluation in this PHA is designed to be protective of the most sensitive populations. However, scientific understanding of how these factors influence health is still evolving.

Because there is not enough information to support a quantitative assessment of the additional sensitivity of subgroups, we include a discussion of the factors that may influence susceptibility in the “Uncertainties and data gaps” section of this PHA.

Cumulative effects

Community Advisory Members raised concerns over the effects of cumulative exposure to multiple chemicals and pathways as well as additive or synergistic effects from the contaminants of concern.

In this PHA, when there were multiple chemicals with the potential to affect the same health outcomes, EHAP evaluated health effects of all chemicals cumulatively. To evaluate cancer risk associated with air emissions, EHAP evaluated cancer risk of all cancer-causing chemicals together. To evaluate cancer risk associated with Johnson Creek sediment, EHAP evaluated the cumulative cancer risk of all cancer-causing contaminants of concern that people may come in contact with through both skin contact and by swallowing. It is possible for chemicals to interact synergistically (to produce an effect that is greater than an additive effect), but there is no evidence that this is true for the chemicals evaluated in this PHA.

The primary focus of this PHA is to assess health risks from PCC. EHAP acknowledges the concern for exposures from other sources. This PHA does not include an in-depth review of exposure risks from other sources beyond the site. The EPA Transportation and Air Quality and Health program developed frequently asked questions on this issue, available at:

<https://www3.epa.gov/otaq/nearroadway.htm>.

Risk communication

Community members expressed concerns about contamination in Johnson Creek. Some community members requested that signage be posted, warning of health risks due to bacteria or chemicals. Community members also noted that DEQ and OHA need clearer communication with the public.

Based on the results of EHAP’s health assessment, occasional contact with chemical contaminants detected in Johnson Creek water and sediment are not expected to harm health. EHAP does not recommend posting warning signs about chemical contamination. However, like many urban streams, Johnson Creek frequently exceeds safe levels of bacterial contamination. Risk of bacterial infections is beyond the scope of EHAPs typical work to evaluate chemical risks, but EHAP recommends that community members take appropriate precautions when coming in contact with Johnson Creek and all urban streams to prevent bacterial infection. Specifically, people should avoid getting water from urban streams in their mouths and use clean water to

wash any parts of their bodies that come in contact with the stream, particularly before eating or drinking.

DEQ uses water quality standards for bacteria to evaluate safety of coastal water for recreational use: <https://www.oregon.gov/deq/wq/Pages/WQ-Standards-Bacteria.aspx>

OHA's Beach monitoring program provides information on health risks from bacteria in water and recommendations for reducing risk:

<https://www.oregon.gov/oha/PH/HEALTHYENVIRONMENTS/RECREATION/BEACHWATERQUALITY/Documents/pocketbrochure.pdf>)

Emergency Preparedness

Community members expressed concern around PCC's emergency procedures, material storage, and shut down in the event of a disaster. They want to know whether PCC's chemical storage facilities are built to withstand an earthquake and how chemical releases would be prevented in an emergency. There was of particular concern around the potential health effects from sudden releases of materials onsite in the event of an emergency.

PCC has posted some information on emergency planning in the FAQ section of its community outreach website (54). The company reports it has a 'Contingency and Emergency Response Plan' that "includes but is not limited to: shutting off all utilities to prevent fire potential using backup generators to keep critical emissions controls operating. Chemicals are stored within secondary containment (e.g. lined concrete vaults)." Secondary containment practices and spill prevention and response plans are described in the Storm Water Pollution Control Plan submitted to DEQ (55). The company also reports participation in meetings with the Local Emergency Planning Committee.

Community members concerned about emergency preparedness may consider contacting the Multnomah County or Clackamas County Local Emergency Planning Committee. Contact information is available at:

https://www.oregon.gov/OSP/SFM/pages/local_emergency_planning_committees.aspx

The DEQ air program does not regulate emergency preparedness and does not have documentation of PCCs emergency response plans.

Noises and Odors

Community members expressed concern over loud grinding noises and odors coming from the site. They also expressed a desire for a better understanding of what all the stacks at PCC are used for and greater transparency about PCC's processes and emissions.

EHAP cannot identify if any odor is coming from PCC. DEQ enforces nuisance odor complaints in Oregon. EHAP encourages communities to file nuisance odor related complaints with DEQ, see resources to do so below:

- DEQ Odors Complaint Online Form <http://www.deq.state.or.us/complaints/dcomplaint.aspx>
- OHA Odors fact sheet https://public.health.oregon.gov/HealthyEnvironments/HealthyNeighborhoods/ToxicSubstances/Documents/OdorsAndYourHealth_Final.pdf
- ATSDR Odors Resources <https://www.atsdr.cdc.gov/odors>

The state of Oregon has noise standards (OAR 340, Division 35) that are enforced by local agencies. Neighbors that are disturbed by noise at PCC can contact city and county officials:

- Portland Noise Control Program: <https://www.portlandoregon.gov/oni/63242>
- City of Milwaukie: <https://www.milwaukieoregon.gov/police/code-enforcement-complaint-form>

Appendix E. Comparison values and contaminant screening

This appendix defines the various comparison values (CVs) that were used in this Public Health Assessment and describes the hierarchy by which they were chosen. It also includes more detailed screening tables for environmental monitoring data near PCC. This process is also explained in Chapter 7 of ATSDR's Public Health Assessment Guidance Manual (53). ATSDR uses the hierarchy shown in Figure A1 to choose CVs for screening purposes. CVs used in this document are listed below:

Environmental Media Evaluation Guides (EMEGs)

EMEGs are an estimate of contaminant concentrations low enough that ATSDR would not expect people to have a negative, non-cancerous health effect. EMEGs are based on ATSDR Minimal Risk Levels (MRLs, described below) and conservative assumptions about the public's contact with contaminated media, such as how much, how often, and for how long someone may be in contact with the contaminated media. EMEGs also account for body weight.

Cancer Risk Guides (CREGs)

CREGs are estimated contaminant concentrations that would be expected to cause no more than one excess cancer in a million (10⁻⁶) persons exposed during their lifetime (70 years). ATSDR's CREGs are calculated from EPA's cancer slope factors (CSFs) for oral exposures or unit risk values for inhalation exposures. These values are based on EPA evaluations and assumptions about hypothetical cancer risks at low levels of exposure.

Reference Dose Media Evaluation Guides (RMEGs)

ATSDR derives RMEGs from EPA's oral reference doses, which are developed based on EPA evaluations. RMEGs represent chemical concentrations in water or soil at which daily human contact is not likely to cause negative, non-cancerous health effects.

Minimal Risk Levels (MRLs)

A MRL is an estimate of daily human exposure – by a specified route and length of time – to a dose of a chemical that is likely to be without a measurable risk of negative, non-cancerous effects. MRLs are based on ATSDR evaluations. Acute MRLs are designed to evaluate exposures lasting 14 days or less. Intermediate MRLs are designed to evaluate exposures lasting from 15-364 days. Chronic MRLs are designed to evaluate exposures lasting for 1 year or longer.

Oral exposures (swallowing the contaminant) are measured in milligrams per kilogram per day [mg/kg/day] and inhalation exposures (breathing the contaminant) are measured in parts per billion [ppb] or micrograms per cubic meter [$\mu\text{g}/\text{m}^3$].

Maximum Contaminant Levels (MCL)

MCLs are derived by EPA as enforceable standards for municipal water systems. These standards are not strictly health-based but are set as close to the maximum contaminant level goals (MCLGs) (health goals) as is feasible and are based upon treatment technologies, costs (affordability) and other feasibility factors, such as the availability of analytical methods, treatment technology and costs for achieving various levels of removal.

Regional Screening Levels (RSLs)

RSLs are contaminant concentrations in soil, water, or air, below which any negative health effects would be unlikely. RSLs are derived by EPA's Region 3 Office using EPA's reference doses (RfDs) and cancer slope factors (CSFs). This ensures that RSLs consider both non-cancer and cancer risks. RSLs are available online at: (http://www.epa.gov/reg3hwmd/risk/human/rbconcentration_table/Generic_Tables/index.htm)

Table E1. Screening of air concentrations prior to HEPA filter installation (3/30/16-5/16/16)

	45th and Harney Monitor (PFH)			S.E. Harney Dive. Monitor (PHD)			Milwaukie Johnson Creek Monitor (MJC)			Comparison Values (CV)					
	Average ng/m ³	UCL ng/m ³	Max ng/m ³	Average ng/m ³	UCL ng/m ³	Max ng/m ³	Average ng/m ³	UCL ng/m ³	Max ng/m ³	Cancer CV ng/m ³	Cancer CV Source	Non-cancer CV ng/m ³	Non-cancer CV source	Non-cancer health effect	COC?
Arsenic	0.74	0.87	2.25	0.81	0.96	4.40	0.88	1.05	5.03	0.23	ATSDR CREG	NA	NA	NA	yes
Beryllium	0.01	0.01	0.02	<0.086	NA	<0.086	<0.086	NA	<0.086	0.42	ATSDR CREG	NA	NA	NA	no
Cadmium	0.09	0.12	0.23	0.17	0.21	0.45	0.14	0.15	0.24	0.56	ATSDR CREG		ATSDR chronic MRL	kidney function	no
Chromium	19.14	NA	31.60	30.91	NA	39.00	42.03	NA	60.30				(see hexavalent chromium)		
Cobalt	1.45	4.80	25.40	1.02	1.38	7.32	3.35	9.50	36.30	NA	NA	100	ATSDR chronic MRL	respiratory function	no
Hexavalent Chromium	0.11	0.15	0.44	0.18	0.23	1.01	0.31	0.39	1.16	0.052	ATSDR CREG	5	ATSDR chronic MRL	upper respiratory effects	yes
Lead	2.20	2.57	5.39	2.26	2.61	5.34	2.08	2.46	4.84	NA	NA	150	ABC/NAAQS	brain development	no
Manganese	7.33	8.98	26.60	9.56	11.57	31.60	7.03	8.90	26.60	NA	NA	300	ATSDR chronic MRL	neurological function	no
Nickel	6.30	11.25	44.50	9.11	12.41	43.00	22.28	31.68	131.00	4	EPA RSL/ABC	90	ATSDR chronic MRL	respiratory inflammation	yes
Selenium	0.17	0.20	1.06	0.65	NA	0.87	0.74	NA	1.12	NA	NA	20,000	EPA RSL	selenosis	no

NA - Not Available; CV - Comparison Value; UCL - Upper Confidence Limit

CREG - Cancer Risk Evaluation Guide for cancer effects (ATSDR)

RSL - Regional Screening Level; Environmental Protection Agency (EPA)

NAAQS- National Ambient Air Quality Standards (EPA)

ABC - Ambient Benchmark Concentration (Oregon DEQ)

Table E2. Screening of air concentrations under current conditions (5/17/16-1/22/17)

	45th and Harney Monitor (PFH)				S.E. Harney Drive Monitor (PHD)				Milwaukie Johnson Creek Monitor (MJC)				Comparison Values					
	Average ng/m ³	UCL ng/m ³	Max ng/m ³		Average ng/m ³	UCL ng/m ³	Max ng/m ³		Average ng/m ³	UCL ng/m ³	Max ng/m ³		Cancer CV ng/m ³	Cancer CV Source	Non- cancer CV ng/m ³	Non-cancer cancer CV source	Non-cancer health effect	COC?
Arsenic	0.6633	0.92	5.48		0.4621	0.65	3.48		0.448	0.62	3.42		0.23	ATSDR CREG	NA	NA	NA	yes
Beryllium	0.0064	0.01	0.018		<0.086	NA	<0.086		<0.086	NA	<0.086		0.42	ATSDR CREG	NA	NA	NA	no
Cadmium	0.1302	0.21	1.3		0.6826	3.16	9.19		0.1186	0.13	0.214		0.56	ATSDR CREG	10	ATSDR chronic MRL	kidney function	yes
Chromium	1.7308		4.83		31.2		31.2		33.554		63.2		(see hexavalent chromium)					
Cobalt	0.134	0.15	0.54		0.3874	0.52	2.63		1.1807	1.42	13.1		NA	NA	100	ATSDR chronic MRL	respiratory function	no
Hexavalent Chromium	0.0772	0.08	0.243		0.1197	0.13	0.589		0.3297	0.37	1.7		0.052	ATSDR CREG	5	ATSDR chronic MRL	upper respiratory effects	yes
Lead	1.8774	2.03	8.65		1.4416	1.56	5.12		1.4352	1.56	5.99		NA	NA	150	ABC/NAA QS	brain development	no
Manganese	5.8653	6.44	36.3		7.6014	8.29	35.8		8.8073	9.80	39.1		NA	NA	300	ATSDR chronic MRL	neurological function	no
Nickel	0.7998	0.88	2.93		2.6301	3.68	15.4		9.5025	11.03	51		4	EPA RSL/ ABC	90	ATSDR chronic MRL	respiratory inflammation	yes
Selenium	0.1971	0.21	1.48		0.4975	0.63	1.03		0.7286	1.76	3.56		NA	NA	20,000	EPA RSL	selenosis	no

NA - Not Available; CV - Comparison Value; UCL - Upper Confidence Limit

CREG - Cancer Risk Evaluation Guide for cancer effects (ATSDR)

RSL - Regional Screening Level; Environmental Protection Agency (EPA)

NAAQS- National Ambient Air Quality Standards (EPA)

ABC - Ambient Benchmark Concentration (Oregon DEQ)

Table E3. Screening of soil concentrations detected June 2016

Contaminant	Average Concentration mg/kg (ppm)	Max Concentration mg/kg (ppm)	Cancer Comparison Value mg/kg (ppm)	Cancer CV source	Non-cancer Comparison Value mg/kg (ppm)	Non-cancer CV source	Chemical of Potential Concern?
Arsenic, Total	4.76	10.90	0.25	ATSDR CREG	17	ATSDR chronic child EMEG and RMEG (dermal effects)	no
Beryllium, Total	0.54	0.66	NA	NA	110	ATSDR chronic child EMEG and RMEG (gastrointestinal effects)	no
Cadmium, Total	0.28	0.82	NA	NA	5.7	ATSDR chronic child EMEG (kidney function)	no
Chromium, Total	53.36	239.00	NA	NA	86,000	ATSDR RMEG for trivalent chromium	no
Chromium, Hexavalent	1.17	5.26	NA	NA	51	ATSDR chronic child EMEG (intestinal effects)	no
Cobalt, Total	20.17	81.00	NA	NA	570	ATSDR intermediate child EMEG (hematological effects)	no
Iron, Total	27,736.67	36,600.00	NA	NA	55,000	EPA residential RSL (gastrointestinal effects)	no
Lead, Total	34.17	91.80	NA	NA	400	EPA lead standard for bare soil in children's play areas (impaired neurodevelopment)	no
Manganese, Total	706.67	1,030.00	NA	NA	2,900	ATSDR chronic child RMEG (neurological function)	no
Nickel, Total	123.43	776.00	NA	NA	1,100	ATSDR chronic child RMEG (decreased body weight)	no
Selenium, Total	0.17	0.36	NA	NA	290	ATSDR chronic child EMEG and RMEG (selenosis)	no
Titanium, Total	1795.00	2680.00	NA	NA	140,000	EPA residential RSL for titanium tetrachloride; no CVs are available for titanium alone	no
Zinc, Total	100.05	213.00	NA	NA	17,000	ATSDR chronic child EMEG (copper deficiency)	no

Table E4. Screening for chemicals in Johnson Creek sediment (Landau Associates 2009-2015)

Chemicals Detected	Max concentration in sediment mg/kg (ppm)	Soil Cancer CV (ppm)	Cancer CV Source	Soil Non-cancer CV (ppm)	Non-cancer CV Source	Chemical of Potential Concern?
Antimony	0.66	NA	NA	23	ATSDR child chronic RMEG	no
Arsenic	6.56	0.25	ATSDR CREG	17	ATSDR child chronic EMEG	no
Barium	1.05	NA	NA	11,000	ATSDR child chronic EMEG	no
Beryllium	0.41	NA	NA	110	ATSDR child chronic EMEG	no
Cadmium	0.67	NA	NA	5.7	ATSDR child chronic EMEG	no
Chromium, Total	1000	NA	NA	75,000	ATSDR child chronic RMEG for trivalent chromium	no
Chromium, hexavalent ^A	22	NA	NA	51	ATSDR chronic child EMEG for hexavalent chromium	no
Copper	100	NA	NA	570	ATSDR child intermediate EMEG	no
Lead	61.8	NA	NA	400	EPA lead standard for bare soil in children's play areas	no
Mercury	0.20	NA	NA	17	ATSDR child chronic EMEG for methylmercury	no
Nickel	2500	NA	NA	1,100	ATSDR child chronic RMEG	yes
Zinc	260	NA	NA	17,000	ATSDR child chronic EMEG	no
Total PCB	0.48	0.19	ATSDR CREG	1.1	ATSDR child chronic EMEG	yes
Total PAH	0.34	0.12	ATSDR CREG	NA	NA	yes

^AEstimated by adjusting average and maximum concentrations of total chromium in soil with EPA's estimate that 2.2% of total chromium will be in the hexavalent form (33).

Table E5. Screening for individual Aroclor mixtures (PCBs) in sediment (Landau Associates 2009-2015).

Chemicals Detected	Max Concentration Detected (ppm)	Soil Cancer Comparison Value (ppm)	Cancer Comparison Value Source	Soil Non-cancer Comparison Value (ppm)	Cancer Comparison Value Source	Chemical of Potential Concern?
Aroclor 1242	0.016	0.19	ATSDR CREG	1.1	ATSDR child chronic EMEG	no
Aroclor 1254	0.48	0.19	ATSDR CREG	1.1	ATSDR child chronic EMEG	yes
Aroclor 1260	0.13	0.19	ATSDR CREG	1.1	ATSDR child chronic EMEG	no
Aroclor 1262	0.008	0.19	ATSDR CREG	1.1	ATSDR child chronic EMEG	no
Total PCB^A	0.48	0.19	ATSDR CREG	1.1	ATSDR child chronic EMEG	yes

^AReflects the maximum sum of PCB concentrations detected in any individual sediment sample.

Table E6. Screening for individual PAHs in sediment (Landau Associates 2009-2015).

PAHs Detected	Max Concentration Detected (ppm)	Relative Potency Factor (RPF) ^A	RPF-adjusted Concentration	Cancer Comparison Value (ppm) for soil	Cancer Comparison Value Source	Non-cancer comparison value (ppm) for soil	Non-cancer Comparison Value Source	Chemical of Potential Concern?
Acenaphthene	0.026	0.001 ^B	0.000026	0.12	ATSDR CREG	3,400	ATSDR chronic child RMEG	no
Acenaphthylene	0.027	0.001 ^B	0.000027	0.12	ATSDR CREG	NA	NA	no
Anthracene	0.027	0	0	0.12	ATSDR CREG	17,000	ATSDR chronic child RMEG	no
Benzo(a)anthracene	0.12	0.2	0.024	0.12	ATSDR CREG	NA	NA	no
Benzo(a)pyrene	0.17	1	0.17	0.12	ATSDR CREG	17	ATSDR chronic child RMEG	yes
Benzo(b)fluoranthene	0.12	0.8	0.096	0.12	ATSDR CREG	NA	NA	no
Benzo(g,h,i)perylene	0.13	0.009	0.00117	0.12	ATSDR CREG	NA	NA	no
Benzo(k)fluoranthene	0.11	0.03	0.0033	0.12	ATSDR CREG	NA	NA	no
Chrysene	0.15	0.1	0.015	0.12	ATSDR CREG	NA	NA	no
Fluoranthene	0.38	0.08	0.0304	0.12	ATSDR CREG	2,300	ATSDR chronic child RMEG	no
Indeno(1,2,3-cd)pyrene	0.13	0.07	0.0091	0.12	ATSDR CREG	NA	NA	no
Phenanthrene	0.32	0	0	0.12	ATSDR CREG	NA	NA	no
Pyrene	0.55	0	0	0.12	ATSDR CREG	1,700	ATSDR chronic child RMEG	no
Total PAH^C			0.34	0.12	ATSDR CREG	NA	NA	yes

^ABenzo(a)pyrene is the only PAH with an ATSDR CREG. EPA has developed 'Relative Potency Factors' (RPF) that quantify the cancer-causing potency of other

PAHs relative to benzo(a)pyrene (56). Cancer comparison values should be compared to RPF-adjusted concentrations.

^BEPA did not assign RPFs for acenaphthene and acenaphthylene, so alternate values cited by EPA were used instead.

^CReflects the maximum sum of PAH concentrations detected in any individual sediment sample. Total PAH concentrations are the sum of 'benzo(a)pyrene equivalent' concentrations (the detected concentration multiplied by EPA's chemical-specific Relative Potency Factor) for all PAHs detected in each sample.

Note that this is not equal to the sum of RPF-adjusted concentrations for individual chemicals because maximum concentrations for individual chemicals were not all at the same location

Table E7. Screening for chemicals in Johnson Creek sediment (Landau Associates incremental sampling 2017)

Chemicals Detected	Max concentration in sediment mg/kg (ppm)	Soil Cancer CV (ppm)	Cancer CV Source	Soil Non-cancer CV (ppm)	Non-cancer CV source	Chemical of Potential Concern?
Antimony	<0.5 ^B	NA	NA	23	ATSDR child chronic RMEG	no
Arsenic	2.57	0.25	ATSDR CREG	17	ATSDR child chronic EMEG	no
Beryllium	0.478	NA	NA	110	ATSDR child chronic EMEG	no
Cadmium	<0.5 ^B	NA	NA	5.7	ATSDR child chronic EMEG	no
Chromium, Total	23.3	NA	NA	75,000	ATSDR chronic child RMEG for trivalent chromium	no
Chromium, hexavalent	0.51	NA	NA	51	ATSDR chronic child EMEG	no
Copper	30.7	NA	NA	570	ATSDR child intermediate EMEG	no
Lead	27.9	NA	NA	400	EPA residential RSL standard for bare soil in children's play areas	no
Mercury	0.0657 ^C	NA	NA	17	ATSDR child chronic EMEG for methylmercury	no
Nickel	49.8	NA	NA	1,100	ATSDR child chronic RMEG	no
Selenium	<1 ^B	NA	NA	290	ATSDR child chronic EMEG and RMEG	no
Silver	<0.5 ^B	NA	NA	290	ATSDR child chronic RMEG	no
Thallium	<0.5 ^B	NA	NA	NA	NA	no
Zinc	197	NA	NA	17,000	ATSDR child chronic EMEG	no
Total PCB	0.1299 ^C	0.19	ATSDR CREG	1.1	ATSDR child chronic EMEG	no

NA indicates comparison values are not available

^A Estimated by adjusting average and maximum concentrations of total chromium in soil with EPA's estimate that 2.2% of total chromium will be in the hexavalent form (33).

^B The chemical was not detected above the sample quantitation limit shown; These chemicals will not be included in further analysis.

^C Concentration was estimated because the chemical was detected, but it is below the level that can be accurately quantified.

Table E8. Screening for chemicals in Johnson Creek sediment (DEQ sampling 2016)

Chemical	Max concentration in sediment mg/kg (ppm)	Soil Cancer CV (ppm)	Cancer CV Source	Soil non-cancer CV (ppm)	Non-cancer CV Source	Chemical of Potential Concern?
Aluminum, Total	16,900	NA	NA	57,000	ATSDR child chronic EMEG	no
Antimony, Total	0.39	NA	NA	23	ATSDR child chronic RMEG	no
Arsenic, Total	2.27	0.25	ATSDR CREG	17	ATSDR child chronic EMEG	no
Barium, Total	114	NA	NA	11,000	ATSDR child chronic EMEG	no
Cadmium, Total	0.22	NA	NA	5.7	ATSDR child chronic EMEG	no
Chromium, Total	476	NA	NA	75,000	ATSDR child chronic RMEG for trivalent chromium	no
Chromium, hexavalent	10.5	NA	NA	51	ATSDR chronic child EMEG for hexavalent chromium	no
Cobalt, Total	131			570	ATSDR child intermediate EMEG	no
Copper, Total	42.4	NA	NA	570	ATSDR child intermediate EMEG	no
Lead, Total	42.3	NA	NA	400	EPA lead standard for bare soil in children's play areas	no
Manganese, Total	268			2,900	ATSDR child chronic RMEG	no
Mercury, Total	<0.040 ^B	NA	NA	17	ATSDR child chronic EMEG for methylmercury	no
Nickel, Total	1,600	NA	NA	1,100	ATSDR child chronic RMEG	yes
Selenium, Total	<1.99 ^B	NA	NA	290	ATSDR child chronic EMEG and RMEG	no
Silver, Total	<0.10 ^B	NA	NA	290	ATSDR child chronic RMEG	no
Thallium, Total	<0.10 ^B	NA	NA	NA	NA	no
Zinc, Total	179	NA	NA	17,000	ATSDR child chronic EMEG	no

Contaminants of concern (detected at concentrations exceeding the comparison value) are highlighted in grey.

NA indicates comparison values are not available

^A Estimated by adjusting average and maximum concentrations of total chromium in soil with EPA's estimate that 2.2% of total chromium will be in the hexavalent form (33).

^B The chemical was not detected above the reporting limit shown

Table E9. Sources of oral comparison values for calculation of crayfish consumption rates

Chemical	Concentration in Crayfish (mg/kg wet wt)	Non-cancer CV (mg/kg body weight /day)	Non-cancer CV Source	Target Organ
Arsenic, Total	0.28	0.0003	ATSDR Oral MRL	skin
Cadmium, Total	<0.03 ^A	0.0001	ATSDR Oral MRL	kidneys
Chromium, Total	0.63	0.0009	ATSDR Oral MRL for hexavalent chromium (makes cautious assumption that all chromium detected is hexavalent)	blood; liver
Cobalt, Total	0.26	0.01	ATSDR intermediate oral MRL	blood
Mercury, Total	0.019	0.0003	ATSDR Oral MRL (makes cautious assumption that all mercury present is methylmercury)	brain; prenatal development
Nickel, Total	1.08	0.02	EPA Oral RfD	decreased body weight
PCBs, Total	0.033	0.00002	EPA Oral RfD for Arochlor 1254	Immune, skin, eyes; brain development
Selenium, Total	<0.59 ^A	0.005	ATSDR Oral MRL	skin, blood (selenosis)
Titanium, Total	11.8	NA	NA	NA
Zinc, Total	24.1	0.3	ATSDR Oral MRL	blood, immune

^A The chemical was not detected above the reporting limit shown

Appendix F. Contaminants of concern and health guideline values used

The chemicals described here were identified as contaminants of concern in the screening portion of this PHA.

Arsenic. Arsenic is a naturally-occurring metal widely distributed in soil. Most arsenic compounds have no smell or special taste (39). Arsenic's toxicity has been recognized since ancient times, and scientists are continuing to learn more about how it works and its additional toxic effects on human health. Arsenic is a known cancer-causing chemical. The types of cancer most often associated with arsenic exposure are skin, bladder, and lung (when inhaled) cancers (39). At higher doses, arsenic can also cause skin conditions that involve discoloration and hardening of the skin as well as appearance of corns or warts on the palms, soles, and torso (39). In addition to these effects on the skin, arsenic can also cause nerve damage (numbness in the extremities) at high doses and more subtle effects on the brain at lower doses over a long time (39).

There is some evidence that inhaled or ingested inorganic arsenic can injure pregnant women or their unborn babies, although the studies are not definitive. We do not know if absorption of inorganic arsenic from the gut in children differs from adults. There is some evidence that exposure to arsenic in early life (including gestation and early childhood) may increase mortality in young adults. Studies in animals show that large doses of inorganic arsenic that cause illness in pregnant females can also cause low birth weight, fetal malformations, and even fetal death. There is also some evidence that suggests that long-term exposure to inorganic arsenic in children may result in lower IQ scores. Arsenic can cross the placenta and has been found in fetal tissues. Arsenic is found at low levels in breast milk.

Soil sampling performed around PCC detected levels of arsenic above ATSDR's CREG for soil. However, the levels of arsenic measured in soil were not different from background levels measured in the Portland area. These background levels are due to Oregon's unique volcanic geology – volcanic soils naturally contain high levels of metals such as arsenic and mercury. The background levels in Portland are similar to background levels statewide. Most (if not all) soils in Oregon will have levels of arsenic that are higher than health screening and cleanup levels. Because normal background levels of arsenic in soil are often above the conservative ATSDR CREG, ATSDR recommends using the ATSDR child EMEG for non-cancer risk of exposure to soil as the comparison value for evaluating public health effects at contaminated sites.

Comparison values for arsenic

- **Inhalation CVs.** The comparison value used for air exposure to arsenic in this PHA is the ATSDR CREG of $0.23\text{ng}/\text{m}^3$ for a 1 in 1 million lifetime cancer risk. The CREG is lifetime cancer risk values derived from EPA's inhalation unit risk for arsenic of $4.3(\text{ng}/\text{m}^3)^{-1}$ designed to be protective of lung cancer in people. Non-cancer comparison values are not available for inhalation of arsenic (39).

- **Ingestion CVs.** The comparison value used for arsenic exposure in soil and sediment in this PHA is ATSDR's child EMEG for chronic exposure, 17 mg/kg (ppm). This chronic non-cancer comparison value is derived from EPA's reference dose of 0.3ug/kg/day and is designed to be protective of effects on the heart and skin (39). An alternate CV is the ATSDR CREG for arsenic lifetime cancer risk in soil and sediment, 0.25 mg/kg (ppm). This conservative (health-protective) cancer risk value is below natural background concentrations of arsenic found in soil across the country. ATSDR therefore recommends using the EMEG for chronic child exposures instead of the CREG as a comparison value for public health assessments.

Cadmium. Cadmium is a soft, silver-white metal that occurs naturally in the earth's crust. Cadmium is not usually present in the environment as a pure metal, but as a mineral combined with other elements. It is most often present in nature as complex oxides, sulfides, and carbonates in zinc, lead, and copper ores. Cadmium has many industrial uses and is used in consumer products including batteries, pigments, metal coatings, plastics, and some alloys (57).

Low levels of cadmium are present in most foods with the highest levels present in shellfish, liver, and kidney meats (57). Cigarette smoke also contains cadmium and can double the daily intake when compared to a non-smoker. Ingestion of high levels of cadmium in contaminated food or water can severely irritate the stomach, leading to vomiting and diarrhea, and sometimes death. Cadmium is a cumulative toxicant and ingestion of lower levels for a long period (above the chronic Minimal Risk Level [MRL] of 10 ng/m³) of time can lead to a buildup of cadmium in the kidneys and, possibly, kidney damage. The kidney is the main target organ for cadmium toxicity following chronic-duration exposure by both oral and inhalation routes. Cadmium interferes with proper functioning of the kidney by damaging the proximal tubules and impairing the kidneys' ability retain and resorb large molecules. Cadmium also prevents the kidney from retaining calcium, so prolonged exposure can lead to calcium depletion and loss of bone density (57).

A few studies in animals indicate that younger animals absorb more cadmium than adults. Animal studies also indicate that the young are more susceptible than adults to a loss of bone and decreased bone strength from exposure to cadmium. Cadmium is found in breast milk and a small amount will enter the infant's body through breastfeeding. The amount of cadmium that can pass to the infant depends on how much exposure the mother may have had. We do not know whether cadmium can cause birth defects in people. Studies in animals exposed to high enough levels of cadmium during pregnancy have resulted in harmful effects in the young. The nervous system appears to be the most sensitive target. Young animals exposed to cadmium before birth have shown effects on behavior and learning. There is also some information from animal studies that high enough exposures to cadmium before birth can reduce body weights and affect the skeleton in the developing young (57).

There is some evidence to suggest an association between cadmium and breast cancer. One analysis of multiple case-control studies in people found that each 0.5-µg/g creatinine increment

of urinary cadmium concentration was associated with a 66% increased risk of breast cancer (58). While evidence from epidemiological studies have been inconsistent, the association is plausible based on evidence from laboratory studies indicating that cadmium may influence estrogen signaling (59) (60).

There is also some evidence that cadmium may impair brain development. Young animals exposed to cadmium before birth have shown effects on behavior and learning (57). Recent epidemiological studies have found limited evidence of similar effects in people. For example, a study in China found an association between cadmium in mothers' blood during pregnancy and delayed development in infants (61). In a study of children in Greece, elevated maternal urinary cadmium concentrations ($\geq 0.8 \mu\text{g/L}$) during pregnancy were associated with lower cognitive scores, though in that study the effect was limited to mothers who smoked (62). There is also evidence that exposure to lead and cadmium during pregnancy may act synergistically to affect brain development (63).

There is insufficient peer-reviewed data on the association between cadmium and breast cancer and cadmium and brain development to support a quantitative evaluation of their risks in this PHA. The potential effect of cadmium on these other health endpoints should be evaluated in the context of potential cumulative effects from other chemicals. For example, if cadmium affects brain development, concurrent exposures to cadmium and lead in the air around PCC could have had cumulative or synergistic effects.

The exposure route of concern for cadmium in this PHA is inhalation of contaminated air. The EPA has classified cadmium as a probable human carcinogen by inhalation. This is based on limited evidence of an increase in lung cancer in humans from occupational exposure to cadmium fumes and dust. This is further supported by evidence of lung cancer in rats (57).

Comparison values for cadmium

- **Inhalation CVs.** The comparison value used for air exposure to cadmium in this PHA is the ATSDR CREG of 0.56 ng/m^3 for a 1 in 1 million lifetime cancer risk. This lifetime cancer risk is derived from EPA's inhalation unit risk for cadmium, $1.8 (\text{ng/m}^3)^{-1}$, designed to be protective of respiratory cancers. The non-cancer comparison value used for cadmium is the ATSDR chronic EMEG of 10 ng/m^3 , based on the ATSDR inhalation MRL, designed to be protective of chronic effects on the kidney (57).
- **Ingestion CVs.** The comparison value used for soil and sediment exposure to cadmium in this PHA is the ATSDR chronic EMEG of 5.7 mg/kg (ppm). This chronic non-cancer risk value is based on the ATSDR ingestion MRL and is designed to be protective of chronic effects on the kidney (57). There are no cancer risk comparison values available for exposure to cadmium through ingestion.

Hexavalent chromium. Chromium is a naturally occurring element found in rocks, animals, plants, and soil. It can exist in several different forms. The trivalent form and hexavalent form

are the most common forms of chromium measured in the environment. Hexavalent chromium is substantially more toxic than trivalent (33). Small amounts of trivalent chromium are considered to be a necessity for human health. Chromium can easily change from one form to another in water and soil, depending on the conditions present. Chromium is widely used in manufacturing and is found in products such as treated wood, tanned leather and stainless-steel cookware (33).

The main health problems seen in animals following ingestion of hexavalent chromium are anemia and irritation and ulcers in the stomach and small intestine. Trivalent chromium compounds are much less toxic and do not appear to cause these problems. Sperm damage and damage to the male reproductive system have also been seen in laboratory animals exposed to hexavalent chromium. Skin contact with certain hexavalent chromium compounds can cause skin ulcers (33). Some people are extremely sensitive to hexavalent chromium or trivalent chromium. Allergic reactions consisting of severe redness and swelling of the skin have been noted.

ATSDR, the International Agency for Research on Cancer (IARC), and EPA have determined that hexavalent chromium compounds are “known” human carcinogens through the exposure route of inhalation. In workers, inhalation of hexavalent chromium has been shown to cause lung cancer. Hexavalent chromium also causes lung cancer in animals. An increase in stomach tumors was observed in humans and animals exposed to hexavalent chromium in drinking water (33).

Children are more sensitive than adults to the cancer effects because hexavalent chromium has a “mutagenic mode of action”. This means that the carcinogen reacts and binds to the DNA in our cells (64). Children are assumed to be at increased risk for cancer and tumor development following exposure to mutagenic compounds because their bodies are growing – their cells are rapidly replicating during this time. It is thought that a child’s DNA repair mechanisms may not be able to keep up with the rapid cell replication (64).

Scientific studies of chromium haven’t fully demonstrated if exposure to chromium could result in birth defects or other developmental effects in people. Some developmental effects have been observed in animals exposed to hexavalent chromium. In animals, some studies show that exposure to high doses during pregnancy may cause miscarriage, low birth weight, and some changes in development of the skeleton and reproductive system. Birth defects in animals may be related, in part, to chromium toxicity in the mothers (33).

Comparison values for hexavalent chromium

- **Inhalation CVs.** The comparison value used for air exposure to hexavalent chromium in this PHA is the ATSDR CREG of 0.052 ng/m³ for a 1 in 1 million lifetime cancer risk. This lifetime cancer risk value is based on EPA’s inhalation unit risk for hexavalent chromium, 1.2 (ug/m³)⁻¹ designed to be protective of lung cancer. The non-cancer

comparison value used for hexavalent chromium is the ATSDR chronic EMEG of 5 ng/m³, based on the ATSDR inhalation MRL designed to be protective of upper respiratory effects (33).

- **Ingestion CVs.** The comparison value used for soil and sediment exposure to hexavalent chromium is ATSDR's EMEG, 51 mg/kg (ppm). This EMEG is derived from ATSDR's chronic ingestion MRL, based on intestinal effects in mice (33). There are no cancer risk comparison values available for exposure to hexavalent chromium through ingestion.

Nickel. Pure nickel is a hard, silvery-white metal, which has properties that make it very desirable for combining with other metals to form mixtures called alloys. Some of the metals that nickel can be alloyed with are iron, copper, chromium, and zinc. The toxicity of nickel may vary with the specific form it takes and the route of exposure (65). Nickel and its compounds have no characteristic odor or taste. The nickel that comes out of the stacks of power plants attaches to small particles of dust that settle to the ground or are taken out of the air in rain or snow. It usually takes many days for nickel to be removed from the air. If the nickel is attached to very small particles, it can take more than a month to settle out of the air.

Primary targets of toxicity appear to be the respiratory tract following inhalation exposure, the immune system following inhalation, oral, or dermal exposure, and possibly the reproductive system and the developing organism following oral exposure. The most common harmful health effect of nickel in humans is an allergic reaction. Approximately 10–20% of the population is sensitive to nickel. Once a person is sensitized to nickel, further contact with the metal may produce a reaction (65).

The most serious harmful health effects from exposure to nickel are respiratory effects such as chronic bronchitis, reduced lung function, and cancer of the lung and nasal sinus. The International Agency for Research on Cancer and the US EPA have concluded that some forms of nickel are carcinogenic to humans (65). Effects of nickel on the respiratory system have been documented in animal studies and in people who have breathed dust containing certain nickel compounds while working in nickel refineries or nickel-processing plants. The levels of nickel in these workplaces were much higher than usual (background) levels in the environment (65).

We do not know whether children differ from adults in their susceptibility to nickel. Human studies that examined whether nickel can harm the developing fetus are inconclusive. Animal studies have found increases in newborn deaths and decreases in newborn weight after ingesting nickel. These doses are 1,000 times higher than levels typically found in drinking water. It is likely that nickel can be transferred from the mother to an infant in breast milk and can cross the placenta (65).

Developing lungs may be particularly susceptible to chemicals that affect respiratory health. There is some evidence that children exposed to other forms of air pollution during gestational development and early life are more likely to have decreased lung function and asthma later in life (66) (67).

Nickel used in manufacturing at Precision Castparts is in an alloy form. There is some evidence that alloys may be less bioavailable and therefore less toxic than nickel alone (40). However, nickel monitoring of ambient air near PCC only provides information about total nickel concentrations and does not distinguish between forms of nickel. To be health protective, this health assessment starts from a “worst case” scenario in which all nickel detected is in a more bioavailable form.

The peer-reviewed comparison values used for this PHA may not reflect all the latest research or protect against potential health effects that are currently being studied by scientists. For example, a few recent studies indicate that nickel in air may increase risk of asthma symptoms in children. In one study, a 14 ng/m³ increase in nickel concentrations was associated with a 28% increase in risk of wheeze in children under 2 years old (68). In another study, a 4 ng/m³ increase in nickel concentrations was associated with an 11% increase in risk of asthma symptoms in adolescents (69). In both studies, other metals were also present in air, making it difficult to establish the degree to which the effect is due to nickel alone or in combination with other exposures. Other studies have found an association between nickel in air and risk of nickel sensitivity. A study in Germany found that children consistently exposed to nickel concentrations above 12 ng/m³ were four times more likely to develop an immune sensitivity to nickel than children exposed to less than 2.5ng/m³ nickel in air (70). These studies suggest the potential for nickel to have respiratory and immune effects at concentrations comparable to what has been detected near PCC. However, these studies alone do not provide conclusive evidence that nickel causes these symptoms and could not be used to support quantitative health effects analysis in this PHA. Generally, findings from new studies must be replicated and corroborated by other studies with different designs, settings, and populations before previously established guidelines or standards can be updated

Comparison values for nickel

- **Inhalation CVs.** The comparison value used for air exposure to nickel in this PHA is EPA’s residential screening level of 4ng/m³ in air for a 1 in a million cancer risk. This value is derived from EPA’s inhalation unit risk for cancer risk of nickel of 0.24 (ng/m³)⁻¹ based on data on cancer risk from occupational exposure to nickel refinery dust. Non-cancer risk was evaluated using ATSDR chronic minimal risk level of 90 ng/m³ designed to be protective of effects of nickel sulfate on the respiratory system (65).
- **Ingestion CVs.** The comparison values used for water, soil, and sediment exposures in this PHA are ATSDR’s chronic RMEGs for soil and water. These values are derived from EPA’s oral reference dose for nickel ingestion of 0.02 mg/kg/day and is designed to be protective of long-term effects of nickel soluble salts on decreased body weight (65).

Polycyclic aromatic hydrocarbons. Polycyclic aromatic hydrocarbons (PAHs) are a group of chemicals that are formed during the incomplete burning of coal, oil, gas, wood, garbage, or

other organic substances, such as tobacco and charbroiled meat. There are more than 100 different PAHs. PAHs generally occur as complex mixtures (for example, as part of combustion products such as soot), not as single compounds (71).

Several of the PAHs, including benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[j]fluoranthene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, and indeno [1,2,3-c,d]pyrene, have caused tumors in laboratory animals when they breathed these substances in the air, when they ate them, or when they had long periods of skin contact with them. Studies of people show that individuals exposed by breathing or skin contact for long periods to mixtures that contain PAHs and other compounds can also develop cancer. Mice fed high levels of benzo[a]pyrene during pregnancy had difficulty reproducing and so did their offspring. The offspring of pregnant mice fed benzo[a]pyrene also showed other harmful effects, such as birth defects and decreased body weight. Similar effects could occur in people, but we have no information to show that these effects do occur (71).

In health assessments, PAHs are typically evaluated as a group because they affect the same health outcomes. The EPA has established 'relative potency factors' that relate the potency of each carcinogenic PAH to the potency of benzo[a]pyrene (56). Relative potency factors are used to weight each PAH according to its potency in evaluation of 'total PAH' toxicity.

In this PHA, PAHs are evaluated because they were measured in Johnson Creek sediment at concentrations above health-based screening levels for soil. While there is no indication that they originated from PCC, they do contribute to the potential health effects of contact with sediment. They are therefore included in the health effects evaluation.

Comparison values for PAHs

- **Inhalation CVs.** PAH's in air were not evaluated in this PHA.
- **Ingestion and dermal contact CVs.** The comparison value used for sediment exposure to PAHs in this PHA is the ATSDR ingestion CREG for the PAH benzo(a)pyrene 0.12 mg/kg (ppm) for a 1 in 1 million lifetime cancer risk. This lifetime cancer risk value is derived from EPA's cancer slope factor for benzo(a)pyrene. The non-cancer effects of benzo(a)pyrene were evaluated against the EPA reference concentration for ingestion of 0.3 ug/kg/day, which is designed to be protective of neurodevelopmental effects of exposure during pregnancy (71).

Polychlorinated Biphenyls. Polychlorinated Biphenyls (PCBs) are a group of synthetic organic chemicals that can cause several different harmful effects. There are no known natural sources of PCBs in the environment. PCBs are either oily liquids or solids and are colorless to light yellow. They have no known smell or taste. PCBs enter the environment as mixtures containing a variety of individual chlorinated biphenyl components, known as congeners, as well as impurities. Once in the environment, PCBs do not readily break down and therefore may remain for very long periods of time. Small amounts of PCBs can be found in almost all outdoor and indoor air, soil, sediments, surface water, and animals. Health effects that have been

associated with exposure to PCBs in humans and/or animals include liver, thyroid, dermal and ocular changes, immunological alterations, neurodevelopmental changes, reduced birth weight, reproductive toxicity, and cancer. Some PCBs can mimic or block the action of hormones from the thyroid and other endocrine glands. Because hormones influence the normal functioning of many organs, some of the effects of PCBs may result from endocrine changes (72).

Studies of workers provide evidence that PCBs were associated with certain types of cancer in humans, such as cancer of the liver and biliary tract. Rats that ate commercial PCB mixtures throughout their lives developed liver cancer. Based on the evidence for cancer in animals, the Department of Health and Human Services (DHHS) has stated that PCBs may reasonably be anticipated to be carcinogens. Both EPA and the International Agency for Research on Cancer (IARC) have determined that PCBs are probably carcinogenic to humans (72).

Children can be exposed to PCBs both prenatally and from breast milk. PCBs are stored in the mother's body and can be released during pregnancy, cross the placenta, and enter fetal tissues. PCBs dissolve readily in fat, meaning they can accumulate in breast milk fat and be transferred to babies and young children. Because the brain, nervous system, immune system, thyroid, and reproductive organs are still developing in the fetus and child, the effects of PCBs on these target systems may be more profound after exposure during the prenatal and neonatal periods, making fetuses and children more susceptible to PCBs than adults (72).

The potential health effects of PCBs are typically evaluated as a group because they affect common health endpoints. In this PHA we add the concentrations of all PCBs detected to determine 'total PCB' concentrations.

Comparison values for PCBs

- **Inhalation CVs.** PCBs in air were not evaluated in the PHA.
- **Ingestion and dermal contact CVs.** The comparison value used for sediment exposure to PCBs in this PHA is the ATSDR ingestion CREG of 0.19 mg/kg (ppm) for a 1 in 1 million lifetime cancer risk. This lifetime cancer risk value is derived from EPA's cancer slope factor for PCBs. The non-cancer effects of PCBs were evaluated against the EPA reference concentration for ingestion of 0.02 ug/kg/day, which is designed to be protective of immunological and developmental effects (72).

Appendix G. Dose and risk calculations

This appendix describes the formulas, methods, and assumptions used to calculate doses of contaminants of concern that may occur under different exposure scenarios. It also presents detailed summaries of health risk calculation results for each scenario. The doses calculated here were used to calculate the risk for people exposed in these scenarios and to determine whether they are at higher risk of illness because of contaminants at or around PCC.

Exposure Dose Calculation Methods

Exposure doses were calculated for each exposure scenario using the equations and assumptions described below.

Dose from exposure to air (chronic exposure)

This formula was used to calculate exposure concentration of metals from inhaling air from the area around PCC:

$$\text{Exposure Concentration} = \frac{\text{CA} \times \text{ET} \times \text{EF} \times \text{ED}}{\text{AT}}$$

- CA = Chemical-specific 95% UCL of median concentration measured in air ($\mu\text{g}/\text{m}^3$)
- ET = Exposure Time (hours/day)
- EF = Exposure frequency (days/year)
- ED = Exposure duration (years)
- AT_{cancer} = Averaging time for cancer (hours over a 78-year lifetime)
- AT_{non-cancer} = Averaging time for non-cancer (hours over exposure duration)

Dose from exposure to sediment (chronic exposure)

Via ingestion of sediment

This formula was used to calculate exposure doses to PCBs, PAHs and nickel from ingestion of Johnson Creek sediment:

$$\text{Ingested Dose (mg/kg/day)} = \frac{\text{C} \times \text{IR} \times \text{EF} \times \text{CF}}{\text{BW}}$$

- C = Contaminant concentration in soil or sediment (mg/kg)
- IR = Intake rate of contaminated soil or sediment (mg/day)
- EF = Exposure factor (unitless) = (F x ED) / AT

F= Exposure frequency (days/year)
 ED= Exposure duration (years)
 AT_{Cancer}= Averaging Time for cancer (days/78 year lifetime)
 AT_{non-cancer}= Averaging Time for non-cancer (days/exposure duration)
 CF = Conversion factor (10⁻⁶ kg/mg)
 BW = Body weight (kg)

Via absorption through skin

This formula was used to calculate exposure doses to PCBs, PAHs from skin contact with Johnson Creek sediment:

$$\text{Dermal Absorbed Dose (mg/kg/day)} = \frac{C \times EF \times CF \times AF \times ABS_d \times SA}{BW \times ABS_{gi}}$$

C = Contaminant concentration in soil or sediment (mg/kg)
 EF = Exposure factor (unitless) = (F x ED)/AT
 F= Exposure frequency (days/year)
 ED= Exposure duration (years)
 AT_{Cancer}= Averaging Time for cancer (days/78 year lifetime)
 AT_{non-cancer}= Averaging Time for non-cancer (days/exposure duration)
 CF = Conversion factor (10⁻⁶ kg/mg)
 AF = Adherence factor of soil or sediment to skin (mg/cm²)
 ABS_d = Dermal absorption fraction
 SA = Surface area available for contact
 BW = Body weight (kg)
 ABS_{gi} = Gastrointestinal absorption

Non-cancer vs. Cancer Averaging Times

Methods for calculating doses for use in assessing non-cancer risk and for cancer risk are identical except the way in which averaging time (AT) is calculated. The rationale for this difference in AT lies in the theory that cancer is the result of multiple defects/mutations in genetic material accumulated over an entire lifetime while non-cancer risks generally occur only when exposure is ongoing.

Non-cancer averaging time is limited to the duration of the exposure:

$$AT_{\text{non-cancer}} = \text{Exposure duration (years)} \times 365 \text{ (days/year)} \times 24 \text{ (hours/day)}$$

Cancer averaging time represents an entire statistical lifetime (78 years) for agents that cause cancer.

$$AT_{\text{cancer}} = 78 \text{ (years/lifetime)} \times 365 \text{ (days/year)} \times 24 \text{ (hours/day)} = 683,280 \text{ hours}$$

Health Risk Calculation Methods

Once exposure doses were calculated for each exposure pathway, health risks were evaluated for cancer and non-cancer effects using the following equations.

Cancer risk calculation:

For cancer-causing chemicals, EPA uses evidence from scientific research to estimate the amount of increased lifetime cancer risk associated with each additional unit of exposure. These estimates are known as Cancer Slope Factors (CSF) for chemicals ingested or absorbed through skin and Inhalation Unit Risks (IUR) for chemicals in air.

Cancer risk is calculated separately for each age group (i.e., birth to <1 year, 1 to <2 years, 2 to <6 years, 6 to <11, 11 to <16 years, 16 to <21 years, ≥21 years) based on age-specific exposure factors (e.g., body weight, soil ingestion rate, etc.). For example, children consume more soil than adults so daily intake of soil or sediment is assumed to be higher for early life exposures. Lifetime cancer risk from many years of exposure is calculated by adding together cancer risks of all age ranges. This approach provides a lifetime cancer risk that accounts for changes in exposure that occur over a lifetime.

In addition, cancer risk for children was weighted by age for hexavalent chromium and for PAHs because they cause cancer by what is known as “mutagenic mode of action.” Mutagenic chemicals are those that can make multiple changes to genes in a cell. For children, mutagens pose a higher risk of cancer when exposures occur early in life. Age-dependent adjustment factors (ADAFs) were applied to reflect the potential for early-life exposure to mutagens to make a greater contribution to lifetime cancer risk (51; 73). For exposures before 2 years of age, a 10-fold adjustment was made. For exposures between 2 and <16 years of age, a 3-fold adjustment was made. For exposures after turning 16 years of age, no further adjustment was made.

Cancer risk equations

Cancer risk from exposure to a chemical during specific age ranges was calculated with the following equations:

For exposure through ingestion or dermal absorption:

$$\text{Cancer Risk} = \text{Dose (mg/kg/day)} \times \text{CSF (mg/kg/day)}^{-1}$$

For exposure through inhalation:

$$\text{Cancer Risk} = \text{EC (}\mu\text{g/m}^3\text{)} \times \text{IUR (}\mu\text{g/m}^3\text{)}^{-1}$$

For chemicals with a mutagenic mode of action:

$$\text{Cancer Risk} = \text{Dose (mg/kg/day)} \times \text{CSF (mg/kg/day)}^{-1} \times \text{ADAF}$$

Where:

CSF= Cancer Slope Factor

IUR= Inhalation Unit Risk

EC = Exposure Concentration (in air)

ADAF = Age-dependent Adjustment Factor (for mutagens)

Cancer risk from exposure throughout multiple life stages is calculated as the sum of cancer risk from exposure at each phase.

Lifetime Cancer Risk for an individual chemical across all ages of exposure

$$= \text{Cancer Risk}_{\text{age0-1}} + \text{Cancer Risk}_{\text{age1-2}} + \text{Cancer Risk}_{\text{age 2-6}} \dots \text{etc.}$$

Cumulative cancer risk across multiple chemicals in a pathway was calculated as the sum of cancer risks from each chemical.

Cumulative lifetime cancer risk across multiple chemicals in a pathway

$$= \text{Cancer Risk}_{\text{chemical A}} + \text{Cancer Risk}_{\text{chemical B}} \dots \text{etc.}$$

When exposure to cancer-causing chemicals occurred through multiple pathways, aggregate cancer risk was calculated as the sum of cumulative lifetime cancer risks calculated for each pathway.

Aggregate lifetime cancer risk across pathways

$$= \text{Cancer Risk}_{\text{ingestion}} + \text{Cancer Risk}_{\text{skin absorption}}$$

Non-cancer risk calculation:

Non-cancer risk is evaluated by comparing calculated exposure doses with health-based guideline concentrations identified by authoritative bodies like EPA and ATSDR. A health guideline is the daily dose of a chemical, below which scientists consider it unlikely to harm people's health. Non-cancer risk is described by hazard quotients, which are the ratio of air concentrations over health guidelines.

$$\text{Hazard Quotient} = \frac{\text{Time Adjusted Air Concentration}}{\text{Health Guideline (MRL, RfD, or RfC)}}$$

A hazard quotient less than one indicates that the sensitive health effects used as the basis for health guideline values are not expected to occur at the predicted dose. A hazard quotient

greater than one requires further investigation. Because health guidelines for different chemicals are based on different health outcomes of varying severity and incorporate different levels of uncertainty, the risk associated with hazard quotients above one are evaluated on a chemical by chemical basis.

Potential for cumulative non-cancer risks is calculated by adding together hazard quotients for each chemical with similar non-cancer effects. The sum of hazard quotients is known as the hazard index.

$$\text{Hazard Index} = \text{HQ}_{\text{chemical A}} + \text{HQ}_{\text{chemical B}} + \text{HQ}_{\text{chemical C}} \dots \text{etc.}$$

In this health assessment, EHAP did not calculate any hazard indexes because nickel was the only chemical of concern identified for non-cancer health outcomes

Detailed Summary of Risk Calculation Results

This section presents details of risk calculations and results for each exposure scenario. Final risk estimates are rounded to a single significant figure to reflect the imprecise nature of risk calculations. Because final numbers presented here are rounded, risk estimates summed across life stages, chemicals, and pathways may not be exactly equal to the sum of risks calculated for individual components of total risk.

Exposure Scenario 2- Long-term resident with exposure to air concentrations detected in 2016 prior to HEPA filter installation

Table G1. Summary of cancer and non-cancer risk under air conditions prior to HEPA-filter installation

Monitoring Location	Scenario	Exposure Assumptions	Cumulative Cancer Risk ^A of Ni, As, Cd, Cr 6+	Hazard Quotient for non-cancer risk from Ni
Milwaukee Johnson Creek	Child	constant exposure for 21 years	7 in 1,000,000	0.35
	Adult	constant exposure for 38 years	8 in 1,000,000	0.35
	Lifetime	constant exposure for 21 years as a child and 38 years as an adult	20 in 1,000,000	0.35
S.E. 45th and Harney Drive	Child	constant exposure for 21 years	3 in 1,000,000	NA
	Adult	constant exposure for 38 years	4 in 1,000,000	NA
	Lifetime	constant exposure for 21 years as a child and 38 years as an adult	7 in 1,000,000	NA
S.E. Harney Drive	Child	constant exposure for 21 years	4 in 1,000,000	NA
	Adult	constant exposure for 38 years	5 in 1,000,000	NA
	Lifetime	constant exposure for 21 years as a child and 38 years as an adult	9 in 1,000,000	NA

^ACancer risk is rounded to a single significant digit.

Table. G2. Cancer risk calculation details- 45th and Harney Drive monitor (air conditions in the month prior to HEPA filter installation)

	Child						Adult				Lifetime ^a
	Nickel	Arsenic	Cadmium	Hexavalent Chromium (0-2 yrs)	Hexavalent Chromium (2-16 yrs)	Hexavalent Chromium (16-21yrs)	Nickel	Arsenic	Cadmium	Hexavalent Chromium	
Air Concentration ^a (ug/m ³)	0.01125	0.000874	0.000124	0.00015	0.00015	0.00015	0.01125	0.000874	0.000124	0.00015	
Exposure Time (hours)	24	24	24	24	24	24	24	24	24	24	
Exposure Factor (days/year)	365	365	365	365	365	365	365	365	365	365	
Exposure Duration (years)	21	21	21	2	14	5	38	38	38	38	
Averaging Time _{cancer} (hours)	683280	683280	683280	683280	683280	683280	683280	683280	683280	683280	
Exposure Concentration (ug/m ³)	0.003029	0.000235	0.000033	0.000012	0.000004	0.000025	0.005481	0.000426	0.000060	0.000073	
Inhalation Unit Risk (ug/m ³) ⁻¹	2.40E-04	4.30E-03	1.80E-03	1.20E-02	1.20E-02	1.20E-02	2.40E-04	4.30E-03	1.80E-03	1.20E-02	
Age-dependent Adjustment Factor (ADAF) for mutagens	NA	NA	NA	10	3	1	NA	NA	NA	NA	
Estimated Cancer Risk	7.27E-07	1.01E-06	6.01E-08	4.62E-07	9.69E-07	1.15E-07	1.32E-06	1.83E-06	1.09E-07	8.77E-07	7.48E-06

^a95% UCL of median concentration measured in air (ug/m³)

^bCumulative lifetime risk for all chemicals

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

Cancer Risk = EC (ug/m³) x IUR (ug/m³)⁻¹

Table G3. Cancer risk calculation details - Milwaukee Johnson Creek monitor (air conditions in the month prior to HEPA filter installation)

	Child							Adult				Lifetime ^B
	Nickel	Arsenic	Cadmium	Hexavalent Chromium (0-2 yrs)	Hexavalent Chromium (2-16 yrs)	Hexavalent Chromium (16-21 yrs)	Hexavalent Chromium (16-21 yrs)	Nickel	Arsenic	Cadmium	Hexavalent Chromium	
Air Concentration ^A (ug/m ³)	0.03168	0.001049	0.000173	0.000386	0.000386	0.000386	0.000386	0.03168	0.001049	0.000154	0.000386	
Exposure Time (hours)	24	24	24	24	24	24	24	24	24	24	24	
Exposure Factor (days/year)	365	365	365	365	365	365	365	365	365	365	365	
Exposure Duration (years)	21	21	21	2	14	5	5	38	38	38	38	
Averaging Time _{cancer} (hours)	683280	683280	683280	683280	683280	683280	683280	683280	683280	683280	683280	
Exposure Concentration (ug/m ³)	0.00853	0.00028	0.00004	0.00001	0.00006	0.00003	0.00003	0.01543	0.00051	0.00008	0.00019	
Inhalation Unit Risk (ug/m ³) ⁻¹	2.40E-04	4.30E-03	1.80E-03	1.20E-02	1.20E-02	1.20E-02	1.20E-02	2.40E-04	4.30E-03	1.80E-03	1.20E-02	
Age-dependent Adjustment Factor (ADAF) for mutagens				10	3	1	1					
Estimated Cancer Risk	2.0E-06	1.2E-06	8.4E-08	1.2E-06	2.5E-06	3.0E-07	3.0E-07	3.7E-06	2.2E-06	1.4E-07	2.3E-06	1.6E-05

^A95% UCL of median concentration measured in air (ug/m³)

^BCumulative lifetime risk for all chemicals

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

Cancer Risk = EC (ug/m³) x IUR (ug/m³)⁻¹

Table G4. Cancer risk calculation details – S.E. Harney Drive monitor (air conditions in the month prior to HEPA filter installation)

	Child						Adult				Lifetime ^B
	Nickel	Arsenic	Cadmium	Hexavalent Chromium (0-2 yrs)	Hexavalent Chromium (2-16 yrs)	Hexavalent Chromium (16-21yrs)	Nickel	Arsenic	Cadmium	Hexavalent Chromium	
Air Concentration ^A (µg/m ³)	0.01241	0.000959	0.000207	0.000227	0.000227	0.000227	0.01241	0.000959	0.000207	0.000227	
Exposure Time (hours)	24	24	24	24	24	24	24	24	24	24	
Exposure Factor (days/year)	365	365	365	365	365	365	365	365	365	365	
Exposure Duration (years)	21	21	21	2	14	5	38	38	38	38	
Averaging Time _{cancer} (hours)	683280	683280	683280	683280	683280	683280	683280	683280	683280	683280	
Exposure Concentration (µg/m ³)	0.00334	0.00026	0.00006	0.00001	0.00004	0.00002	0.00605	0.00047	0.00010	0.00011	
Inhalation Unit Risk (µg/m ³) ⁻¹	2.40E-04	4.30E-03	1.80E-03	1.20E-02	1.20E-02	1.20E-02	2.40E-04	4.30E-03	1.80E-03	1.20E-02	
Age-dependent Adjustment Factor (ADAF) for mutagens				10	3	1					
Estimated Cancer Risk	8.0E-07	1.1E-06	1.0E-07	7.0E-07	1.5E-06	1.7E-07	1.5E-06	2.0E-06	1.8E-07	1.3E-06	9.3E-06

^A95% UCL of median concentration measured in air (µg/m³)

^BCumulative lifetime risk for all chemicals

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

Cancer Risk = EC (µg/m³) x IUR (µg/m³)⁻¹

Table G5. Non-cancer risk calculation details for Nickel- Milwaukee Johnson Creek monitor^A (air conditions in the month prior to HEPA filter installation)

	Child	Adult	Lifetime
Nickel Air Concentration ^B (ug/m ³)	0.03168	0.03168	0.03168
Exposure Time (hours)	24	24	24
Exposure Factor (days/year)	365	365	365
Exposure Duration (years)	21	57	78
Averaging Time ^C non-cancer (hours)	183960	499320	683280
Exposure Concentration	0.03168	0.03168	0.03168
Non-cancer Comparison Value for nickel	0.09	0.09	0.09
Chronic Non-cancer Risk	0.35	0.35	0.35

^ANon-cancer risk was only calculated for nickel concentrations detected at the Milwaukee Johnson Creek monitor prior to installation of HEPA-filters because nickel concentrations were below comparison values at all other monitoring locations

^B95% UCL of median concentration measured in air (µg/m³)

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

Non-cancer Risk = EC/CV

Exposure Scenario 3. Long-term resident with exposure to air under current conditions

Table G6. Summary of cancer and non-cancer risk under current air conditions

Monitoring Location	Scenario	Exposure Assumptions	Cumulative Cancer Risk ^A of Ni, As, Cd, Cr 6+	Hazard Quotient for non-cancer risk from Ni
	Child	constant exposure for 21 years	5 in 1,000,000	NA
	Adult	constant exposure for 57 years	7 in 1,000,000	NA
Milwaukie Johnson Creek	Lifetime	constant exposure for 21 years as a child and 57 years as an adult	10 in 1,000,000	NA
	Child	constant exposure for 21 years	2 in 1,000,000	NA
	Adult	constant exposure for 57 years	4 in 1,000,000	NA
S.E. 45th and Harney Drive	Lifetime	constant exposure for 21 years as a child and 57 years as an adult	6 in 1,000,000	NA
	Child	constant exposure for 21 years	4 in 1,000,000	NA
	Adult	constant exposure for 57 years	8 in 1,000,000	NA
	Lifetime	constant exposure for 21 years as a child and 57 years as an adult	10 in 1,000,000	NA

^ACancer risk is rounded to a single significant digit.

Table G7. Cancer risk calculation details - 45th and Harney Drive monitor (current air conditions)

	Child						Adult				Lifetime ^a
	Nickel	Arsenic	Cadmium	Hexavalent Chromium (0-2 yrs)	Hexavalent Chromium (2-16 yrs)	Hexavalent Chromium (>16yrs)	Nickel	Arsenic	Cadmium	Hexavalent Chromium	
Air Concentration ^a (ug/m ³)	0.000875	0.000919	0.000214	0.0000827	0.0000827	0.0000827	0.000875	0.000919	0.000214	0.0000827	
Exposure Time (hours)	24	24	24	24	24	24	24	24	24	24	
Exposure Factor (days/year)	365	365	365	365	365	365	365	365	365	365	
Exposure Duration (years)	21	21	21	2	14	5	57	57	57	57	
Averaging Time _{cancer} (hours)	683280	683280	683280	683280	683280	683280	683280	683280	683280	683280	
Exposure Concentration (ug/m ³)	0.000236	0.000247	0.000058	0.000002	0.000014	0.000022	0.000639	0.000672	0.000156	0.000060	
Inhalation Unit Risk (ug/m ³) ⁻¹	0.00024	0.0043	0.0018	1.20E-02	1.20E-02	0.012	0.00024	0.0043	0.0018	0.012	
Age-dependent Adjustment Factor (ADAF) for mutagens	NA	NA	NA	10	3	1	NA	NA	NA	NA	
Estimated Cancer Risk	5.7E-08	1.1E-06	1.0E-07	2.5E-07	5.3E-07	6.4E-08	1.5E-07	2.9E-06	2.8E-07	7.3E-07	6.1E-06

^a95% UCL of median concentration measured in air (ug/m³)

^bCumulative lifetime risk for all chemicals

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

Cancer Risk = EC (ug/m³) x IUR (ug/m³)⁻¹

Table G8. Cancer risk calculation details – Milwaukee Johnson Creek monitor (current air conditions)

	Child						Adult				Lifetime ^a
	Nickel	Arsenic	Cadmium	Hexavalent Chromium (0-2 yrs)	Hexavalent Chromium (2-16 yrs)	Hexavalent Chromium (>16yrs)	Nickel	Arsenic	Cadmium	Hexavalent Chromium	
Air Concentration ^a (ug/m ³)	0.01103	0.000618	0.000131	0.000367	0.000367	0.000367	0.01103	0.000618	0.000131	0.000367	
Exposure Time (hours)	24	24	24	24	24	24	24	24	24	24	
Exposure Factor (days/year)	365	365	365	365	365	365	365	365	365	365	
Exposure Duration (years)	21	21	21	2	14	5	57	57	57	57	
Averaging Time _{cancer} (hours)	683280	683280	683280	683280	683280	683280	683280	683280	683280	683280	
Exposure Concentration (ug/m ³)	0.002970	0.000166	0.000035	0.000009	0.000061	0.000028	0.008060	0.000452	0.000096	0.000268	
Inhalation Unit Risk (ug/m ³) ⁻¹	0.00024	0.0043	0.0018	0.012	0.012	0.012	0.00024	0.0043	0.0018	0.012	
Age-dependent Adjustment Factor (ADAF) for mutagens	NA	NA	NA	10	3	1	NA	NA	NA	NA	
Estimated Cancer Risk	7.1E-07	7.2E-07	6.3E-08	1.1E-06	2.4E-06	2.8E-07	1.9E-06	1.9E-06	1.7E-07	3.2E-06	1.3E-05

^a95% UCL of median concentration measured in air (ug/m³)

^bCumulative lifetime risk for all chemicals

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

Cancer Risk = EC (ug/m³) x IUR (ug/m³)⁻¹

Table G9. Cancer risk calculation details – S.E. Harney Drive monitor (current air conditions)

	Child						Adult				Lifetime ^B
	Nickel	Arsenic	Cadmium	Hexavalent Chromium (0-2 yrs)	Hexavalent Chromium (2-16 yrs)	Hexavalent Chromium (>16yrs)	Nickel	Arsenic	Cadmium	Hexavalent Chromium	
Air Concentration ^A (µg/m ³)	0.003677	0.000645	0.003155	0.00013	0.00013	0.00013	0.003677	0.000645	0.003155	0.00013	
Exposure Time (hours)	24	24	24	24	24	24	24	24	24	24	
Exposure Factor (days/year)	365	365	365	365	365	365	365	365	365	365	
Exposure Duration (years)	21	21	21	2	14	5	57	57	57	57	
Averaging Time _{cancer} (hours)	683280	683280	683280	683280	683280	683280	683280	683280	683280	683280	
Exposure Concentration (µg/m ³)	0.000990	0.000174	0.000849	0.000003	0.000022	0.000010	0.002687	0.000471	0.002306	0.000095	
Inhalation Unit Risk (µg/m ³) ⁻¹	0.00024	0.0043	0.0018	0.012	0.012	0.012	0.00024	0.0043	0.0018	0.012	
Age-dependent Adjustment Factor (ADAF) for mutagens	NA	NA	NA	10	3	1	NA	NA	NA	NA	
Estimated Cancer Risk	2.4E-07	7.5E-07	1.5E-06	4.0E-07	8.4E-07	1.0E-07	6.4E-07	2.0E-06	4.2E-06	1.1E-06	1.2E-05

^A95% UCL of median concentration measured in air (µg/m³)

^BCumulative lifetime risk for all chemicals

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

Cancer Risk = EC (µg/m³) x IUR (µg/m³)⁻¹

Exposure Scenario 4. Contact with contaminated Johnson Creek sediment

Table G10. Summary of estimated cumulative cancer risk from exposure to PCBs and PAHs in sediment through ingestion and absorption through skin (assuming weekly year-round exposure)

Exposure Period	Cumulative cancer risk from dermal contact with PCBs and PAHs in sediment ^A	Cumulative cancer risk from ingestion of PCBs and PAHs in sediment ^A	Aggregate cumulative cancer risk from dermal contact and ingestion of PCBs and PAHs in sediment ^A
Child 6 wks to < 1 yr	NA	NA	NA
Child 1 to < 2 yr	4 in 1,000,000	0.1 in 1,000,000	5 in 1,000,000
Child 2 to < 6 yr	6 in 1,000,000	0.2 in 1,000,000	6 in 1,000,000
Child 6 to < 11 yr	6 in 1,000,000	0.1 in 1,000,000	6 in 1,000,000
Child 11 to <16 yr	5 in 1,000,000	0.06 in 1,000,000	5 in 1,000,000
Child 16 to <21 yr	3 in 1,000,000	0.03 in 1,000,000	3 in 1,000,000
Cumulative Child 0-21 years	20 in 1,000,000	0.5 in 1,000,000	30 in 1,000,000
Adult for 33 years (95% residential occupancy period)	20 in 1,000,000	0.1 in 1,000,000	20 in 1,000,000
Lifetime (21 years of childhood exposure plus 33 years of adult exposure)	40 in 1,000,000	0.6 in 1,000,000	40 in 1,000,000

^ACancer risk is rounded to a single significant digit.

Table G11. Summary of estimated cumulative cancer risk from exposure to PCBs and PAHs in sediment through ingestion and absorption through skin (assuming daily year-round exposure)

Exposure Period	Cumulative cancer risk from dermal contact with PCBs and PAHs in sediment ^A	Cumulative cancer risk from ingestion of PCBs and PAHs in sediment ^A	Aggregate cumulative cancer risk from dermal contact and ingestion of PCBs and PAHs in sediment ^A
Child 6 wks to < 1 yr	NA	NA	NA
Child 1 to < 2 yr	30 in 1,000,000	1 in 1,000,000	30 in 1,000,000
Child 2 to < 6 yr	40 in 1,000,000	1 in 1,000,000	40 in 1,000,000
Child 6 to < 11 yr	40 in 1,000,000	0.8 in 1,000,000	40 in 1,000,000
Child 11 to <16 yr	30 in 1,000,000	0.4 in 1,000,000	30 in 1,000,000
Child 16 to <21 yr	20 in 1,000,000	0.2 in 1,000,000	20 in 1,000,000
Adult CR (33 years) -- 95% residential occupancy period	100 in 1,000,000	0.7 in 1,000,000	100 in 1,000,000
Lifetime (21 years of childhood exposure plus 33 years of adult exposure)	300 in 1,000,000	4 in 1,000,000	300 in 1,000,000

^ACancer risk is rounded to a single significant digit.

Table G13. Cancer risk calculation details- Absorption of total PCBs through skin (assuming weekly year-round exposure)

	Description	Child 1 to < 2 yr	Child 2 to < 6 yr	Child 6 to < 11 yr	Child 11 to <16 yr	Child 16 to <21 yr	Adult	Lifetime Exposure ^b
C	Contaminant concentration ^a (mg/kg)	0.48	0.48	0.48	0.48	0.48	0.48	
EF	Exposure factor (unit less)= (F x ED)/ATc	0.0018	0.0073	0.0092	0.0092	0.0092	0.0604	
F	Frequency of Exposure (days/week x weeks/year)	52.14	52.14	52.14	52.14	52.14	52.14	
ED	Age-specific Exposure duration (years)	1	4	5	5	5	33	
AT _{Cancer}	Cancer averaging time (days/78 year lifetime)	28468	28468	28468	28468	28468	28468	
CF	Conversion factor (10 ⁻⁶ kg/mg)	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	
AF	Adherence factor of soil or sediment to skin (mg/cm ²) based on geometric mean mud adherence for 9-14 year-olds	21	21	21	21	21	21	
ABS _{dermal}	Chemical-specific dermal absorption fraction	0.14	0.14	0.14	0.14	0.14	0.14	
SA	Surface area available for contact -head, hands, forearms, lower legs, and feet (cm ²)	2,299	2,592	3,824	5,454	6,083	6,030	
BW	Body weight (kg)	11.4	17.4	31.8	56.8	71.6	80	
ABS _{gi}	Gastrointestinal absorption	1	1	1	1	1	1	
D	Dermal absorbed dose (mg/kg/day)	5.2E-07	1.5E-06	1.6E-06	1.2E-06	1.1E-06	6.4E-06	
ADAF	Age Dependent Adjustment Factor for mutagens (unitless)	NA	NA	NA	NA	NA	NA	
CSF	Cancer Slope Factor (mg/kg/day) ⁻¹	2	2	2	2	2	2	
Risk	Estimated cancer risk from stage-specific exposures	1.0E-06	3.1E-06	3.1E-06	2.5E-06	2.2E-06	1.3E-05	2.5E-05

^aMaximum total PCB concentration detected in any sediment sample

^bSum of lifetime cancer risks from all child and adult exposure periods

D= (C x EF x CF x AF x ABS_{dermal} x SA)/(BW x ABS_{gi})

Risk= D x CSF x ADAF

Table G14. Cancer risk calculation details- Absorption of total PAHs through skin (assuming weekly year-round exposure)

	Description	Child 1 to < 2 yr	Child 2 to < 6 yr	Child 6 to < 11 yr	Child 11 to <16 yr	Child 16 to <21 yr	Adult	Lifetime Exposure ^B
C	Contaminant concentration ^A (mg/kg)	0.336	0.336	0.336	0.336	0.336	0.336	
EF	Exposure factor (unit less)= (F x ED)/ATc	0.00183	0.00733	0.00916	0.00916	0.00916	0.06044	
F	Frequency of Exposure (days/week x weeks/year)	52.14	52.14	52.14	52.14	52.14	52.14	
ED	Age-specific Exposure duration (years)	1	4	5	5	5	33	
AT _{cancer}	Cancer averaging time (days/78 year lifetime)	28468	28468	28468	28468	28468	28468	
CF	Conversion factor (10 ⁻⁶ kg/mg)	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	
AF	Adherence factor of soil or sediment to skin (mg/cm ²) based on geometric mean mud adherence for 9-14 year-olds	21	21	21	21	21	21	
ABS _{dermal}	Chemical-specific dermal absorption fraction	0.13	0.13	0.13	0.13	0.13	0.13	
SA	Surface area available for contact -head, hands, forearms, lower legs, and feet (cm ²)	2,299	2,592	3,824	5,454	6,083	6,030	
BW	Body weight (kg)	11.4	17.4	31.8	56.8	71.6	80	
ABS _{gi}	Gastrointestinal absorption	1	1	1	1	1	1	
D	Dermal absorbed dose (mg/kg/day)	3.4E-07	1.0E-06	1.0E-06	8.1E-07	7.1E-07	4.2E-06	
ADAF	Age Dependent Adjustment Factor for mutagens (unitless)	10	3	3	3	1	1	
CSF	Cancer Slope Factor (mg/kg/day) ⁻¹	1	1	1	1	1	1	
Risk	Estimated cancer risk from stage-specific exposures	3.4E-06	3.0E-06	3.0E-06	2.4E-06	7.1E-07	4.2E-06	1.7E-05

^AMaximum total PCB concentration detected in any sediment sample

^BSum of lifetime cancer risks from all child and adult exposure periods

D= (C x EF x CF x AF x ABS_{dermal} x SA)/(BW x ABS_{gi})

Risk= D x CSF x ADAF

Table G15. Estimated cumulative cancer risk from absorption of PCBs and PAHs in sediment through skin (assuming weekly year-round exposure)

Exposure Period	Total PCBs	Total PAHs	Sum for all chemicals
Child 6 wks to < 1 yr	NA	NA	NA
Child 1 to < 2 yr	1 in 1,000,000	3 in 1,000,000	4 in 1,000,000
Child 2 to < 6 yr	3 in 1,000,000	3 in 1,000,000	6 in 1,000,000
Child 6 to < 11 yr	3 in 1,000,000	3 in 1,000,000	6 in 1,000,000
Child 11 to <16 yr	3 in 1,000,000	2 in 1,000,000	5 in 1,000,000
Child 16 to <21 yr	2 in 1,000,000	0.7 in 1,000,000	3 in 1,000,000
Adult	10 in 1,000,000	4 in 1,000,000	20 in 1,000,000
Lifetime	30 in 1,000,000	20 in 1,000,000	40 in 1,000,000

Table G16. Cancer risk calculation details- Absorption of total PCBs through skin (assuming daily year-round exposure)

	Description	Child 1 to < 2 yr	Child 2 to < 6 yr	Child 6 to < 11 yr	Child 11 to <16 yr	Child 16 to <21 yr	Adult	Lifetime Exposure ^B
C	Contaminant concentration ^A (mg/kg)	0.48	0.48	0.48	0.48	0.48	0.48	
EF	Exposure factor (unit less) = (F x ED)/ATc	0.013	0.051	0.064	0.064	0.064	0.423	
F	Frequency of Exposure (days/week x weeks/year)	365	365	365	365	365	365	
ED	Age-specific Exposure duration (years)	1	4	5	5	5	33	
AT _{cancer}	Cancer averaging time (days/78 year lifetime)	28468	28468	28468	28468	28468	28468	
CF	Conversion factor (10 ⁻⁶ kg/mg)	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	
	Adherence factor of soil or sediment to skin (mg/cm ²) based on geometric mean mud adherence for 9-14 year-olds	21	21	21	21	21	21	
AF	Chemical-specific dermal absorption fraction	0.14	0.14	0.14	0.14	0.14	0.14	
ABS _{dermal}	Surface area available for contact - head, hands, forearms, lower legs, and feet (cm ²)	2,299	2,592	3,824	5,454	6,083	6,030	
SA	Body weight (kg)	11.4	17.4	31.8	56.8	71.6	80	
BW	Gastrointestinal absorption	1	1	1	1	1	1	
ABS _{gi}	Dermal absorbed dose (mg/kg/day)	3.6E-06	1.1E-05	1.1E-05	8.7E-06	7.7E-06	4.5E-05	
D	Age Dependent Adjustment Factor for mutagens (unitless)	NA	NA	NA	NA	NA	NA	
ADAF	Cancer Slope Factor (mg/kg/day) ⁻¹	2	2	2	2	2	2	
CSF								

Risk	Estimated cancer risk from stage-specific exposures	7.3E-06	2.2E-05	2.2E-05	1.7E-05	1.5E-05	9.0E-05	1.7E-04
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^aMaximum total PCB concentration detected in any sediment sample
^bSum of lifetime cancer risks from all child and adult exposure periods
 $D = (C \times EF \times CF \times AF \times ABS_{dermal} \times SA) / (BW \times ABS_{gi})$
 Risk = $D \times CSF \times ADAF$

Table G17. Cancer risk calculation details- Absorption of total PAHs through skin (assuming *daily* year-round exposure)

Description	Child 1 to < 2 yr	Child 2 to < 6 yr	Child 6 to < 11 yr	Child 11 to <16 yr	Child 16 to <21 yr	Adult	Lifetime Exposure ^b
C	0.336	0.336	0.336	0.336	0.336	0.336	
EF	0.013	0.051	0.064	0.064	0.064	0.423	
F	365	365	365	365	365	365	
ED	1	4	5	5	5	33	
AT _{cancer}	28468	28468	28468	28468	28468	28468	
CF	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	
AF	21	21	21	21	21	21	
ABS _{dermal}	0.13	0.13	0.13	0.13	0.13	0.13	
SA	2,299	2,592	3,824	5,454	6,083	6,030	
BW	11.4	17.4	31.8	56.8	71.6	80	
ABS _{gi}	1	1	1	1	1	1	
D	2.4E-06	7.0E-06	7.1E-06	5.6E-06	5.0E-06	2.9E-05	
ADAF	10	3	3	3	1	1	
CSF	1	1	1	1	1	1	
Risk	2.4E-05	2.1E-05	2.1E-05	1.7E-05	5.0E-06	2.9E-05	1.3E-04

^aMaximum total PCB concentration detected in any sediment sample
^bSum of lifetime cancer risks from all child and adult exposure periods
 $D = (C \times EF \times CF \times AF \times ABS_{dermal} \times SA) / (BW \times ABS_{gi})$
 Risk = $D \times CSF \times ADAF$

Table G18. Estimated cumulative cancer risk from absorption of PCBs and PAHs in sediment through skin (assuming *daily* year-round exposure)

Exposure Period	Total PCBs	Total PAHs	Sum for all chemicals ^A
Child 6 wks to < 1 yr	NA	NA	NA
Child 1 to < 2 yr	7 in 1,000,000	20 in 1,000,000	30 in 1,000,000
Child 2 to < 6 yr	20 in 1,000,000	20 in 1,000,000	40 in 1,000,000
Child 6 to < 11 yr	20 in 1,000,000	20 in 1,000,000	40 in 1,000,000
Child 11 to <16 yr	20 in 1,000,000	20 in 1,000,000	30 in 1,000,000
Child 16 to <21 yr	20 in 1,000,000	5 in 1,000,000	20 in 1,000,000
Adult	90 in 1,000,000	30 in 1,000,000	100 in 1,000,000
Lifetime	200 in 1,000,000	100 in 1,000,000	300 in 1,000,000

^ACancer risk is rounded to a single significant digit.

Table G19. Cancer risk calculation details- Ingestion of total PCBs in sediment (assuming weekly year-round exposure)

	Description	Child 1 to < 2 yr	Child 2 to < 6 yr	Child 6 to < 11 yr	Child 11 to <16 yr	Child 16 to <21 yr	Adult	Lifetime Exposure ^a
C	Contaminant concentration ^a (ppm or mg/kg)	0.48	0.48	0.48	0.48	0.48	0.48	
IR	Intake rate - upper percentile of daily soil intake for each age group (mg/day)	200	200	200	200	200	100	
EF	Exposure factor= (F x ED)/AT	0.0018	0.0073	0.0092	0.0092	0.0092	0.0604	
	Frequency of Exposure (days/week x weeks/year)	52	52	52	52	52	52	
F								
ED	Age-specific Exposure duration (years)	1	4	5	5	5	33	
ATc								
	Cancer averaging time (days/78 year lifetime)	28468	28468	28468	28468	28468	28468	
CF	Conversion factor 0.000001 (kg/mg)	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	
BW	Body weight (kg)	11.4	17.4	31.8	56.8	71.6	80	
D	Estimated dose rate from the above equation (mg/kg/day)	1.5E-08	4.0E-08	2.8E-08	1.5E-08	1.2E-08	3.6E-08	
CSF	Cancer Slope Factor (mg/kg/day) ¹	2	2	2	2	2	2	
ADAF	Age-dependent adjustment factor - for <i>mutagenic chemicals only</i> (unitless)	NA	NA	NA	NA	NA	NA	
Risk	Estimated cancer risk from stage-specific exposures	3.1E-08	8.1E-08	5.5E-08	3.1E-08	2.5E-08	7.3E-08	3.0E-07

^aMaximum total PCB concentration detected in any sediment sample

^bSum of lifetime cancer risks from all child and adult exposure periods

D= (C x IR x EF x CF) / BW

Risk= D x CSF x ADAF

Table G20. Cancer risk calculation details- Ingestion of total PAHs in sediment (assuming weekly year-round exposure)

	Description	Child 1 to < 2 yr	Child 2 to < 6 yr	Child 6 to < 11 yr	Child 11 to <16 yr	Child 16 to <21 yr	Adult	Lifetime Exposure ^B
C	Contaminant concentration ^A (ppm or mg/kg)	0.336	0.336	0.336	0.336	0.336	0.336	
IR	Intake rate - upper percentile of daily soil intake for each age group (mg/day)	200	200	200	200	200	100	
EF	Exposure factor= (F x ED)/AT	0.0018	0.0073	0.0092	0.0092	0.0092	0.0604	
F	Frequency of Exposure (days/week x weeks/year)	52	52	52	52	52	52	
	ED	1	4	5	5	5	33	
ATc	Cancer averaging time (days/78 year lifetime)	28468	28468	28468	28468	28468	28468	
	CF	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	
	BW	11.4	17.4	31.8	56.8	71.6	80	
D	Estimated dose rate from the above equation (mg/kg/day)	1.1E-08	2.8E-08	1.9E-08	1.1E-08	8.6E-09	2.5E-08	
CSF	Cancer Slope Factor (mg/kg/day) ⁻¹	1	1	1	1	1	1	
ADAF	Age-dependent adjustment factor- <i>for mutagenic chemicals only</i> (unitless)	10	3	3	3	1	1	
Risk	Estimated cancer risk from stage-specific exposures	1.1E-07	8.5E-08	5.8E-08	3.3E-08	8.6E-09	2.5E-08	3.2E-07

^AMaximum total PCB concentration detected in any sediment sample

^BSum of lifetime cancer risks from all child and adult exposure periods

D= (C x IR x EF x CF) / BW

Risk= D x CSF x ADAF

Table G21. Estimated cumulative cancer risk from exposure to PCBs and PAHs in sediment through ingestion (assuming weekly year-round exposure)

Exposure Period	Total PCBs	Total PAHs	Sum for all chemicals ^A
Child 6 wks to < 1 yr	NA	NA	NA
Child 1 to < 2 yr	0.03 in 1,000,000	0.1 in 1,000,000	0.1 in 1,000,000
Child 2 to < 6 yr	0.08 in 1,000,000	0.08 in 1,000,000	0.2 in 1,000,000
Child 6 to < 11 yr	0.06 in 1,000,000	0.06 in 1,000,000	0.1 in 1,000,000
Child 11 to <16 yr	0.03 in 1,000,000	0.03 in 1,000,000	0.06 in 1,000,000
Child 16 to <21 yr	0.02 in 1,000,000	0.009 in 1,000,000	0.03 in 1,000,000
cumulative Child for 21 years	0.2 in 1,000,000	0.3 in 1,000,000	0.5 in 1,000,000
Adult CR (33 years) - 95% residential occupancy period	0.07 in 1,000,000	0.02 in 1,000,000	0.1 in 1,000,000
Lifetime	0.3 in 1,000,000	0.3 in 1,000,000	0.6 in 1,000,000

^ACancer risk is rounded to a single significant digit.

Table G22. Cancer risk calculation details- Ingestion of total PCBs in sediment (assuming *daily* year-round exposure)

	Description	Child 1 to < 2 yr	Child 2 to < 6 yr	Child 6 to < 11 yr	Child 11 to <16 yr	Child 16 to <21 yr	Adult	Lifetime Exposure ^a
C	Contaminant concentration ^a (ppm or mg/kg)	0.48	0.48	0.48	0.48	0.48	0.48	
IR	Intake rate - upper percentile of daily soil intake for each age group (mg/day)	200	200	200	200	200	100	
EF	Exposure factor= (F x ED)/AT	0.013	0.051	0.064	0.064	0.064	0.423	
	Frequency of Exposure (days/week x weeks/year)	365	365	365	365	365	365	
F	Age-specific Exposure duration (years)	1	4	5	5	5	33	
ED								
ATc	Cancer averaging time (days/78 year lifetime)	28468	28468	28468	28468	28468	28468	
CF	Conversion factor 0.000001 (kg/mg)	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	
BW	Body weight (kg)	11.4	17.4	31.8	56.8	71.6	80	
D	Estimated dose rate from the above equation (mg/kg/day)	1.1E-07	2.8E-07	1.9E-07	1.1E-07	8.6E-08	2.5E-07	
CSF	Cancer Slope Factor (mg/kg/day) ⁻¹	2	2	2	2	2	2	
ADAF	Age-dependent adjustment factor - for <i>mutagenic chemicals only</i> (unitless)	NA	NA	NA	NA	NA	NA	
Risk	Estimated cancer risk from stage-specific exposures	2.2E-07	5.7E-07	3.9E-07	2.2E-07	1.7E-07	5.1E-07	2.1E-06

^aMaximum total PCB concentration detected in any sediment sample

^bSum of lifetime cancer risks from all child and adult exposure periods

D= (C x IR x EF x CF) / BW

Risk= D x CSF x ADAF

Table G23. Cancer risk calculation details- Ingestion of total PAHs in sediment (assuming *daily* year-round exposure)

	Description	Child 1 to < 2 yr	Child 2 to < 6 yr	Child 6 to < 11 yr	Child 11 to <16 yr	Child 16 to <21 yr	Adult	Lifetime Exposure ^a
C	Contaminant concentration ^b (ppm or mg/kg)	0.336	0.336	0.336	0.336	0.336	0.336	
IR	Intake rate - upper percentile of daily soil intake for each age group (mg/day)	200	200	200	200	200	100	
EF	Exposure factor= (F x ED)/AT	0.0128	0.0513	0.0641	0.0641	0.0641	0.4231	
F	Frequency of Exposure (days/week x weeks/year)	365	365	365	365	365	365	
ED	Age-specific Exposure duration (years)	1	4	5	5	5	33	
ATc	Cancer averaging time (days/78 year lifetime)	28468	28468	28468	28468	28468	28468	
CF	Conversion factor 0.000001 (kg/mg)	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	
BW	Body weight (kg)	11.4	17.4	31.8	56.8	71.6	80	
D	Estimated dose rate from the above equation (mg/kg/day)	7.6E-08	2.0E-07	1.4E-07	7.6E-08	6.0E-08	1.8E-07	
CSF	Cancer Slope Factor (mg/kg/day) ⁻¹	1	1	1	1	1	1	
ADAF	Age-dependent adjustment factor - for <i>mutagenic chemicals only</i> (unitless)	10	3	3	3	1	1	
Risk	Estimated cancer risk from stage-specific exposures	7.6E-07	5.9E-07	4.1E-07	2.3E-07	6.0E-08	1.8E-07	2.2E-06

^aMaximum total PCB concentration detected in any sediment sample

^bSum of lifetime cancer risks from all child and adult exposure periods

D= (C x IR x EF x CF) / BW

Risk= D x CSF x ADAF

Table G24. Estimated cancer risk from exposure to PCBs and PAHs in sediment through ingestion (daily year-round exposure)

Exposure Period	Total PCB	Total PAH	Sum for all chemicals ^A
Child 6 wks to < 1 yr	NA	NA	NA
Child 1 to < 2 yr	0.2 in 1,000,000	8 in 10,000,000	1 in 1,000,000
Child 2 to < 6 yr	0.6 in 1,000,000	6 in 10,000,000	1 in 1,000,000
Child 6 to < 11 yr	0.4 in 1,000,000	0.4 in 1,000,000	0.8 in 1,000,000
Child 11 to < 16 yr	0.2 in 1,000,000	0.2 in 1,000,000	0.4 in 1,000,000
Child 16 to < 21 yr	0.2 in 1,000,000	0.06 in 1,000,000	0.2 in 1,000,000
cumulative Child for 21 years	2 in 1,000,000	2 in 1,000,000	4 in 1,000,000
Adult CR (33 years) - 95% residential occupancy period	0.5 in 1,000,000	0.2 in 1,000,000	0.7 in 1,000,000
Lifetime	2 in 1,000,000	2 in 1,000,000	4 in 1,000,000

^ACancer risk is rounded to a single significant digit.

Table G25. Summary of non-cancer risk from ingestion of nickel in Johnson Creek sediment.

Scenario	Hazard Quotient based on weekly year-round exposure	Hazard Quotient based on daily year-round exposure
Child 6 wks to < 1 yr	0.0	0.0
Child 1 to < 2 yr	0.3	2.2
Child 2 to < 6 yr	0.2	1.4
Child 6 to < 11 yr	0.1	0.8
Child 11 to < 16 yr	0.1	0.4

Child 16 to <21 yr	0.05	0.3
Adult CR (33 years) -- 95% residential occupancy period	0.02	0.2

Table G26. Non-cancer risk calculation details for ingestion of nickel in Johnson Creek sediment (assuming weekly year-round exposure)

	Description	Child 1 to < 2 yr	Child 2 to < 6 yr	Child 6 to < 11 yr	Child 11 to <16 yr	Child 16 to <21 yr	Adult
C	Contaminant concentration (ppm or mg/kg)	2500	2500	2500	2500	2500	2500
IR	Intake rate - upper percentile of daily soil intake for each age group (mg/day)	200	200	200	200	200	100
EF	Exposure factor (F x ED)/AT	0.14	0.14	0.14	0.14	0.14	0.14
F	Frequency of Exposure (days/week x weeks/year)	52	52	52	52	52	52
ED	Age-specific Exposure duration (years)	1	4	5	5	5	33
ATnc	Cancer averaging time (days during exposure duration)	365	1460	1825	1825	1825	12044
CF	Conversion factor 0.000001 (kg/mg)	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001
BW	Body weight (kg)	11.4	17.4	31.8	56.8	71.6	80
D	Estimated dose rate from the above equation (mg/kg/day)	6.3E-03	4.1E-03	2.2E-03	1.3E-03	1.0E-03	4.5E-04
Rfd	EPA Reference Dose (mg/kg/day)	0.02	0.02	0.02	0.02	0.02	0.02
HQ	Hazard Quotient	0.31	0.21	0.11	0.06	0.05	0.02

D= (C x IR x EF x CF) / BW

HQ= D / Rfd

Table G27. Non-cancer risk calculation details for ingestion of nickel in Johnson Creek sediment (assuming daily year-round exposure)

	Description	Child 1 to < 2 yr	Child 2 to < 6 yr	Child 6 to < 11 yr	Child 11 to <16 yr	Child 16 to <21 yr	Adult
C	Contaminant concentration (ppm or mg/kg)	2500	2500	2500	2500	2500	2500
IR	Intake rate - upper percentile of daily soil intake for each age group (mg/day)	200	200	200	200	200	100
EF	Exposure factor (F x ED)/AT	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
F	Frequency of Exposure (days/week x weeks/year)	365	365	365	365	365	365
ED	Age-specific Exposure duration (years)	1	4	5	5	5	33
ATnc	Cancer averaging time (days during exposure duration)	365	1460	1825	1825	1825	12044
CF	Conversion factor 0.000001 (kg/mg)	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001
BW	Body weight (kg)	11.4	17.4	31.8	56.8	71.6	80
D	Estimated dose rate from the above equation (mg/kg/day)	4.4E-02	2.9E-02	1.6E-02	8.8E-03	7.0E-03	3.1E-03
RfD	EPA Reference Dose (mg/kg/day)	0.02	0.02	0.02	0.02	0.02	0.02
HQ	Hazard Quotient	2.19	1.44	0.79	0.44	0.35	0.16

D= (C x IR x EF x CF) / BW

HQ= D / RfD

Exposure Scenario 5. Consumption of crayfish from Johnson Creek

Table G28. Calculation of the number of Johnson Creek crayfish meals that can be consumed each month without exceeding health-based exposure guidelines for individual metals and PCBs

	Description	Arsenic, Total	Chromium, Total	Cobalt, Total	Mercury, Total	Nickel, Total	Zinc, Total
BW	Body Weight (kg)	70	70	70	70	70	70
D	Days/month (days)	30.44	30.44	30.44	30.44	30.44	30.44
Kg/meal	Fish/meal (one 8-ounce meal = 0.227 kg)	0.227	0.227	0.227	0.227	0.227	0.227
C	Contaminant concentration detected in crayfish (mg/kg wet weight)	0.028 ^A	0.63 ^B	0.26	0.019	1.08	24.1
CV	Oral dose comparison value (mg/kg body weight/day)	0.0003	0.0009	0.01	0.0003	0.02	0.3
	8-ounce crayfish meals per month based on risk from individual chemicals = (BW x D)/(kg/meal) x (CV/C)	100.6	13.4	361.0	148.2	173.8	116.8

^A Assumes that 10% of the arsenic detected is in its more toxic, inorganic form. The general consensus in the scientific literature is that about 10% of the arsenic typically found in the edible parts of fish and shellfish is inorganic arsenic (39).

^B Based on the unlikely but health-protective assumption that 100% of chromium detected is in its more toxic, hexavalent form.

Table G29. Calculation of the number of Johnson Creek crayfish meals that can be consumed each month without exceeding health-based exposure guidelines for combined risk of metals and PCBs that target specific organ systems

Organ systems targeted	8-ounce crayfish meals that can be consumed each month based on cumulative risk of chemicals that target each organ system ^A
Brain development (methylmercury and PCBs)	5.4 eight-ounce meals
Immune system (zinc and PCBs)	5.4 eight-ounce meals
Skin (arsenic and PCBs)	5.3 eight-ounce meals
Blood (zinc, chromium, and cobalt)	11.6 eight-ounce meals

^A Calculated using the formula defined in OHA's fish advisory Standard Operating Guidance (38): Meals per month = (BW x D)/(kg/meal) x (1/ $\sum$ C/CV))

Appendix H. Glossary

This glossary defines words used in this document.

Absorption:	How a chemical enters a person's blood after the chemical has been swallowed, has come into contact with the skin, or has been breathed in.
Adverse (or negative) Health Effects	A change in body function or cell structure that might lead to disease or health problems
ATSDR:	The A gency for T oxic S ubstances and D isease R egistry. ATSDR is a federal health agency in Atlanta, Georgia that deals with hazardous substance and waste site issues. ATSDR gives people information about harmful chemicals in their environment and tells people how to protect themselves from coming into contact with chemicals.
Background Level:	An average or expected amount of a chemical in a specific environment or amounts of chemicals that occur naturally in a specific environment.
Bioavailability:	See Relative Bioavailability .
Cancer:	A group of diseases that occur when cells in the body become abnormal and grow or multiply out of control.
Chronic Exposure:	A contact with a substance or chemical that happens over a long period of time. ATSDR considers exposures of more than one year to be <i>chronic</i> .
Completed Exposure Pathway:	See Exposure Pathway .

Comparison Value: (CVs)	Concentrations of substances in air, water, food, and soil that are unlikely, upon exposure, to cause adverse health effects. Comparison values are used by health assessors to select which substances and environmental media (air, water, food and soil) need additional evaluation while health concerns or effects are investigated.
Concern:	A belief or worry that chemicals in the environment might cause harm to people.
Concentration:	How much or the amount of a substance present in a certain amount of soil, water, air, or food.
Contaminant:	See Environmental Contaminant .
Dermal Contact:	A chemical getting onto your skin. (See Route of Exposure).
Dose:	The amount of a substance to which a person may be exposed, usually daily. Dose is often explained as “amount of substance(s) per body weight per day”.
Duration:	The amount of time (days, months, years) that a person is exposed to a chemical.
Environmental Contaminant:	A substance (chemical) that gets into a system (person, animal, or the environment) in amounts higher than the Background Level , or what would be expected.
Environmental Media:	Usually refers to the air, water, and soil in which chemicals of interest are found. Sometimes refers to the plants and animals that are eaten by humans. Environmental Media is the second part of an Exposure Pathway .
US Environmental Protection Agency (EPA):	The federal agency that develops and enforces environmental laws to protect the environment and the public’s health.

Exposure: Coming into contact with a chemical substance. (For the three ways people can come in contact with substances, see **Route of Exposure**.)

Exposure Assessment: The process of finding the ways people come in contact with chemicals, how often and how long they come in contact with chemicals, and the amounts of chemicals with which they come in contact.

Exposure Pathway: A description of the way that a chemical moves from its source (where it began) to where and how people can come into contact with (or get exposed to) the chemical.

ATSDR defines an exposure pathway as having 5 parts:

1. Source of Contamination,
2. Environmental Media and Transport Mechanism,
3. Point of Exposure,
4. Route of Exposure, and
5. Receptor Population.

When all 5 parts of an exposure pathway are present, it is called a **Completed Exposure Pathway**. Each of these 5 terms is defined in this Glossary.

Frequency: How often a person is exposed to a chemical over time; for example, every day, once a week, or twice a month.

Health Effect: ATSDR deals only with **Adverse Health Effects** (see definition in this Glossary).

Ingestion: Swallowing something, as in eating or drinking. It is a way a chemical can enter your body (See **Route of Exposure**).

Inhalation: Breathing. It is a way a chemical can enter your body (See **Route of Exposure**).

kg	Kilogram or 1000 grams. Usually used here as part of the dose unit mg/kg/day meaning mg (contaminant)/kg (body weight)/day.
µg	Microgram or 1 millionth of 1 gram. Usually used here as part of the concentration of contaminants in water (µg/Liter).
mg	Milligram or 1 thousandth of 1 gram. Usually used here as in a concentration of contaminant in soil mg contaminant/kg soil or as in the dose unit mg/kg/day meaning mg (contaminant)/kg (body weight)/day.
MRL:	Minimal Risk Level. An estimate of daily human exposure – by a specified route and length of time -- to a dose of chemical that is likely to be without a measurable risk of adverse, non-cancerous effects. An MRL should not be used to predict adverse health effects.
oxbow	A U-shaped bend in the course of a river
PHA:	Public Health Assessment. A report or document that looks at chemicals at a hazardous waste site and tells if people could be harmed from coming into contact with those chemicals. The PHA also tells if possible further public health actions are needed.
Point of Exposure:	The place where someone can come into contact with a contaminated environmental medium (air, water, food or soil). Some examples include: the area of a playground that has contaminated dirt, a contaminated spring used for drinking water, or the backyard area where someone might breathe contaminated air.
Population:	A group of people living in a certain area or the number of people in a certain area.
Public Health Assessment(s):	See PHA .

Reference Dose (RfD):	An estimate, with safety factors (see Safety Factor) built in, of the daily, life-time exposure of human populations to a possible hazard that is <u>not</u> likely to cause harm to the person.
Relative Bioavailability:	The amount of a compound that can be absorbed from a particular medium (such as soil) compared to the amount absorbed from a reference material (such as water). Expressed in percentage form.
Route of Exposure:	The way a chemical can get into a person's body. There are three exposure routes: – breathing (also called inhalation), – eating or drinking (also called ingestion), and – getting something on the skin (also called dermal contact).
Safety Factor:	Also called Uncertainty Factor . When scientists don't have enough information to decide if an exposure will cause harm to people, they use "safety factors" and formulas in place of the information that is not known. These factors and formulas can help determine the amount of a chemical that is <u>not</u> likely to cause harm to people.
Source (of Contamination):	The place where a chemical comes from, such as a landfill, pond, creek, incinerator, tank, or drum. Contaminant source is the first part of an Exposure Pathway .
Toxic:	Harmful to health. Any substance or chemical can be toxic at a certain dose (amount). The dose is what determines the potential harm of a chemical and whether it would cause someone to get sick.
Tumor:	Abnormal growth of tissue or cells that have formed a lump or mass.
Uncertainty Factor:	See Safety Factor .



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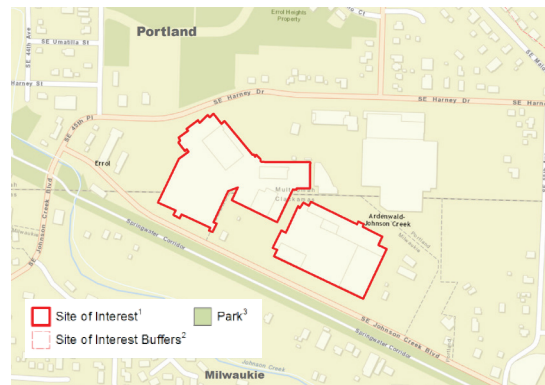
Precision Castparts Public Health Assessment

Summary Fact Sheet

The Oregon Health Authority (OHA) conducted a public health assessment (PHA) of the area around the Precision Castparts Corporation (PCC) campus in southeast Portland. The PHA responded to a neighborhood advocacy group's request to OHA to evaluate health risks for the area surrounding PCC. This is a summary of the PHA.

Background

- PCC is a large metal foundry operated in southeast Portland since 1957. PCC makes parts for various industries using nickel, titanium, aluminum and steel alloys at this location.
- From 2013 to 2015, the U.S. Forest Service (USFS) helped the Oregon Department of Environmental Quality (DEQ) locate possible sources of heavy metals air emissions in Portland. USFS collected moss samples from trees around the city. The moss showed high levels of heavy metals near PCC. These results raised concerns about potential human exposure. However, the levels of metals in moss didn't give information needed to determine health risks to people.
- In response, DEQ began air monitoring and collected soil from areas around PCC in 2016. DEQ and PCC collected data on contaminants in PCC storm water runoff and in surface water, sediment and crayfish in nearby Johnson Creek.
- In June 2016, South Portland Air Quality (SPAQ) asked OHA to conduct a PHA because of concerns about short-term and long-term health effects from PCC emissions to air, water and soil. In response, OHA's Environmental Health Assessment Program conducted a public health assessment with the input of an advisory committee, made up of people living nearby.



The PCC campus, in red outline, is located near neighborhoods, businesses, parks, Johnson Creek and a multi-purpose trail.

The PCC PHA found



Measured concentrations of metals in air near PCC are **not likely to harm health.**



There is not enough known about past air emissions from PCC to calculate past health risks before 2016.



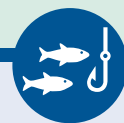
Measured concentrations of metals in soil from areas around the PCC facility **are not likely to harm health.**



Measured concentrations of chemicals in surface water of Johnson Creek near PCC are **not likely to harm health.**



Measured concentrations of chemicals in the sediment of Johnson Creek near PCC **are not likely to harm the health of people who occasionally encounter it.**



People may safely eat **up to five meals of crayfish per month** (40 ounces for adults) from Johnson Creek.

OHA's public health approach

OHA evaluated air, soil, river sediment, surface water and crayfish data.

OHA considered the following to find out if a health threat exists:

- The type of contaminant
- How exposure occurs (breathing in, eating or touching/skin contact)
- Length of time of a person's exposure
- The amount of contaminant present during a person's exposure
- Site conditions (how people use the site and where the contamination might be)

Contaminants of concern in this PHA include:

- Arsenic
- Cadmium
- Hexavalent chromium
- Nickel
- Polychlorinated biphenyls (PCBs)
- Polycyclic aromatic hydrocarbons (PAHs)

For more information on the potential health effects of each chemical, see Appendix F of the report.

Community engagement

OHA held a series of meetings with a community advisory committee (CAC) made up of people who live, work, learn or play near PCC. These meetings' purpose was to:

- Receive input and feedback from local residents. This helped shape the assumptions used to calculate health risks in the PHA. The feedback ensured the community gave input to the assessment.
- Educate participants about the process of a PHA.
- Develop relationships with local residents to build trust between the community and the agency.
- Identify the most relevant way of communicating the PHA to the broader community, including an understanding of how OHA develops PHA conclusions and how communities can engage in the public comment period.
- Ensure the PHA highlights, incorporates and addresses community concerns.

About public health assessments

- The OHA Public Health Division's Environmental Health Assessment Program completes public health assessments (PHA) under a federal grant from the U.S. Centers for Disease Control and Prevention.
- PHAs occur when community members or agencies contact EHAP with health concerns about chemicals in their environment.
- EHAP evaluates available environmental data to determine if chemicals in the environment are harmful to the health of a community. We collect community input and make recommendations for how to protect health based on this information.
- Uncertainties exist in any PHA. Scientists use assumptions, judgments and limited data. These relate to uncertainty in estimating risk. See the full report for a description of uncertainties and limitations.



We want to hear from you!

The public comment period for the PHA is open until Jan. 15, 2019:

Send your comments to ehap.info@dhsosha.state.or.us or mail them to:

Oregon Health Authority

Public Health Division

Environmental Health Assessment Program

800 N.E. Oregon St., Suite 640

Portland, OR 97232

Helpful resources

Read the full report: www.healthoregon.org/ehap/

Access gardening resources: www.healthoregon.org/gardening

Learn more about Cleaner Air Oregon: www.cleanerair.oregon.gov

For more information about this Public Health Assessment, please contact EHAP by:

- Emailing ehap.info@dhsosha.state.or.us or
- Calling 1-877-290-6767.



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Attachment 3

Neighbors question state study giving clean bill of health to area surrounding Precision Castparts

 Steve Law

 Thursday, November 08, 2018

0 Comments

State toxicologists say studies of air, soil and water near SE Portland plant showed no health concerns, at least since 2016.



PORTLAND TRIBUNE FILE PHOTO - Precision Castparts has a long history of toxic emissions near its Southeast Portland plant, but state health officials say emissions, at least since 2016, haven't posed a human health threat.

(<http://pamplinmedia.com/images/artimg/00003624425521-0645.jpg>)Toxic metals and other chemicals released in recent years into the air, soil and water surrounding Precision Castparts' Southeast Portland metals plant are not likely to have harmed human health, according to a new report by state public health officials.

The findings, based on environmental samples collected in 2016 and 2017, were released last week by the Environmental Health Assessment Program of the Oregon Health Authority's Public Health Division.

The public health assessment found that levels of metals — including arsenic, cadmium, chromium and nickel — detected near Precision Castparts' Large Parts campus in Portland were below levels that would be expected to harm public health.

"Based on currently available science, guidance from federal agencies, and (the Department of Environmental Quality's) environmental monitoring data, we concluded that the risk to the health of people living and working in the area since 2016 is low," concluded Susanna Wegner, the public health toxicologist who led the Precision Castparts assessment.

The metals plant is located at 4600 S.E. Harney Drive, near Johnson Creek Boulevard and Portland's Brentwood-Darlington neighborhood.

The health studies came after a series of investigations by Portland Tribune freelance reporter Paul Koberstein documented multiple incidents of toxic emissions by Precision Castparts in the air, soil and water near its plant, including in Johnson Creek.

The state's assessment included monitoring of metals, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and other chemicals in surface water, sediment and crayfish tissue in Johnson Creek. Those tests were conducted by DEQ and Precision Castparts in a series of monitoring efforts performed between 2009 and 2017.

State toxicologists concluded that humans can safely consume up to five crayfish per month from Johnson Creek.

Asked for a reaction to the state study, Precision Castpart's director of corporate communications David Dugan released a brief statement via email: "We are pleased that the Oregon Health Authority's Public Health Assessment recognizes the controls in place at our Large Parts Campus and concluded that PCC Structural's operations are unlikely to be harmful to the health of the community," Dugan wrote. "We have and continue to take very seriously our commitment to operate in a safe and responsible manner."



COURTESY FILE PHOTO - Neighbors of the Precision Castparts plant hold protest to press the company to halt its emissions of metals and other chemicals into the surrounding air.

(<http://pamplinmedia.com/images/artimg/00003623930639-0645.jpg>) Alarmed by the Tribune's findings and related information emerging from a U.S. Forest Service study of moss samples near the plant, nearby residents and activists in the grass roots group South Portland Air Quality pressed state officials to conduct the studies.

Andrew Nemec, a steering committee member for South Portland Air Quality, said he was glad the studies were completed but was "not entirely comfortable with the outcome."

Nemec also served on a citizens advisory committee appointed by the Oregon Health Authority to provide feedback to the state on its follow-up efforts. The citizens advisory committee had asked to receive earlier drafts of the state report but was turned down, Nemec said.

No analysis of longer-term impacts

His biggest concern was that the state study didn't evaluate potential health impacts from longer-term exposure to emissions at the Precision Castparts plant, because the state limited its scope to conditions in 2016 and 2017.

"They haven't compared any data prior to that," Nemec said.

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State health officials noted that their data was collected since 2016, so they couldn't say what health impacts there might have been from prior metals and chemical releases.

"There is insufficient information about historical air emissions of metals and solvents at (Precision Castparts) to calculate past health risks," the study concluded.

"What we are unable to say confidently is the extent to which people were exposed, or whether their health may have been harmed, before air, soil and water samples were collected starting that year," Wegner said.

Prior emissions much higher

The study noted that emissions reported to the U.S. Environmental Protection Agency's Toxic Release Inventory showed much higher toxic emissions into the surrounding air in prior years.

"Emissions reported to (the EPA inventory) since 1987 indicate that emissions of some chemicals may have been 10 and 100 times higher than current emissions during some periods of (Precision Castparts') past operations," the study noted. "Historical emissions of trichloroethylene and tetrachloroethylene would have also contributed to past risks of cancer and developmental defects."

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oaparams=2__bannerid=8310__zoneid=739__cb=663319c08f__oadest=http%3A%2F%2Fbit.ly%2F2QMwYTB)

Nemec, speaking on behalf of himself and other activists, also questioned why public health experts didn't check data for those who live near the plant and have come down with cancer. Such data is available to government health researchers but not the general public.

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"They did not consider the Oregon Cancer Data Registry set," Nemec said.

The study found that "cumulative exposure" to the air around the plant "may be predicted to elevate lifetime cancer risk by as many as 20 additional cases of cancer per 1 million people exposed continuously for a lifetime." Authorities consider that "to be very low risk."

In part, that's because the cancer estimate was largely based on an assumption that nickel emissions found in the air were in its most toxic form.

"It is likely that nickel emissions from (Precision Castparts) are in an alloy form that may be less available to the body and, therefore, less carcinogenic," the study reported.



PORTLAND TRIBUNE FILE PHOTO - A stretch of Johnson Creek near where Precision Castparts emitted toxic materials in the past.

(<http://pamplinmedia.com/images/artimg/00003623930706-0645.jpg>) In general, state agencies said they couldn't verify the source of the toxic emissions, as some might come from other industrial operations, or, in the case of Johnson Creek, from upstream sources.

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However, some of the emissions were from Precision Castparts storm drainage pipe that feeds into Johnson Creek, as reported by the Tribune. The studies found that chemicals in Johnson Creek do not exceed health standards designed to protect drinking water.

Health analysts concluded that the PCBs and PAHs found in Johnson Creek sediment near Precision's stormwater outfall are "not likely to harm health of people," in part because few come in regular contact with it.

"While extremely frequent (daily year-round) contact with Johnson Creek sediment could result in a slight increased risk of both non-cancer and cancer health effects, the likelihood of this degree of contact is quite low," the study concluded.

stevelaw@portlandtribune.com (<mailto:stevelaw@portlandtribune.com>)

Find out more

ADVERTISING | Continue reading below

RS154

11/26/2018 Pamplin Media Group - Neighbors question state study giving clean bill of health to area surrounding Precision Castparts

- The state will conduct a community meeting to present and discuss the findings with the public on Thursday, Nov. 29, at the Lane Middle School library, 7200 S.E. 60th Ave. in Portland. At 6 p.m., there will be an open house format and Q&A with Oregon Health Authority and Department of Environmental Quality staff.

At 7 p.m., there will be a presentation by health officials on the findings of the public health assessment, following by a Q&A.

- Citizens may provide public comments about the state findings until Jan. 15. Those can be sent via email to ehap.info@state.or.us (mailto:ehap.info@state.or.us) or via postal mail to the Oregon Health Authority, Public Health Division, Environmental Health Assessment Program, 800 N.E. Oregon St., Suite 640, Portland, OR 97232.
- To read the assessment: bit.ly/2JGsEmq (<https://bit.ly/2JGsEmq>)
- To contact South Portland Air Quality: www.facebook.com/groups/southportlandairquality/ (<http://www.facebook.com/groups/southportlandairquality/>)

Drink This Each Morning & Flush Away 17Lbs Every Week!

This Fruit Eats Your Belly Fat 24/7

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Precision Castparts Corp. Public Health Assessment

Ehap.info@state.or.us



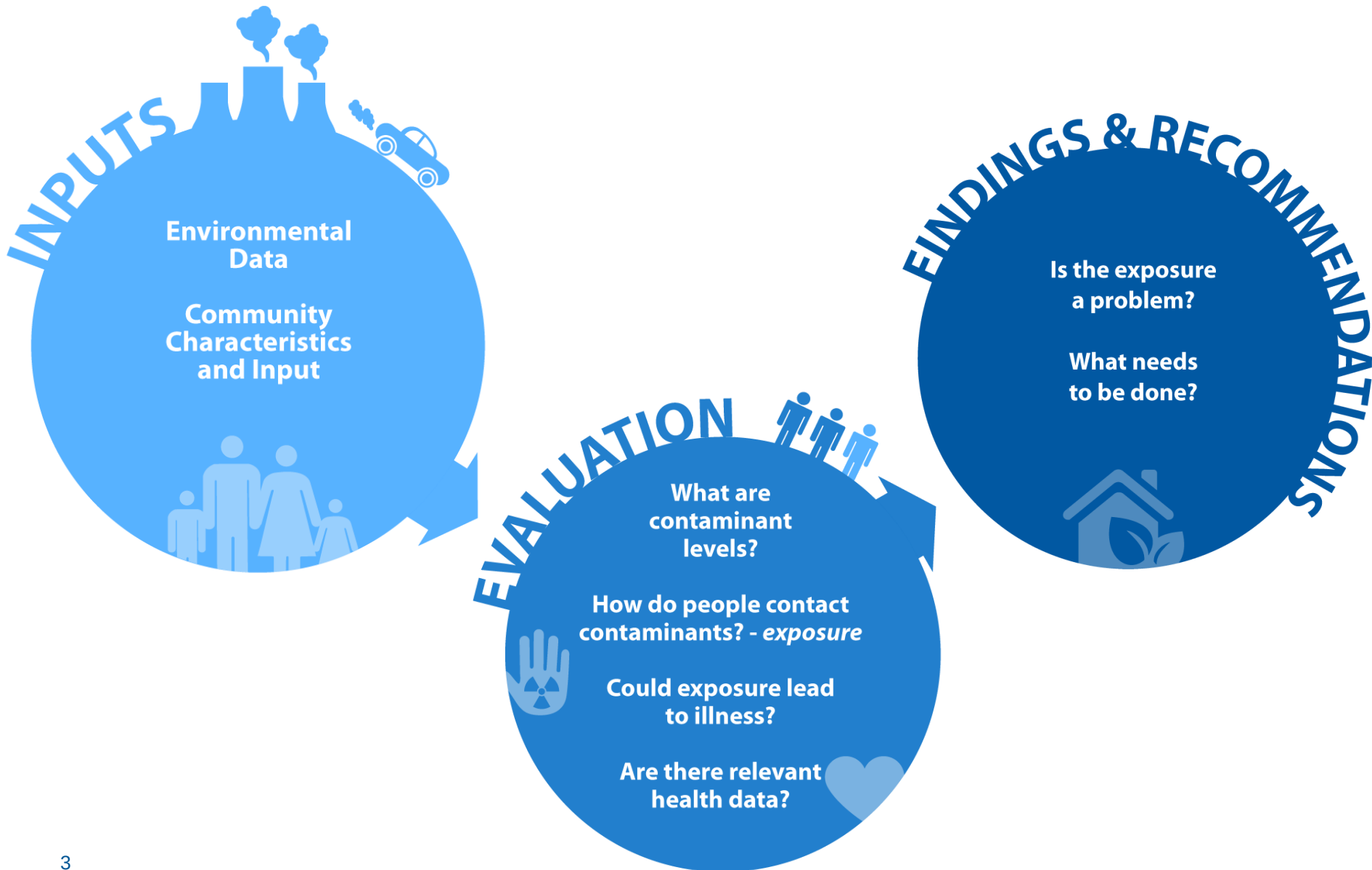
ENVIRONMENTAL PUBLIC HEALTH ASSESSMENT PROGRAM (EHAP)

www.healthoregon.org/ehap

Overview

- What is a public health assessment (PHA)
- What prompted us to conduct this PHA
- Health risk evaluation steps
- Assessment findings
- How does this relate to Cleaner Air Oregon?
- Opportunities for public comment

What is a Public Health Assessment??



What questions can a PHA answer?

- **PHAs are based on levels of chemicals detected in the environment and can answer the following questions:**
 - What do we know about health risks from chemicals detected?
 - How much might people be exposed to?
 - Who might be exposed?
 - Are the chemicals present likely to harm health at the expected levels of exposure?
- **PHAs are not based on diagnosed health problems in a neighborhood**
 - To perform a meaningful community health study that links existing health problems in the community to specific environmental exposures, we would need:
 - Known level of exposure to each chemical for specific people
 - Large study population
 - Known risk factors for disease in each person

What led us to perform this public health assessment?

Moss-derived element concentrations in Portland, Oregon with Web AppBuilder for ArcGIS

Elemental atmospheric pollution assessment via moss-based measurements in Portland, Oregon
By Demetrios Gatzidis, Sarah Iovan, Geoffrey Donovan, Michael Amacher, and Vicente Morleón

USDA UAS PNW

USDA Forest Service, PNW Research Station, the Resource Monitoring and Assessment Program & the Goods, Services, and Values Program

Publication text and instructions on how to use this application are available in PDF format at: <http://www.fs.fed.us/pnw/research/moss/>

Abstract Moss accumulates pollutants from the atmosphere and can serve as an inexpensive screening tool for measuring air quality and guiding the placement of monitoring instruments. We measured twenty-two elements using 540 moss samples collected across Portland, Oregon in December 2012. Our objectives were to develop a color-coded map of the concentration in moss for each element and identify potential air pollution "hotspots." We used simple dot maps, histograms, and summary statistics to describe the distribution of each element. Pollutants found in high concentrations were: lead, cadmium, chromium, and copper. These metals in particular were found in high concentrations in the SE Harney Dr. area. The map shows that element concentrations are highest in the SE Harney Dr. area. Therefore, air quality is poor in this area. This is an air quality monitor is suggested by the moss analysis. We provide the raw element concentrations, regional importance and possible

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South Portland Air Quality
Public Group

About Discussion Members Events Videos Photos Files

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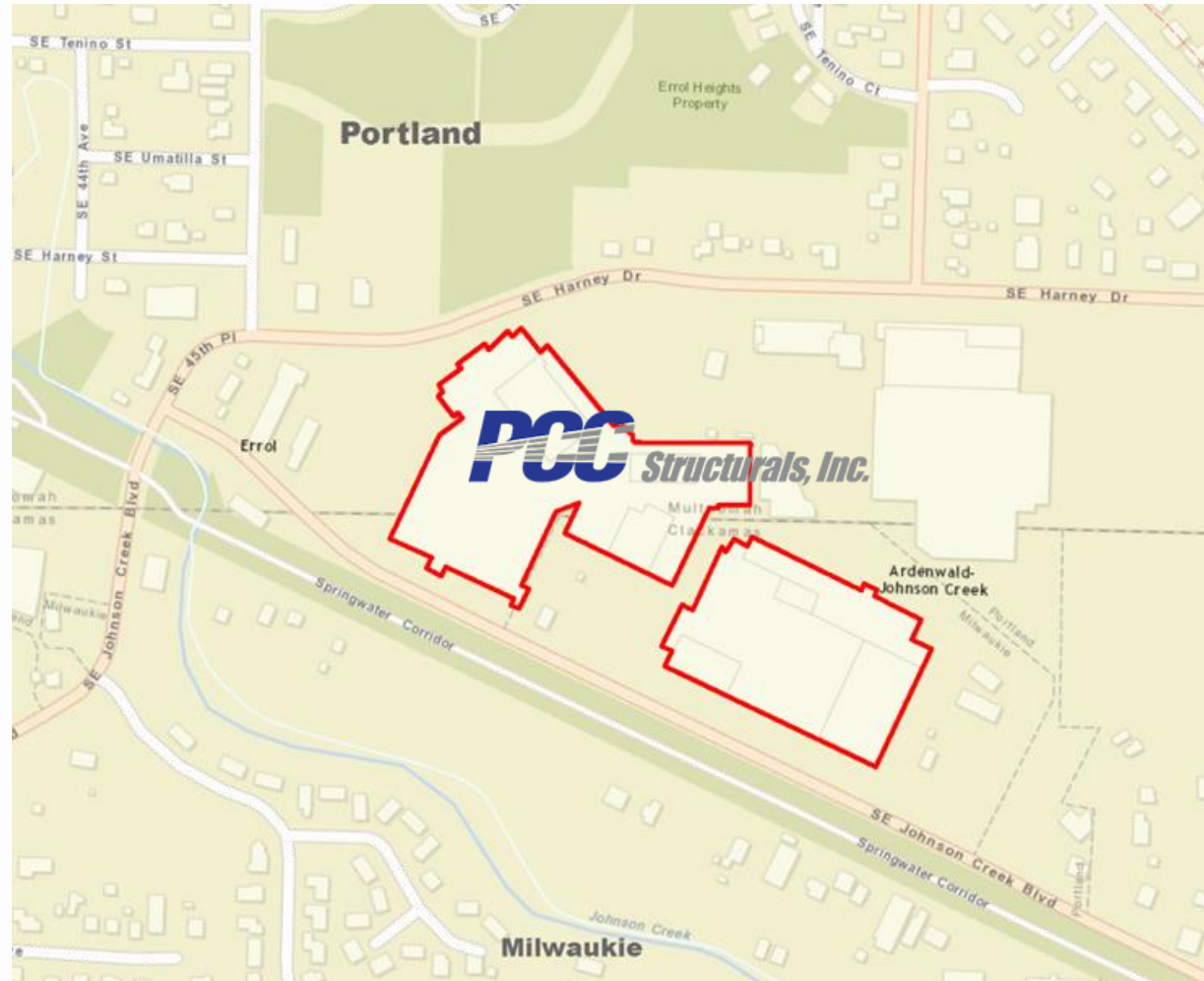
Did you know this neighborhood has a
TOXIC AIR HOTSPOT?

BRENTWOOD-DARLINGTON
WOODSTOCK
EASTMORELAND
MT. SCOTT-ARLETA
ARDENWALD-JOHNSON CREEK
MILWAUKIE

FIND OUT WHAT YOU'RE BREATHING

+ Join Group More Join this group to post and comment.

PCC Structurals Large parts Campus



Community Advisory Committee

- **Volunteer Community Advisory Committee**
 - Learned about the PHA process
 - Identified key questions of interest for the community
 - Provided input on exposure scenarios and assumptions used in risk calculations
 - Advised us on communication of findings

What data was considered in the PHA?



- PCC groundwater monitoring wells
- City of Milwaukie DW
- PCC Stormwater
- City of Portland Johnson Creek Surface Water
- PCC & DEQ Sediment
- DEQ crayfish data



- DEQ Soil Sampling



- USFS Moss
- DEQ Air monitoring
- PCC Reported Toxic Release Inventory

Screening

- Identified contaminants of concern for further investigation in risk calculations
- Eliminated contaminants that don't pose health risks
- PHA used conservative screening values established by ATSDR and EPA



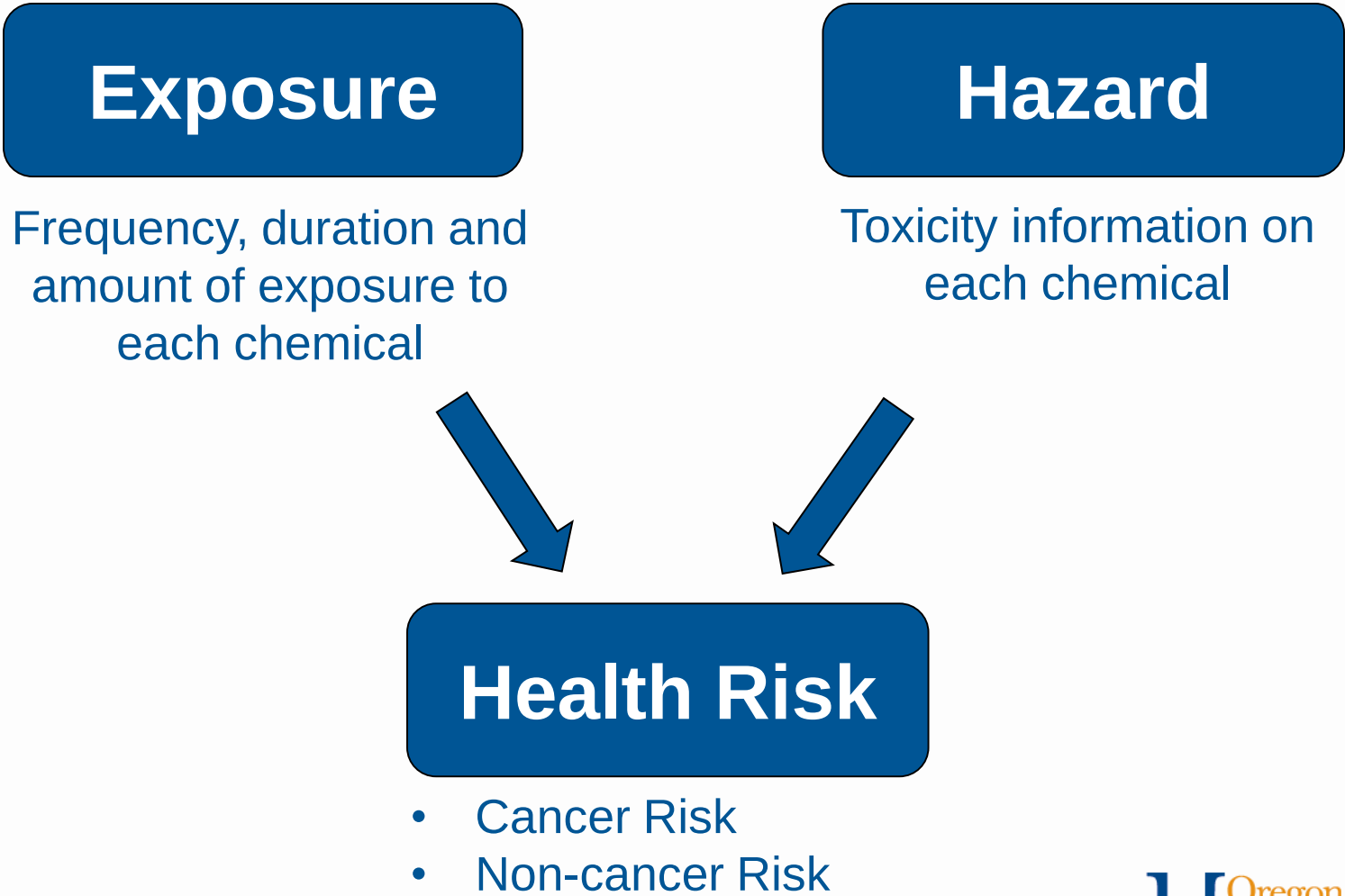
Risk Calculations

Exposure

Frequency, duration and amount of exposure to each chemical

Hazard

Toxicity information on each chemical



```
graph TD; Exposure[Exposure] --> HealthRisk[Health Risk]; Hazard[Hazard] --> HealthRisk;
```

Health Risk

- Cancer Risk
- Non-cancer Risk

Conclusions - Air



Measured concentrations of metals in air near PCC are **not likely to harm health**



There is not enough known about past air emissions from PCC's metals and solvents to calculate past health risks before 2016

Conclusions - Soil



Measured concentrations of metals in soil from areas around the PCC facility **are not likely to harm health.**

Conclusions – Johnson Creek



Measured concentrations of chemicals in surface water of Johnson Creek **are not likely to harm health**



Measured concentrations of chemicals in the sediment of Johnson Creek near PCC **are not likely to harm health of people who occasionally encounter it.**



People may safely eat **up to five meals of crayfish per month** (40 ounces for adults) from Johnson Creek.

Uncertainties and data gaps

- Toxicity information is always evolving
- Risks to sensitive populations
- Exposure information
- Source of contamination

Cleaner Air Oregon

Public health assessments and Cleaner Air Oregon risk assessments are different

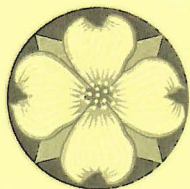
- Designed to answer different questions
- Use different methods
- Rely on different sources of data
- Use different thresholds for acceptable risk

The results of this PHA do not predict whether PCC will be called into the program or what regulatory requirements PCC might face

Public Comment Period

Public Comment Period ends January 15th, 2019

- Read the full report, available at the Woodstock library and at www.healthoregon.org/pccpha
- Send your public comments by email to: ehap.info@state.or.us
- Leave a voicemail at 971-673-0475
- or by mail to:
800 NE Oregon St. Suite 640,
Portland, OR 97232



**CITY OF MILWAUKIE
CITY COUNCIL**

10722 SE Main Street
P) 503-786-7502
F) 503-653-2444
ocr@milwaukieoregon.gov

Speaker Registration

The City of Milwaukie encourages all citizens to express their views to their city leaders in a **respectful** and **appropriate** manner. If you wish to speak before the City Council, fill out this card and hand it to the City Recorder. Note that this Speakers Registration card, once submitted to the City Recorder, becomes part of the public record.

Name: Steven Myers

Organization:

Address: 10155 SE Liebert St Portland OR 97266
Phone: 503-847-4368
Email: Rhmmyers@gmail.com

Meeting Date: DEC 4th 18 **Topic:** _____

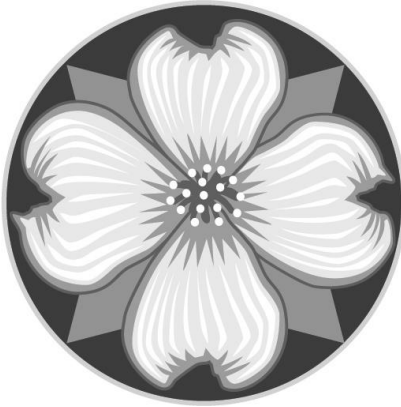
Agenda Item You Wish to Speak to:

- ☐ #4 Audience Participation
- ☐ #5 Public Hearing, Topic:
- ☐ #6 Other Business, Topic:

You are Speaking...

- ☐ in Support
- ☒ in Opposition
- ☐ from a Neutral Position
- ☐ to ask a Question

Comments:



RS Agenda Item

3

Consent Agenda



COUNCIL REGULAR SESSION

City Hall Council Chambers
10722 SE Main Street
www.milwaukieoregon.gov

2279th Meeting

MINUTES

NOVEMBER 6, 2018

Mayor Mark Gamba called the Council meeting to order at 5:08 p.m.

Present: Council President Lisa Batey; Councilors Angel Falconer, Wilda Parks, Shane Abma

Staff: Accounting and Contracts Specialist Kelli Tucker Administrative Specialists Amy Aschenbrenner, Christina Fadenrecht Assistant City Manager Kelly Brooks City Attorney Justin Gericke City Manager Ann Ober	City Recorder Scott Stauffer Engineering Technician Jennifer Backhaus Finance Director Bonnie Dennis Right-of-Way and Contract Coordinator Reba Crocker Public Works Director Peter Passarelli Records and Web Specialist Hannah Wells
---	---

1. CALL TO ORDER

Pledge of Allegiance.

2. PROCLAMATIONS, COMMENDATION, SPECIAL REPORTS AND AWARDS

Mayor Gamba reported that Mr. Stauffer had received the 2018 President's Award of Distinction from the Oregon Association of Municipal Recordors (OAMR). The group congratulated Mr. Stauffer and presented him with a dogwood bow tie. **Mr. Stauffer** thanked Council, Ms. Ober, and staff for the opportunity to serve Milwaukie.

A. Veterans Day – Proclamation

Jerry Craig, American Legion Post 180 Chaplain, and **Mayor Gamba** commented on the history of Veterans Day and discussed the consequences of war. **Mayor Gamba** proclaimed November 11, 2018, to be Veterans Day in Milwaukie.

3. CONSENT AGENDA

Mayor Gamba noted that he had removed the October 2, 2018, Regular Session minutes for further review by staff.

It was moved by Council President Batey and seconded by Councilor Parks to approve the Consent Agenda, minus the October 2, 2018, Regular Session Minutes.

A. City Council Meeting Minutes:

1. October 2, 2018, Work Session;
2. ~~October 2, 2018, Regular Session~~ (removed by Mayor Gamba); and
3. October 9, 2018, Study Session.

B. Resolution 90-2018: A Resolution of the City Council of the City of Milwaukie, Oregon, making an appointment to the Public Safety Advisory Committee.

C. Resolution 91-2018: A Resolution of the City Council of the City of Milwaukie, Oregon, declaring a vacancy and making an appointment to the Budget Committee.

D. Resolution 92-2018: A Resolution of the City Council of the City of Milwaukie, Oregon, authorizing the purchase of a replacement asphalt paving truck system.

- E. **Resolution 93-2018: A Resolution of the City Council of the City of Milwaukie, Oregon, acting as the Local Contract Review Board, approving the award of a contract for the construction of the Sellwood/30th/Madison Street Safe Access for Everyone (SAFE) Project (CIP-2018-T41) to Tapani, Inc.**
- F. **Resolution 94-2018: A Resolution of the City Council of the City of Milwaukie, Oregon, to protect local control of, and receive reasonable compensation for, access to the City of Milwaukie's rights-of-way.**

Motion passed with the following vote: Councilors Falconer, Batey, Parks, and Abma and Mayor Gamba voting "aye." [5:0]

4. AUDIENCE PARTICIPATION

Mayor Gamba noted that no audience member wished to address Council.

5. PUBLIC HEARING

A. None Scheduled.

6. OTHER BUSINESS

A. Contracts Requiring Council Approval – Discussion

Ms. Tucker provided an overview of the City's Local Contract Review Board (LCRB) procedures, noting which contracts and intergovernmental agreements (IGAs) required Council approval. She discussed scenarios where certain IGAs could be renewed or approved more efficiently without Council approval.

Council President Batey, Ms. Ober, and Ms. Tucker noted that IGAs for certain inter-jurisdictional services and those that exceed spending authority limits would always be required to come to Council for approval.

The group discussed why the LCRB procedures had been changed in 2015. It was noted that some IGAs are included in the budget that is approved by Council.

Mayor Gamba expressed support for changing the procedures back to the pre-2015 rules for renewing IGAs. **Ms. Ober** remarked that staff would always watch for specific IGAs that Council would want to consider. She explained that the proposed changes were meant to make the City's contracting processes quicker and more efficient.

Ms. Tucker explained that some IGAs include a set number of extension periods. She suggested that the procedures be changed so that IGAs being extended, as outlined in the original approved terms, did not have to come back to Council for approval.

Councilor Abma expressed support for changing the procedures so Council would not be required to approve IGAs that cost less than \$100,000, are being renewed, or do not having a monetary value.

It was Council consensus that staff would prepare a resolution changing the LCRB procedures so that Council would not be required to approve IGAs being renewed or costing less than \$100,000.

Councilor Falconer asked if the City Manager's spending authority had been recently increased. **Ms. Tucker** reported that the City Manager's authority had last been changed in 2012. **Ms. Ober** remarked on the possible need to re-evaluate spending limits, given the volume of work the City was currently doing. She suggested staff would provide additional information to Council at a future meeting.

7. INFORMATION

Mayor Gamba announced City facility closures for Veterans Day and Thanksgiving. He noted upcoming events, including a Milwaukie Bay Park final design open house, leaf drop-off opportunities, a pre-Thanksgiving Milwaukie Sunday Farmers Market, the annual Umbrella Parade and Christmas Tree Lighting, and the Winter Solstice and Christmas Ships watching event. **Council President Batey** added that Celebrate Milwaukie, Inc. (CMI) would be hosting a downtown businesses holiday decorating contest with winners being announced during the Umbrella Parade event.

Councilor Abma thanked staff for creating an upcoming events graphic to show during this section of the meeting.

The group remarked that it was Election Day. They noted ballot box locations and thanked staff for helping voters find the new box at City Hall.

Ms. Ober noted that Mayor Gamba had indicated an interest in discussing how Council minutes were written. She asked Council to send staff examples of the type of changes they would like to see. **Mayor Gamba** commented on his interest in having the minutes provide references for future Councils to understand why certain decisions were made. **Council President Batey** agreed that old Council minutes sometimes did not include enough description of the discussion. **Ms. Ober** summarized that staff would look at minute writing options and report back to Council.

The group congratulated Mr. Stauffer on receiving an award from OAMR. They remarked on the use of certain words and passive voice in the minutes.

8. ADJOURNMENT

It was moved by Councilor Falconer and seconded by Councilor Parks to adjourn the Regular Session. Motion passed with the following vote: Councilors Falconer, Batey, Parks, and Abma and Mayor Gamba voting “aye.” [5:0]

Mayor Gamba moved to adjourn the regular session at 5:53 p.m.

Respectfully submitted,

Scott Stauffer, City Recorder

COUNCIL STAFF REPORT

To: Mayor and City Council
Ann Ober, City Manager

Date Written: Nov. 20, 2018

Reviewed: Amy Aschenbrenner, Administrative Specialist II

From: Scott Stauffer, City Recorder

Subject: **Certification of the November 2018 General Election Results**

ACTION REQUESTED

As required by the Milwaukie City Charter, Council is asked to acknowledge and certify the results of the election held on Tuesday November 6, 2018, as reported by the Clackamas County Elections Division and the Multnomah County Elections Division.

HISTORY OF PRIOR ACTIONS AND DISCUSSIONS

Milwaukie City Councilors and the Mayor are elected to four-year terms that end at staggered times so that every two years either two or three positions appear on the November ballot. The individuals elected in November serve four-year terms beginning January of the next year.

To qualify to serve on the Council, an individual must be a registered voter in the State of Oregon and have resided within the City limits for at least six months before the election. In 2018, the deadline to reside in City limits was May 6.

Individuals interested in running for Council positions begin the process by filing candidate and petition forms with the City's Elections Officer during the 30-day filing period as outlined in the Charter. As of the 2018 filing deadline, August 28, four individuals had filed and qualified to run for the three Council positions that would be on the November ballot. They included: Elvis Clark and Lisa Batey for Council Position 2; Kathy Hyzy for Council Position 4; and Mark Gamba for Mayor.

In Oregon, counties administer all elections. Therefore, Clackamas and Multnomah County elections divisions distributed, collected, and counted all ballots issued to Milwaukie voters. Canvass reports from precincts located in the City, as submitted by the counties, are attached to this staff report as Attachment 2.

ANALYSIS

Pursuant to Charter Chapter IV. Section 13. Election Returns, election results "shall be made a matter of record in the record of the proceedings of the Council." Accordingly, the Elections Officer requests that the Council adopt a resolution acknowledging and certifying the results of the November 6, 2018 election.

Further, the Charter also directs that Certificates of Election be issued to each elected person. Therefore, the Elections Officer will issue the attached certificates to the elected individuals.

BUDGET IMPACTS

None.

WORKLOAD IMPACTS

None.

COORDINATION, CONCURRENCE, OR DISSENT

The Elections Officer worked with the Clackamas County Elections Division to ensure a smooth administration of the election. The Clackamas County Elections Division and the Multnomah County Elections Division provided the election results attached to this staff report.

STAFF RECOMMENDATION

Staff recommends that Council accept and certify the results of the November 6, 2018 election in accordance with the Charter directive to make the results a part of the Council record.

ALTERNATIVES

None.

ATTACHMENTS

1. Resolution
2. Election Results
3. Certificates of Election



COUNCIL RESOLUTION No.

**A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF MILWAUKIE, OREGON,
CERTIFYING THE RESULTS OF THE NOVEMBER 6, 2018 GENERAL ELECTION.**

WHEREAS, Chapter IV. Section 13. of the Milwaukie City Charter requires election results to be included in the proceedings of the City Council; and

WHEREAS, the election results from the November 6, 2018, General Election have been certified by the Clackamas County Elections Division and the Multnomah County Elections Division.

Now, Therefore, be it Resolved by the City Council of the City of Milwaukie, Oregon, that the certified election results attached to this resolution as "Exhibit A" are now made a part of the record of proceedings of the City Council.

Introduced and adopted by the City Council on **December 4, 2018**.

This resolution is effective immediately.

Mark F. Gamba, Mayor

ATTEST:

APPROVED AS TO FORM:

Scott S. Stauffer, City Recorder

Justin D. Gericke, City Attorney



**CLACKAMAS
COUNTY**

Office of County Clerk

SHERRY HALL
CLERK

1710 Red Soils Court Suite 100
OREGON CITY, OR 97045
503.722.6086

November 21, 2018

BY EMAIL AND USPS

City of Milwaukie
Attn: Scott Stauffer
10722 SE Main St
Milwaukie OR 97222

Greetings:

Please find attached certified results of the November 6, 2018 General Election.

Let us know if any additional information is needed.

Sincerely,

A handwritten signature in black ink, appearing to read "A. Jones", is written over a light blue horizontal line.

Andrew Jones
Elections Manager

Board of Property Tax Appeals
1710 Red Soils Court, Ste 100
Oregon City, OR 97045
503.655.8662
FAX 503.650.5687

Elections Division
1710 Red Soils Court, Ste 100
Oregon City, OR 97045
503.655.8510
FAX 503.655.8461

Recording Division
1710 Red Soils Court Ste 110
Oregon City, OR 97045
503.655.8551
FAX 503.650.5688

Records Management Division
1810 Red Soils Court, Ste 120
Oregon City, OR 97045
503.655.8323
FAX 503.655.8195

RS164

Canvass Results

Official Tally

Run Time 9:21 AM

Run Date 11/21/2018

Clackamas County, Oregon

November 6, 2018 General Election

11/6/2018

Page 117 of 216

Official results**Registered Voters**

203764 of 288244 = 70.69 %

Precincts Reporting

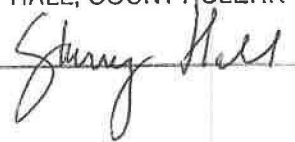
120 of 120 = 100.00 %

City of Milwaukie, Mayor - Vote for one

Precinct	Mark Gamba	Cast Votes	Undervotes	Overvotes	Write-ins	Vote By Mail Ballots Cast	Total Ballots Cast	Registered Voters	Turnout Percentage
051	1273	1273	1018	0	65	2356	2356	3246	72.58 %
052	1267	1267	1148	0	54	2469	2469	3425	72.09 %
053	1088	1088	880	0	66	2034	2034	2870	70.87 %
054	1122	1122	867	0	53	2042	2042	2751	74.23 %
055	1085	1085	950	0	82	2117	2117	3052	69.36 %
Totals	5835	5835	4863	0	320	11018	11018	15344	71.81 %

CERTIFIED COPY OF THE ORIGINAL
SHERRY HALL, COUNTY CLERK

BY:

**RS165**

Canvass Results

Official Tally

Run Time 9:21 AM

Run Date 11/21/2018

Clackamas County, Oregon

November 6, 2018 General Election

11/6/2018

Page 118 of 216

Official results**Registered Voters**

203764 of 288244 = 70.69 %

Precincts Reporting

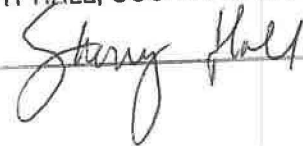
120 of 120 = 100.00 %

City of Milwaukie, Councilor, Position 2 - Vote for one

Precinct	Elvis Clark	Lisa Batey	Cast Votes	Undervotes	Overvotes	Write-ins	Vote By Mail Ballots Cast	Total Ballots Cast	Registered Voters	Turnout Percentage
051	558	1263	1821	520	0	15	2356	2356	3246	72.58 %
052	680	1206	1886	580	0	3	2469	2469	3425	72.09 %
053	616	931	1547	479	0	8	2034	2034	2870	70.87 %
054	488	1067	1555	484	0	3	2042	2042	2751	74.23 %
055	561	1028	1589	512	0	16	2117	2117	3052	69.36 %
Totals	2903	5495	8398	2575	0	45	11018	11018	15344	71.81 %

CERTIFIED COPY OF THE ORIGINAL
SHERRY HALL, COUNTY CLERK

BY:

**RS166**

Canvass Results

Official Tally

Run Time 9:21 AM

Run Date 11/21/2018

Clackamas County, Oregon

November 6, 2018 General Election

11/6/2018

Page 119 of 216

Official results

Registered Voters

203764 of 288244 = 70.69 %

Precincts Reporting

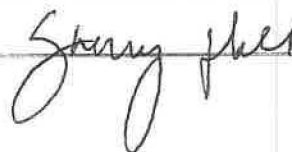
120 of 120 = 100.00 %

City of Milwaukie, Councilor, Position 4 - Vote for one

Precinct	Katharine Hyzy	Cast Votes	Undervotes	Overvotes	Write-ins	Vote By Mail Ballots Cast	Total Ballots Cast	Registered Voters	Turnout Percentage
051	1177	1177	1145	0	34	2356	2356	3246	72.58 %
052	1141	1141	1305	0	23	2469	2469	3425	72.09 %
053	1023	1023	985	0	26	2034	2034	2870	70.87 %
054	1013	1013	1008	0	21	2042	2042	2751	74.23 %
055	1024	1024	1046	0	47	2117	2117	3052	69.36 %
Totals	5378	5378	5489	0	151	11018	11018	15344	71.81 %

CERTIFIED COPY OF THE ORIGINAL
SHERRY HALL, COUNTY CLERK

BY:

**RS167**

Multnomah County Election Results
 November 2018 General Election - Final Precinct Results
 All Precincts, CITY OF MILWAUKIE (JT), All ScanStations, City of Milwaukie, Mayor, City of Milwaukie, Councilor, Position 2, City of Milwaukie, Councilor, Position 4, All Boxes
 Total Ballots Cast: 0

Page: 1 of 3
 2018-11-26
 10:38:59

City of Milwaukie, Mayor (Vote for 1)

Precinct	Total Votes	Mark Gamba	Write-In	Over Votes	Under Votes
Precinct 4102	0	0 0.00%	0 0.00%	0	0
Total	0	0 0.00%	0 0.00%	0	0

Certificate

I certify that the votes recorded on this abstract correctly summarize the tally of votes cast at the election indicated.



Tim Scott, Director of Elections
 Multnomah County, Oregon

Multnomah County Election Results
November 2018 General Election - Final Precinct Results
All Precincts, CITY OF MILWAUKIE (JT), All ScanStations, City of Milwaukie, Mayor, City of Milwaukie, Councilor, Position 2, City of Milwaukie, Councilor, Position 4, All Boxes
Total Ballots Cast: 0

Page: 2 of 3
2018-11-26
10:38:59

City of Milwaukie, Councilor, Position 2 (Vote for 1)

Precinct	Total Votes	Elvis Clark		Lisa Bailey		Write-in		Over Votes	Under Votes
Precinct 4102	0	0	0.00%	0	0.00%	0	0.00%	0	0
Total	0	0	0.00%	0	0.00%	0	0.00%	0	0

Certificate

I certify that the votes recorded on this
abstract correctly summarize the tally of
votes cast at the election indicated.



Tim Scott, Director of Elections
Multnomah County, Oregon

Multnomah County Election Results
 November 2018 General Election - Final Precinct Results
 All Precincts, CITY OF MILWAUKIE (JT), All Scan Stations, City of Milwaukie, Mayor, City of Milwaukie, Councilor, Position 2, City of Milwaukie, Councilor, Position 4, All Boxes
 Total Ballots Cast: 0

Page: 3 of 3
 2018-11-26
 10:38:59

City of Milwaukie, Councilor, Position 4 (Vote for 1)

Precinct	Total Votes	Katharine Hyzy	Write-In	Over Votes	Under Votes
Precinct 4102	0	0 0.00%	0 0.00%	0	0
Total	0	0 0.00%	0 0.00%	0	0

Certificate

I certify that the votes recorded on this abstract correctly summarize the tally of votes cast at the election indicated.



Tim Scott, Director of Elections
 Multnomah County, Oregon

CERTIFICATE OF ELECTION



This certifies that at the **November 6, 2018**, General Election held
in the City of Milwaukie, County of Clackamas, State of Oregon,

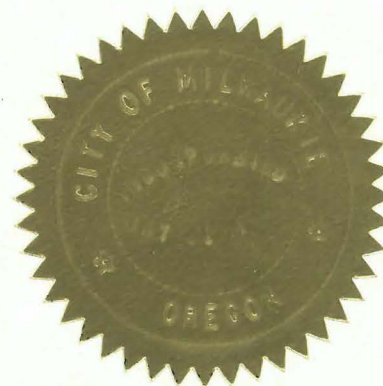
Lisa Batey

was elected to the **Office of City Council Position No. 2**
for a term beginning **January 2019** and ending **December 31, 2022**.

As directed by the City Charter, I have
placed the seal of the City of Milwaukie and
signed this certificate on **December 4, 2018**.

A handwritten signature in blue ink, reading "Scott S. Stauffer", is written over a horizontal line.

Scott S. Stauffer, City Recorder



CERTIFICATE OF ELECTION



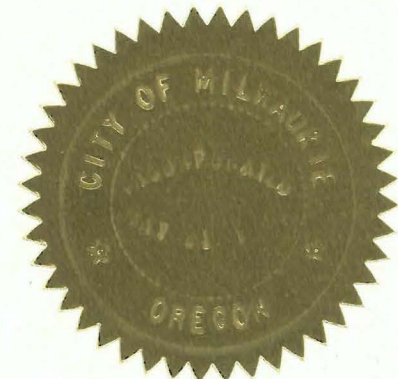
This certifies that at the **November 6, 2018**, General Election held
in the City of Milwaukie, County of Clackamas, State of Oregon,

Kathy Hyzy

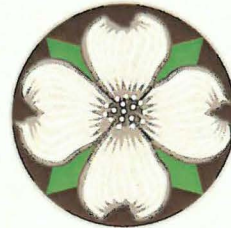
was elected to the **Office of City Council Position No. 4**
for a term beginning **January 2019** and ending **December 31, 2022**.

As directed by the City Charter, I have
placed the seal of the City of Milwaukie and
signed this certificate on **December 4, 2018**.

Scott S. Stauffer, City Recorder



CERTIFICATE OF ELECTION



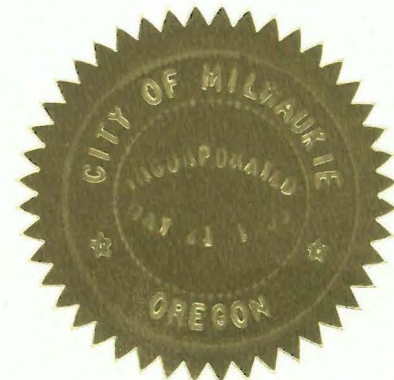
This certifies that at the **November 6, 2018**, General Election held
in the City of Milwaukie, County of Clackamas, State of Oregon,

Mark Gamba

was elected to the **Office of Mayor**
for a term beginning **January 2019** and ending **December 31, 2022**.

As directed by the City Charter, I have
placed the seal of the City of Milwaukie and
signed this certificate on **December 4, 2018**.

Scott S. Stauffer, City Recorder



COUNCIL STAFF REPORT

To: Mayor and City Council
Ann Ober, City Manager

Date Written: Nov. 27, 2018

Reviewed: Justin Gericke, City Attorney
From: Gary Rebello, Human Resources Director

Subject: **City Manager Employment Agreement**

ACTION REQUESTED

Approve revised City Manager Employment Agreement effective December 4, 2018.

HISTORY OF PRIOR ACTIONS AND DISCUSSIONS

City Manager received her initial and current Employment Agreement upon hire effective October 17, 2016.

ANALYSIS

Revisions to the City Manager Employment Agreement are relatively minor:

- Section 1: Term. Eliminate reference to three-year term. City Manager serves at the pleasure of the City Council and may be removed by the City Council at any time.
- Section 3: Compensation. Update to annual base salary. Eliminate reference to probationary period (already completed).
- Section 16: Residency and Relocation Expense. Eliminate entire section. Residency requirement is included in the City Charter. City Manager resides in the City. City Manager has completed relocation.

BUDGET IMPACTS

None.

WORKLOAD IMPACTS

None.

COORDINATION, CONCURRENCE, OR DISSENT

City Attorney reviewed and concurs.

STAFF RECOMMENDATION

Approve revisions to City Manager Employment Agreement effective December 4, 2018.

ALTERNATIVES

Maintain current City Manager Employment Agreement language.

ATTACHMENTS

1. Resolution
2. Revised City Manager Employment Agreement.



COUNCIL RESOLUTION No.

**A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF MILWAUKIE, OREGON,
REVISING EXISTING CITY MANAGER EMPLOYMENT AGREEMENT.**

WHEREAS, City Manager has successfully completed two years of employment with the City; and

WHEREAS, City Manager's initial Employment Agreement needs revision; and

WHEREAS, a revised and updated City Manager Employment Agreement has been created at Council's direction.

Now, Therefore, be it Resolved that City Council approves the revised City Manager Employment Agreement effective December 4, 2018.

Introduced and adopted by the City Council on _____.

This resolution is effective on _____.

Mark F. Gamba, Mayor

ATTEST:

APPROVED AS TO FORM:

Scott S. Stauffer, City Recorder

Justin D. Gericke, City Attorney

**CITY OF MILWAUKIE
EMPLOYMENT AGREEMENT – CITY MANAGER**

Introduction

This Agreement is made and entered into this 4th day of December, 2018, by and between the City of Milwaukie, an Oregon municipal corporation, (hereinafter called “Employer”) and Ann Ober, (hereinafter called “Employee”) an individual who has the education, training and experience in local government management and who, as a member of the International City/County Management Association (ICMA), is subject to the ICMA Code of Ethics, both of whom agree as follows:

Section 1: Term

The City Council shall be responsible for employee’s appointment, removal and supervision. Employee shall serve at the pleasure of the City Council and may be removed by the City Council at any time without cause.

Section 2: Duties and Authority

A. Employer agrees to employ Ann Ober as City Manager to perform the functions and duties specified in the City of Milwaukie Charter, ordinances, resolutions, and to perform other legally permissible and proper duties and functions as the City Council may assign from time to time without interference. (City Manager job description is attached as reference ‘A’).

B. Employee is the chief executive officer of the Employer and shall faithfully perform the duties as prescribed in the job description as set forth in the Employer’s charter and/or ordinances and as may be lawfully assigned by the Employer and shall comply with all lawful governing body directives, state and federal law, Employer policies, rules and ordinances as they exist or may hereafter be amended and the City Manager job description as described in ‘A’ attached.

C. Specifically, it shall be the duty of the Employee to employ on behalf of the Employer all other employees of the organization consistent with the policies of the governing body and the ordinances and charter of the Employer.

D. It shall also be the duty of the Employee to direct, assign, reassign and evaluate all of the employees of the Employer consistent with policies, ordinances, charter, state and federal law.

E. It shall also be the duty of the Employee to organize, reorganize and arrange the staff of the Employer and to develop and establish internal regulations, rules and procedures which the Employee deems necessary for the efficient and effective operation of the Employer consistent with the lawful directives, policies, ordinances, state and federal law.

F. It shall also be the duty of the Employee to accept all resignations of employees of the Employer consistent with the policies, ordinances, state and federal law, except the Employee's resignation which must be accepted by the governing body.

G. The Employee shall perform the duties of city manager of the Employer with reasonable care, diligence, skill and expertise.

H. All duties assigned to the Employee by the governing body shall be appropriate to and consistent with the professional role and responsibility of the Employee.

I. The Employee cannot be reassigned from the position of city manager to another position without the Employee's express written consent.

J. The Employee or designee shall attend, and shall be permitted to attend, all meetings of the governing body, both public and closed, with the exception of those closed meetings devoted to the subject of this Agreement, or any amendment thereto or the Employee's evaluation or otherwise consistent with state law.

K. The governing body, individually and collectively, shall refer in a timely manner all substantive criticisms, complaints and suggestions called to their attention to the Employee for study and/or appropriate action. At the Employee's discretion, she may report to the Council any conclusions or recommendations.

Section 3: Compensation

A. Base Salary: Employer agrees to pay Employee an annual base salary of \$157,000.00, payable in installments at the same time that the other management employees of the Employer are paid.

B. This agreement shall be automatically amended to reflect any salary adjustments that are provided or required by the Employer's compensation policies.

C. In addition, consideration shall be given on an annual basis to an increase in compensation with similar consideration as is given to Employer's other management employees.

D. Employer has authorized non-represented exempt employees, on a voluntary basis, to use a personal cellular device (smartphone only) for work purposes in-lieu of a City provide cellular device. If employee chooses this option, the City will compensate employee with a taxable monthly allowance. The allowance is based on the cost savings for the City and not on the cost of the employee's personal device or plan. The monthly allowance is subject to change. The allowance is currently set at \$65.00 per month. The other option is to use a City provided cellular device for work purposes only, as detailed in the City's Cellular Telephone Use Policy (500.3).

E. As part of Employee's compensation, Employer shall provide Employee with unrestricted use of a laptop computer or tablet, including Wi-Fi, broadband and internet capability, beginning with the effective date of this agreement. Employee may select the make

and model of laptop computer or tablet to be used, subject to approval by Employer. Employer's approval shall not be withheld without good cause; however, the laptop computer or tablet must be compatible with the City's computer system and other electronics used by City employees.

Section 4: Health, Disability and Life Insurance Benefits

Employer agrees to provide health care benefits consistent with those provided pursuant to the City's Employment Policies and Procedures including but not limited to medical, dental, vision, life, and long-term disability with coverage equivalent to that provided to management personnel of the city.

Section 5: Vacation, Sick, and Management Leave

A. Upon commencing employment, the Employee shall be credited with sick and vacation leave as provided to all other employees. Beginning on the effective date of this agreement, the Employee shall accrue 12 hours of vacation leave per month or 18 days (3.6 weeks) per year (assumes employee begins with the City with 109 months of credited service) at time of hire. Employee shall be eligible for increased vacation accrual consistent with the City Personnel Policies. Maximum accrual rates for all leaves shall be consistent with the City's Employment Policies and procedures. Therefore, the Employee is entitled to accrue all unused leave, up to a maximum of two (2) times the annual accrual rate. In the event the Employee's employment is terminated, either voluntarily or involuntarily, the Employee shall be compensated for all accrued vacation time, to date.

B. City agrees to credit employee with a prorated amount of hours of management leave for the remainder of the current fiscal year in accordance with the City Personnel Rules. Beginning in the following fiscal year, employee will receive normal management leave of 96 hours. Any unused management leave shall not carry over to any subsequent fiscal year, and employee shall not be entitled to any compensation for any unused management leave upon termination of employment.

Section 6: Automobile

Employee shall furnish her own transportation for business purposes, the cost of which shall be borne by Employee. The Employer agrees to pay to the Employee, during the term of this Agreement and in addition to other salary and benefits herein provided the sum of \$400 per month, as a vehicle allowance to be used to purchase, lease, or own, operate and maintain a vehicle. The vehicle allowance is in lieu of standard mileage reimbursement for business related travel.

Section 7: Retirement

A. City agrees to contribute to the Public Employees Retirement System (PERS) an amount prescribed by State law once the employee is eligible for participation in PERS (six month waiting period). There is an employee contribution of 6% of salary and an employer contribution portion, the City contributes both the employee and City portion to the State Public Employee's Retirement Plan above the base compensation listed above. Employee compensation

shall not be reduced as a result of the City's payment of Employee contribution.

B. The City agrees to place an additional amount of base salary, currently at 2.5%, into a deferred compensation program on behalf of the employee. City agrees to execute any agreements reasonably necessary to allow employee to defer payment of agreed upon compensation in accordance with the deferred compensation programs offered by the City.

C. Due to the employee's need to satisfy the PERS six-month eligibility waiting period, Employer shall contribute six percent of base pay, on a pay period basis, for the first 6 months of employment in a deferred compensation plan of Employee's choice. This is in addition to the 2.5% deferred compensation contribution listed above.

Section 8: General Business Expenses

A. Employer agrees to budget and pay for professional dues, including but not limited to the International City/County Management Association, and subscriptions of the Employee necessary for continuation and full participation in national, regional, state, and local associations, and organizations necessary and desirable for the Employee's continued professional participation, education, growth, and advancement, and for the good of the Employer.

B. The Employer acknowledges the value of having Employee participate and be directly involved in local civic clubs or organizations. Accordingly, Employer shall pay membership expenses and dues for those civic groups for which Employee determines her membership is beneficial to the City, subject to approval of expenses through the City's budget process.

C. Other business-related expenses incurred by Employee not outlined in this Section may be reimbursed pursuant to the Cities Policies and Procedures subject to approval through the City budget process.

Section 9: Termination

A. Termination Without Cause.

1. If the majority of the governing body votes to terminate or accept the resignation of the Employee in-lieu of termination at a duly authorized public meeting, unless the termination is for cause as provided under Subsection B determination shall be without cause. Nothing in this employment agreement shall prevent, limit or otherwise interfere with the right of the City to immediately terminate the employee. If the termination is without cause the City agrees to provide a letter of written endorsement.

2. If the Employer, citizens or legislature act to amend any provisions of the City's Charter pertaining to the role, powers, duties, authority, responsibilities of the Employee's position that substantially changes the form of government, the Employee shall have the right to declare that such amendments constitute termination without cause. However, Employee may declare that such amendments constitute a termination only if Employee also reasonably declares

that such amendments result in a material negative change to Employee in Employee's employment with Employer, such as the duties to be performed, the conditions under which the duties are to be performed, or the compensation to be received for employment with Employer.

3. If the Employer reduces the base salary, compensation or any other financial benefit of the Employee, unless it is applied in no greater percentage than the average reduction of all department heads, Employee shall have the right to declare that the reduction constitutes a termination without cause.

B. Termination for Cause.

1. Employer may terminate Employee for cause as a result of violation of any of City's policies or directives, because of illegal action involving personal gain, violation of ICMA Code of Ethics or crimes of moral turpitude. Employee shall receive notice of any charges against her and possible sanctions being considered. The Employer and Employee shall meet in private at mutually convenient times for a period of up to five days to seek a resolution of any reported violation. After said five-day period, if no resolution can be reached, Employee shall also be advised of the date and time when Employer will consider charges and possible sanction. She will be afforded an opportunity to refute the charges, either orally or in writing, before the Council, and to have representation of her choice at the hearing. Available options to Employer other than termination include oral or written reprimand and suspension with pay. In addition to the above, grounds for removal include but are not limited to:

- (a) Incompetence, inefficiency or inattention to or dereliction of duty.
- (b) Dishonesty, intemperance, addiction to drugs or controlled substances, immoral conduct, insubordination or discourteous treatment of the public or fellow employees.
- (c) Any other willful failure of good conduct tending to injure the public service.
- (d) Neglect of duty and excessive absence.

Section 10: Severance

Severance shall be paid to the Employee when employment is terminated as defined in Section 9(A) only. No severance will be paid if termination is during the probationary period. If the Employee is terminated, the Employer shall provide a 30-day notice period or pay in-lieu of notice and a minimum six months' severance payment equal to the unpaid salary at the current rate of pay with benefits (calculated as the employer paid share of the medical/dental/vision premium). This severance shall be payable in a lump sum at time of termination unless otherwise agreed to in writing by the Employer and the Employee.

Section 11: Resignation

In the event that the Employee voluntarily resigns her position with the Employer, the Employee shall provide a minimum of sixty (60) days' notice unless Employer and Employee agree otherwise. No severance payment is due employee in the event of a voluntary termination.

Section 12: Performance Evaluation

A. Employer shall annually review the performance of the Employee subject to a process, form, criteria, and format for the evaluation as determined by the City Council.

B. The annual evaluation process, at a minimum, shall include the opportunity for both parties to: 1) prepare a written evaluation, 2) meet and discuss the evaluation and 3) present a written summary of the evaluation results. Said evaluation shall remain private and confidential, unless State law requires otherwise. The final written evaluation should be completed and delivered to the Employee within 30 days of the evaluation meeting.

Section 13: Hours of Work

It is recognized that the Employee must devote a great deal of time outside the normal office hours on business for the Employer, and to that end Employee shall be allowed to establish an appropriate work schedule with the approval of the Council.

Section 14: Ethical Commitments

Employee will at all times uphold the tenets of the ICMA Code of Ethics, a copy of which is attached (marked 'B') hereto and incorporated herein. Specifically, Employee shall not endorse candidates, make financial contributions, sign or circulate petitions, or participate in fund-raising activities for individuals seeking or holding elected office, nor seek or accept any personal enrichment or profit derived from confidential information or misuse of public time.

Employer shall support Employee in keeping these commitments by refraining from any order, direction or request that would require Employee to violate the ICMA Code of Ethics. Specifically, neither the governing body nor any individual member thereof shall request Employee to endorse any candidate, make any financial contribution, sign or circulate any petition, or participate in any fund-raising activity for individuals seeking or holding elected office, nor to handle any matter of personnel on a basis other than fairness, impartiality and merit.

Section 15: Outside Activities

The employment provided for by this Agreement shall be the Employee's sole employment. Recognizing that certain outside consulting or teaching opportunities provide indirect benefits to the Employer and the community, the Employee may elect to accept limited teaching, consulting or other business opportunities with the understanding that such arrangements must neither constitute interference with nor a conflict of interest with his or her responsibilities under this Agreement. Employee must disclose to the City Council any such arrangement that may conflict with the best interests of the City as reasonably judged by the Employee.

Section 16: Indemnification

Beyond that required under Federal, State or Local Law, Employer shall defend, save harmless and indemnify Employee against any tort, professional liability claim or demand or other legal action, whether groundless or otherwise, arising out of an alleged act or omission occurring in the performance of Employee's duties as City Manager or resulting from the exercise of judgment or discretion in connection with the performance of program duties or responsibilities, unless the act or omission involved willful or wanton conduct. The Employee may request and the Employer shall not unreasonably refuse to provide independent legal representation chosen by Employee at Employer's expense and Employer may not unreasonably withhold approval. Legal representation, provided by Employer for Employee, shall extend until a final determination of the legal action including any appeals brought by either party. The Employer shall indemnify employee against any and all losses, damages, judgments, interest, settlements, fines, court costs and other reasonable costs and expenses of legal proceedings including attorney's fees, and any other liabilities incurred by, imposed upon, or suffered by such Employee in connection with or resulting from any claim, action, suit, or proceeding, actual or threatened, arising out of or in connection with the performance of her duties. Any settlement of any claim must be made with prior approval of the Employer in order for indemnification, as provided in this Section, to be available. Employee recognizes that Employer shall have the right to compromise and unless the Employee is a party to the suit in which case Employee shall have a veto authority over the settlement, settle any claim or suit; unless, said compromise or settlement is of a personal nature to Employee. Further, Employer agrees to pay all reasonable litigation expenses of Employee throughout the pendency of any litigation to which the Employee is a party, witness or advisor to the Employer. Such expense payments shall continue beyond Employee's service to the Employer as long as litigation is pending. Further, Employer agrees to pay Employee reasonable consulting fees and travel expenses when Employee serves as a witness, advisor or consultant to Employer regarding pending litigation.

Section 17: Bonding

Employer shall bear the full cost of any fidelity or other bonds required of the Employee under any law or ordinance.

Section 18: Other Terms and Conditions of Employment

A. The Employer, only upon written agreement with Employee, shall fix any such other terms and conditions of employment, as it may determine from time to time, relating to the performance of the Employee, provided such terms and conditions are not inconsistent with or in conflict with the provisions of this Agreement, the City of Milwaukie Charter, local ordinances or any other law.

B. In the absence of any specific provision in this Agreement, City Employment Policies and Procedures will apply.

Section 19: Notices

Notice pursuant to this Agreement shall be given by depositing in the custody of the United States Postal Service, postage prepaid, and addressed as follows:

(a) EMPLOYER: Mayor, City of Milwaukie
 10722 SE Main Street,
 Milwaukie, Oregon 97222

 With a copy to: City Attorney
 10722 SE Main Street,
 Milwaukie, Oregon 97222

(b) EMPLOYEE: Ann Ober
 4438 SE Jefferson Street,
 Milwaukie, OR 97222

Notice shall be given as of the date of personal service or as the date of deposit of such written notice in the course of transmission in the United States Postal Service.

OR

Alternatively, notice required pursuant to this Agreement may be personally served in the same manner as is applicable to civil judicial practice. Notice shall be deemed given as of the date of personal service or as the date of deposit of such written notice in the course of transmission in the United States Postal Service. Either party may change such addresses from time to time by providing written notice to the other in the manner set forth above.

Section 21: General Provisions

A. Integration. This Agreement sets forth and establishes the entire understanding between the Employer and the Employee relating to the employment of the Employee by the Employer. Any prior discussions or representations by or between the parties are merged into and rendered null and void by this Agreement. The parties by mutual written agreement may amend any provision of this agreement during the life of the agreement. Such amendments shall be incorporated and made a part of this agreement.

B. Binding Effect. This agreement shall be binding on the Employer and the Employee as well as their heirs, assigns, executors, personal representatives and successors in interest, except that Employee may not assign this Agreement without the prior written consent of Employer, which consent may be withheld for any or no reason.

C. Effective Date. This Agreement shall become effective on the date executed.

D. Severability. The invalidity or partial invalidity of any portion of the Agreement will not affect the validity of other provisions. In the event that any provision of this Agreement is held to be invalid, the remaining provisions shall be deemed to be in full force and effect as if they have been executed by both parties subsequent to the expungement or judicial modification

of the invalid provision.

E. Upon termination of this Agreement, Employee shall deliver all records, notes, data, memoranda, models, and equipment of any nature that are in Employee's possession or under her control and that are Employer's property or relate to Employer's business.

F. The failure of either party to enforce any provision of this Agreement shall not be construed as a waiver or limitation of that party's right to subsequently enforce and compel strict compliance with every provision of this Agreement.

Section 22. Confidentiality

A. Employee recognizes that Employer has and will have future plans, business affairs, employment, legal and litigation matters, and other proprietary information that are valuable, special and unique assets of City and need to be protected from improper disclosure. Employee agrees not to, at any time or in any manner, either directly or indirectly, use any information for her own benefit, or divulge in any manner to any third party without the prior written consent of Employer. Employee will protect the information as strictly confidential. A violation of this paragraph shall be a material violation of this Agreement.

B. If it appears that Employee has disclosed (or has threatened to disclose) information in violation of this Agreement, Employer shall be entitled to an injunction to restrain Employee from disclosing, in whole or in part, such information, or from providing any services to any party to whom such information has been disclosed or may be disclosed. Employer shall not be prohibited by this provision from pursuing other remedies, including a claim for losses and damages.

C. The confidentiality provisions of this Agreement shall remain in full force and effect after the termination of this Agreement.

Section 23. Attorney Fees

In the event any action, suit, arbitration or other proceeding shall be instituted by either party to this Agreement to enforce any provision of this Agreement or any matter arising therefrom or to interpret any provision of this Agreement, including any proceeding to compel arbitration, the prevailing party shall be entitled to recover from the other a reasonable attorney fee to be determined by the Court or Arbitrator(s). In addition to recovery of a reasonable attorney fee, the prevailing party shall be entitled to recover from the other costs and disbursements, including all costs of Arbitration and the Arbitrator(s) fees, and expert witness fees, as fixed by the Court or tribunal in which the case is heard. In the event any such action, suit, arbitration or other proceeding is appealed to any higher court or courts, the prevailing party shall recover from the other a reasonable attorney fee for prosecuting or defending such appeal or appeals, in addition to the reasonable attorney fees in the lower court or courts or arbitration proceeding, such fee to be determined by the appellate court or lower court or arbitrator, as the appellate court may determine. In addition to recovery of a reasonable attorney fee on appeal, the

prevailing party shall be entitled to recover from the other costs and disbursements and expert witness fees as fixed by the appellate court. All costs and disbursements which may be awarded pursuant to this paragraph shall bear interest at the maximum legal rate from the date they are incurred until the date they are paid by the losing party.

CITY

EMPLOYEE

Mayor - Mark Gamba

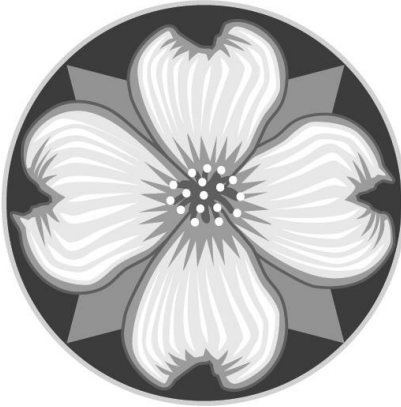
Ann Ober

Dated:_____

Dated:_____

APPROVED AS TO FORM:

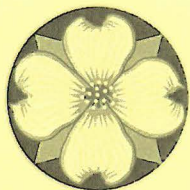
City Attorney



RS Agenda Item

4

Audience Participation



CITY OF MILWAUKIE CITY COUNCIL

10722 SE Main Street
P) 503-786-7502
F) 503-653-2444
ocr@milwaukieoregon.gov

Speaker Registration

The City of Milwaukie encourages all citizens to express their views to their city leaders in a **respectful** and **appropriate** manner. If you wish to speak before the City Council, fill out this card and hand it to the City Recorder. Note that this Speakers Registration card, once submitted to the City Recorder, becomes part of the public record.

Name: Vince Alvarez

Organization:

Address:

Phone:

Email: heavytech77@gmail.com

Meeting Date: 12-4-18

Topic: Speak to plans for Mil. Bay Park

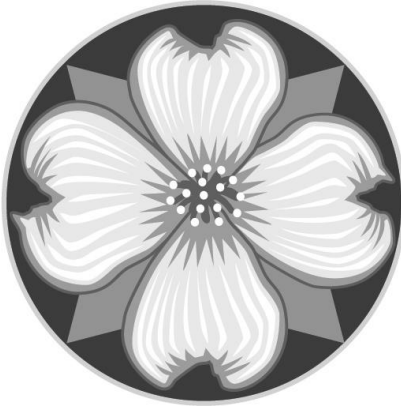
Agenda Item You Wish to Speak to:

- ☒ #4 Audience Participation
- ☐ #5 Public Hearing, Topic:
- ☐ #6 Other Business, Topic:

You are Speaking...

- ☒ in Support
- ☒ in Opposition
- ☒ from a Neutral Position
- ☒ to ask a Question

Comments:



RS Agenda Item

6

Other Business

COUNCIL STAFF REPORT

To: Mayor and City Council

Date Written: November 20,
2018

Ann Ober, City Manager

Reviewed: Alma Flores, Community Development Director

From: David Levitan, Senior Planner

Subject: **Resolution extending the City's Housing Emergency until June 4, 2019**

ACTION REQUESTED

Adopt a resolution that extends the City of Milwaukee's declared housing emergency for a six-month period, with a new expiration date of June 4, 2019.

HISTORY OF PRIOR ACTIONS AND DISCUSSIONS

April 19, 2016: The City Council approved [Ordinance 2117](#), which authorized the City Council to declare a Housing Emergency in the City of Milwaukee, and adopted [Resolution 46-2016](#), which declared a Housing Emergency in the City of Milwaukee for a period of one year from the effective date of the resolution (April 19, 2016).

March 7, 2017: The City Council held a work session to discuss whether to extend the Housing Emergency for an additional six months from the scheduled expiration date of April 19, 2017. Council directed staff to draft a resolution that extends the housing emergency until October 19, 2017.

April 18, 2017: The City Council adopted [Resolution 45-2017](#), extending the Housing Emergency for an additional six months, with a new expiration date of October 19, 2017.

May 2, 2017: The City Council adopted [Resolution 52-2017](#), adopting three Council Goals for the 2017-2018 Biennium. Goal 1: Housing is directly related to housing affordability, and directs the City Manager to take every opportunity to address the current housing crisis and provide housing options that are affordable for Milwaukians at every income level and stage of life.

December 5, 2017: The City Council adopted [Resolution 93-2017](#), extending the Housing Emergency for an additional six months, with a new expiration date of June 5, 2018.

June 5, 2018: The City Council adopted [Resolution 42-2018](#), extending the Housing Emergency for an additional six months, with a new expiration date of December 5, 2018.

July 17, 2018: The City Council adopted [Resolution 62-2018](#), approving the Milwaukee Housing Affordability Strategy (MHAS).

ANALYSIS

On April 19, 2016, the City Council unanimously approved Ordinance 2117, which authorized the Council to declare a housing emergency, and adopted Resolution 46-2016, which declared a housing emergency in Milwaukie for a period of one year from the effective date of the resolution. Section 2 of Ordinance 2117 states that the “initial duration of a housing emergency shall not exceed one year, but may be extended in six-month increments.” The housing emergency has since been extended three times (April 18 and December 5, 2017 and June 5, 2018), and is currently scheduled to expire on December 5, 2018.

When the housing emergency was declared 2 ½ years ago, Milwaukie and the rest of the Portland metropolitan region was experiencing a rapid increase in rental rates and home sale prices. For the 12-month period ending in December 2015, US Census data showed that the region had the highest rent increase (11.3%) and lowest vacancy rate (2.4%) in the nation, which the Council found had resulted in increased gentrification, displacement of residents, and housing uncertainty for many Milwaukie residents. Within Milwaukie, personal accounts from local residents of rent increases of up to and above 25% per year were common, many of which have been shared with the Mayor and City Council.

Over the past 2 ½ years, the regional housing market has cooled somewhat. US Census data shows that the region’s rental vacancy rate has risen as high as 6.7% for the second quarter of 2017, before falling to 2.6% for the fourth quarter of 2018 and settling at 4.5% for the most recent data available (third quarter of 2018). These fluctuations can be attributed to both seasonal variations, and, as previously noted, a glut of new supply in Portland as developers sought to get projects approved before Portland inclusionary zoning ordinance took effect.

During the same period, however, Milwaukie has consistently outperformed the region and continues to experience a very tight rental market. According to a Fall 2018 survey by Multifamily NW, which represents property owners and property managers whose members manage over 200,000 rental units between Medford and Southwest Washington, Milwaukie had the second lowest vacancy rate (3.0%) of 20 areas within the Portland region.

Since the declaration of the housing emergency, the City has dedicated significant time and resources to topics related to housing and housing affordability. In December 2016, the City completed a [Housing Needs Analysis](#) (HNA) and [Housing Strategies Report](#), which provide the technical analysis and foundation required by Statewide Planning Goal 10 to support the City’s Comprehensive Plan Update. The HNA found that 45% of Milwaukie renters spent more than 30% of their income on housing (the generally accepted “housing affordability quotient”), with 22% of renters spending more than 50% of their income on housing. Housing affordability was also identified as a major priority by the Milwaukie community during the recent community visioning effort, with several action items related to housing affordability being included in the [Vision Action Plan](#).

Recognizing the importance of the issue, the Council included housing affordability as one of its three goals for the 2017-2018 Biennium period, and directed the City Manager to work with partners to develop housing options that are affordable for Milwaukians at every income level and stage of life. Beginning in late 2017, the City worked with Portland State University’s Institute of Portland Metropolitan Studies to create actions and strategies to address this goal, in the form of a Milwaukie Housing Affordability Strategy (MHAS). The Council adopted the MHAS on July 17, 2018.

As the Council and City staff begin to implement actions and strategies outlined in the MHAS and develop updated goals and policies for the Comprehensive Plan's Housing chapter, staff is recommending that the Council extend the declared housing emergency for a period of six months (until June 4, 2019). Staff will continue to monitor the local housing market and will be checking in frequently with the Council to receive direction on priorities and strategies for addressing the current housing affordability crisis.

BUDGET IMPACTS

The Community Development Department has adequate staffing to continue this work with no additional budget impacts.

WORKLOAD IMPACTS

Staff will continue to monitor the local housing market, and housing will be a major focus of the Comprehensive Plan Update's second block of work, which will be starting this month and lasting through the first half of 2019.

COORDINATION, CONCURRENCE, OR DISSENT

Representatives from several local, county, and state housing agencies, and other community partners, have been involved in the discussion of Milwaukie's declared housing emergency over the past two years, primarily through their participation on the HNA's Technical Advisory Group and the Housing Affordability Work Group. City staff has continued to engage these partners and has received support for the City's housing emergency declaration.

STAFF RECOMMENDATION

Staff recommends that the Council adopt the attached resolution, which extends the City of Milwaukie's declared housing emergency for an additional six months, with a new expiration date of June 4, 2019.

ALTERNATIVES

The City Council may choose to let the declared housing emergency expire as of December 5, 2018.

ATTACHMENTS

1. NEW: Resolution extending the City's declared housing emergency until June 4, 2019
2. Ordinance 2117

COUNCIL RESOLUTION No.**A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF MILWAUKIE, OREGON, EXTENDING THE DECLARED HOUSING EMERGENCY FOR A PERIOD OF SIX MONTHS, PURSUANT TO ORDINANCE 2117.**

WHEREAS, the City Council approved Ordinance 2117 on April 19, 2016, which granted the Council the authority to declare a housing emergency to address housing needs affecting the health, safety and welfare of city residents; and

WHEREAS, in response to a combination of low vacancy rates and rapidly increasing rents and home sales prices, the City Council adopted Resolution 46-2016, which declared a housing emergency in the City of Milwaukie with an effective date of April 19, 2016; and

WHEREAS, Section 2 of Ordinance 2117 states that the initial duration of a housing emergency shall not exceed one year, but may be extended in six-month increments; and

WHEREAS, the City Council has adopted resolutions extending the housing emergency on three previous occasions, most recently on June 5, 2018; and

WHEREAS, the City Council adopted the Milwaukie Housing Affordability Strategy on July 17, 2018, and has directed staff to implement policies and programs that improve housing affordability in the City of Milwaukie;

Now, Therefore, be it Resolved that the housing emergency established by Resolution 46-2016 is extended for a period of six months, with a new expiration date of June 4, 2019.

Introduced and adopted by the City Council on _____.

This resolution is effective on _____.

Mark Gamba, Mayor

ATTEST:

APPROVED AS TO FORM:
Jordan Ramis PC

Scott Stauffer, City Recorder

City Attorney



CITY OF MILWAUKIE
"Dogwood City of the West"

Ordinance No. 2117

AN ORDINANCE OF THE CITY OF MILWAUKIE, OREGON, AUTHORIZING THE CITY COUNCIL TO DECLARE A HOUSING EMERGENCY UNDER SPECIFIED CIRCUMSTANCES, DEFINING DURATION AND CITY COUNCIL POWERS DURING A HOUSING EMERGENCY AND DECLARING AN EMERGENCY

WHEREAS, the Portland metropolitan region had the lowest residential vacancy rate in the nation as of the fourth quarter of 2015, estimated at 2.4%; and

WHEREAS, the region's low vacancy rate has resulted in significant rent increases over the last several years, including a 11.3% yearly increase as of the fourth quarter of 2015; and

WHEREAS, Milwaukie's proximity to Portland has resulted in increased gentrification and displacement of residents in recent years; and

WHEREAS, at the same time, many city residents have experienced a decrease in inflation adjusted wages and a reduced ability to find adequate and affordable housing; and

WHEREAS, the combination of high rents and low vacancy rates has resulted in heightened housing uncertainty for many Milwaukie residents; and

WHEREAS, the City Council finds that the uncertainty created by the possibility of losing affordable housing and homelessness is a danger to the public health, safety and welfare,

Now, Therefore, the City of Milwaukie does ordain as follows:

- Section 1. The City Council is authorized to declare a housing emergency when there is an immediate need to address the shortage of affordable housing, in order to avoid human suffering.
- Section 2. The initial duration of a housing emergency shall not exceed one year, but may be extended in six-month increments.
- Section 3. The Milwaukie City Council shall terminate a housing emergency by resolution when the emergency no longer exists or when the threat of an emergency has passed.

Section 4. Upon the declaration of a housing emergency, in addition to any other powers that may be exercised by a local government, the City Council may:

- A) Utilize City owned resources;
- B) Designate persons to coordinate the work of public, private or nonprofit relief agencies responding to the housing emergency;
- C) Order such other measures as may be necessary to protect the life, safety and health of persons, property or the environment.

Section 5. Emergency. With increasing housing uncertainty and fear of homelessness for city residents, this Ordinance is necessary for the immediate protection of public health, safety and general welfare; therefore an emergency is declared to exist and this Ordinance shall become effective upon the date of its adoption.

Read the first time on 4/19/16, and moved to second reading by 5:0 vote of the City Council.

Read the second time and adopted by the City Council on 4/19/16.

Signed by the Mayor on 4/19/16.

APPROVED:

Approved by Milwaukie City Council this 19th day of April, 2016.



Mark Gamba, Mayor

ATTEST:

APPROVED AS TO FORM:

Jordan Ramis PC



Pat DuVal, City Recorder



City Attorney

COUNCIL STAFF REPORT

To: Mayor and City Council

Date Written: November 20,
2018

Ann Ober, City Manager

Reviewed: Alma Flores, Community Development Director

From: David Levitan, Senior Planner

Subject: **Resolution to maintain renter protection measures in MMC 5.60**

ACTION REQUESTED

Adopt a resolution that maintains the renter protection measures in Milwaukie Municipal Code Section 5.60, which require landlords to provide 90 days' notice to renters for no-cause evictions.

HISTORY OF PRIOR ACTIONS AND DISCUSSIONS

April 19, 2016: The City Council approved [Ordinance 2118](#), MMC Chapter 5.60 (Renter Protections), which requires landlords to provide 90 days' notice to tenants prior to a no-cause eviction.

March 7, 2017: The City Council held a work session to discuss whether to maintain the renter protection measures in MMC 5.60 and to extend the City's declared housing emergency for an additional six months. Council directed staff to draft a resolution that maintains the renter protections in MMC 5.60, and to continue to track state legislation on no-cause evictions.

April 18, 2017: The City Council adopted [Resolution 46-2017](#), maintaining the renter protection measures in MMC 5.60 for a period of one year or until the metropolitan region's vacancy rate rises above 4%, whichever comes first.

May 2, 2017: The City Council adopted [Resolution 52-2017](#), adopting three Council Goals for the 2017-2018 Biennium. Goal 1: Housing is directly related to housing affordability, and directs the City Manager to take every opportunity to address the current housing crisis and provide housing options that are affordable for Milwaukians at every income level and stage of life.

December 5, 2017: The City Council adopted [Resolution 94-2017](#), maintaining the renter protection measures in MMC 5.60 for a period of one year or until the metropolitan region's vacancy rate rises above 4%, whichever comes first.

July 17, 2018: The City Council adopted [Resolution 62-2018](#), approving the Milwaukie Housing Affordability Strategy (MHAS).

ANALYSIS

On April 19, 2016, the City Council approved Ordinance 2118, creating MMC 5.60, which requires that landlords provide tenants with 90 days' notice for no-cause evictions (excluding week-to-week tenancies). No-cause evictions are defined as evictions that are carried out for reasons other than those listed as "for cause" under Section 90.392 of the Oregon Revised Statutes (ORS). For cause evictions include, but are not limited to, failure to pay rent or a material violation of the rental agreement. MMC Section 5.60 outlines the applicability of the 90 day no-cause eviction provision as well as possible punitive damages for violating the provision, and supersedes the 30 days' notice that is required by state law for no-cause evictions as codified in ORS Section 90.427.

Section 2 of Ordinance 2118 states that the City Council "shall reconsider the protections herein if the Portland metropolitan region's residential vacancy rate rises above 4%, or after one year, whichever comes first." When Ordinance 2118 was approved, the most recent Census quarterly rental vacancy rate for the Portland Metropolitan region was 2.4% for the 4th Quarter of 2015. In the nearly three years since the ordinance was approved, the metropolitan region's vacancy rate has crisscrossed the 4% threshold on several occasions. The vacancy rate peaked at 6.7% in the second quarter of 2017, dropped to 2.6% by the fourth quarter of 2017, and was 4.5% in the recently released results for third quarter 2018.

As staff has previously noted, the Census's regional vacancy rate is sensitive to surges in new supply that come online during specific quarters. This has been especially notable over the last few years, as developers sought to get new developments approved before Portland's inclusionary zoning ordinance came into effect, with thousands of units entering the marketplace and often taking several months to be filled.

Multifamily NW, a regional association representing property owners and property managers whose members manage over 200,000 rental units between Medford and Southwest Washington, conducts a biannual vacancy rate survey of local markets, including Milwaukie. According to Multifamily NW's most recent survey from Fall 2018, Milwaukie had the second tightest rental market of the 20 areas surveyed within the Portland/Vancouver metropolitan area (after Troutdale/Fairview/Wood Village), with a vacancy rate of 3.0% for the 1,882 Milwaukie rental units covered by the survey. In comparison, Downtown and NW Portland which have seen a large increase in higher rental rate supply in recent years had vacancy rates above 6% during the same period.

In 2017, the State House of Representatives approved House Bill 2004, which would have increased the required notification period for no-cause evictions in the state from 30 days to 90 days and required landlords to pay one month's rent to tenants displaced by no-cause evictions beyond the first six months of occupancy. The bill died in the Senate and did not become state law. As such, local jurisdictions must implement their own ordinances for any renter protection measures beyond the standard 30-day notice period.

Even as the regional vacancy rate has periodically risen above the 4% threshold the last few years, Milwaukie, which consists primarily of older and less expensive rental units that are in demand within the region, has continued to experience a very tight rental market. The City Council has voted to maintain the provisions of MMC 5.60 on two previous occasions, adopting [Resolution 46-2017](#) on April 18, 2017 and [Resolution 94-2017](#) on December 5, 2017. Staff is

recommending that the City Council again adopt a resolution maintaining the renter protection measures in MMC 5.60.

BUDGET IMPACTS

The Community Development Department has adequate staffing to continue this work with no additional budget impacts.

WORKLOAD IMPACTS

Staff will continue to monitor the local housing market, and housing will be a major focus of the Comprehensive Plan Update's second through third block of work, which will be starting this month and lasting through the first half of 2019.

COORDINATION, CONCURRENCE, OR DISSENT

Representatives from several local, county, and state housing agencies, and other community partners, have been involved in the discussion of Milwaukie's declared housing emergency and measures that have been taken to address the emergency, including the adoption of the 90-day No-cause Eviction Ordinance.

STAFF RECOMMENDATION

Staff recommends that the Council adopts the attached resolution, which maintains the renter protection measures included in MMC 5.60.

ALTERNATIVES

The City Council may choose to develop an ordinance that revises or revokes MMC 5.60.

ATTACHMENTS

1. NEW: Resolution to Maintain the Renter Protection Measures in MMC 5.60
2. Ordinance 2118



COUNCIL RESOLUTION No.

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF MILWAUKIE, OREGON, MAINTAINING THE RENTER PROTECTION MEASURES IN MMC 5.60, PURSUANT TO ORDINANCE 2118.

WHEREAS, the City Council approved Ordinance 2118 on April 19, 2016, which established new regulations for no cause evictions in Milwaukie Municipal Code Chapter 5.60 and declared an emergency; and

WHEREAS, Section 2 of Ordinance 2118 states that the City Council shall reconsider the protections in MMC 5.60 should the Portland metropolitan region's residential vacancy rate rise above 4% or in one year, whichever comes first; and

WHEREAS, the region's vacancy rate rose above 4% for the second and third quarters of 2018; and

WHEREAS, Milwaukie's vacancy rate has been consistently lower than the region's vacancy rate, with a Fall 2018 survey from industry group Multifamily NW showing a rate of 3.0%, which indicates a very tight rental market; and

WHEREAS, the City continues to work on ways to address the housing affordability crisis through the implementation of the Milwaukie Housing Affordability Strategy and the upcoming update to the Comprehensive Plan's Housing Chapter.

Now, Therefore, be it Resolved by the City Council of the City of Milwaukie, Oregon, that the renter protection measures outlined in MMC 5.60 are maintained.

Introduced and adopted by the City Council on _____.

This resolution is effective on _____.

Mark Gamba, Mayor

ATTEST:

APPROVED AS TO FORM:
Jordan Ramis PC

Scott Stauffer, City Recorder

City Attorney


CITY OF MILWAUKIE
"Dogwood City of the West"
Ordinance No. 2118
AN ORDINANCE OF THE CITY OF MILWAUKIE, OREGON, RELATING TO RENTER PROTECTIONS, ESTABLISHING NEW CODE CHAPTER 5.60 AND DECLARING AN EMERGENCY

WHEREAS, the Portland metropolitan region had the lowest residential vacancy rate in the nation as of the fourth quarter of 2015, estimated at 2.4%; and

WHEREAS, the region's low vacancy rate has resulted in significant rent increases over the last several years, including a 11.3% yearly increase as of the fourth quarter of 2015; and

WHEREAS, Milwaukie's proximity to Portland has resulted in increased gentrification and displacement of residents in recent years; and

WHEREAS, the combination of high rents and low vacancy rates has resulted in heightened housing uncertainty for many Milwaukie residents; and

WHEREAS, in recognition of the impact of the low residential vacancy rates and increasing rents, the Milwaukie City Council has declared a housing emergency; and

WHEREAS, the Milwaukie City Council has authority under Ordinance No. 2117 to take legislative action to provide adequate written notice of a no cause termination; and

WHEREAS, the Residential Landlord and Tenant Act (ORS Chapter 90) allows for no-cause terminations of month-to-month rental agreements with 30 days' notice during the first year of a tenant's occupancy, and with 60 days' notice after the first year of occupancy; and

WHEREAS, the Milwaukie City Council has determined that 30 or 60 days is not adequate time for displaced tenants to find and secure new rental housing; and

WHEREAS, in order to provide tenants enough time to find and secure a new rental unit, the minimum written notice of a no cause termination of tenancy should be 90 days.

Now, Therefore, the City of Milwaukie does ordain as follows:

Section 1. A new Chapter 5.60 is adopted and added to the Municipal Code of Milwaukie which will read as follows:

5.60 Milwaukie Renter Additional Protections

5.60.010 Purpose and Intent. The purpose of this Section is to provide residential renters in the City of Milwaukie with adequate protections in the event that they are served with a no cause eviction.

5.60.020 Definitions.

Act – the Residential Landlord and Tenant Act, codified in Chapter 90 of the Oregon Revised Statutes. For the purposes of Chapter 5.60, capitalized terms have the meaning set forth in the Act.

5.60.030 Applicability. The following apply to Tenants of Dwelling Units within the boundaries of the City of Milwaukie, which are in addition to the requirements and protections set forth in the Act:

A. A Landlord may terminate a Rental Agreement without a cause specified in the Act (“no cause eviction”) only by delivering a written notice of termination to the Tenant of (a) not less than 90 days before the termination designated in that notice as calculated under the Act; or (b) the time period designated in the Rental Agreement, whichever is longer. This requirement does not apply to Rental Agreements for Week-to-week tenancies or to Tenants that occupy the same Dwelling Unit as the Landlord.

B. A Landlord that fails to comply with any of the requirements set forth in this Section 5.60.030 shall be liable to the Tenant for an amount up to three months’ Rent as well as actual damages, reasonable attorney fees and costs (collectively, “Damages”). Any Tenant claiming to be aggrieved by a Landlord’s noncompliance with the foregoing has a cause of action in any court of competent jurisdiction for Damages and such other remedies as may be appropriate.

Section 2. The Milwaukie City Council shall reconsider the protections herein if the Portland metropolitan region’s residential vacancy rate rises above 4%, or after one year, whichever occurs first.

Section 3. Emergency. With increasing housing uncertainty and fear of homelessness for city residents, this Ordinance is necessary for the immediate protection of public health, safety and general welfare; therefore an emergency is declared to exist and this Ordinance shall become effective upon the date of its adoption.

Read the first time on 4/19/16, and moved to second reading by 5:0 vote of the City Council.

Read the second time and adopted by the City Council on 4/19/16.

Signed by the Mayor on 4/19/16.

APPROVED: Approved by Milwaukie City Council on 4/19/16.



Mark Gamba, Mayor

ATTEST:

APPROVED AS TO FORM:
Jordan Ramis PC



Pat DuVal, City Recorder



City Attorney

COUNCIL STAFF REPORT

To: Mayor and City Council
Ann Ober, City Manager

Reviewed: Peter Passarelli, Public Works Director, and
Blanca Marston (as to form), Administrative Specialist

From: Damien Farwell, Fleet and Facilities Supervisor

Subject: **City Hall Garage Bay Conversion/Entry Update**

Date Written: Nov. 18, 2018

ACTION REQUESTED

No action requested. Update of the project to convert the City Hall garage bay to serve as Council Chambers, work room and conference room, as well as an update of the City Hall entry.

HISTORY OF PRIOR ACTIONS AND DISCUSSIONS

- [July 17, 2018, City Council Work Session](#): Provided City Council an update on the City Hall project that outlined history, estimated costs, planned phases, and schedule.
- [October 1, 2018, Design and Landmarks Committee](#): Staff met with the Design and Landmarks Committee (DLC) to request approval of the application to alter the exterior of City Hall.
- [October 23, 2018, Planning Commission Meeting](#): The Planning Commission held a hearing on the project land use applications.
- [November 13, 2018, Planning Commission Meeting](#): The Planning Commission held a second hearing on the applications and [approved the applications with conditions](#).

ANALYSIS

The project goal is to add space for up to 11 employees at City Hall. The Facilities Division entered into an architectural services contract with Di Loreto Architecture to provide pre-design schematic, design development, and construction documents. At the end of the design development stage, staff will be able to procure preliminary contractor pricing. Staff will use the construction documents to go out to bid for the construction phase.

Scope of Work

Phase 1: Second Floor (completed)

Reconfigure City Hall Conference Room

- 4-6 cubes; cube walls between workstations.
- 1 conference space for 4-6.
- Likely need to temporarily repurpose the guest work space outside of City Recorder's office. The ultimate use of this space will be sorted out as part of the space needs study for phase 2.
- Cubes to be reused in phase 3.

Phase 2: First Floor

Council Chambers and entry way

- Reconstruct the 1,400 SF garage bay into City Council chambers. Maintain usable bay doors with the redesign.
- Renovate the main reception desk area (approximately 400 SF).

Preliminary Design	Complete
Construction Drawings	Expected December
Preliminary Pricing	mid December
Construction Completion	Approximately 6-8 months, dependent on final design and contractor input.

Phase 3: Second Floor

Reconfigure City Council Chambers and other City Hall spaces (will follow space needs study that will begin in February).

- 8-10 cubes (includes the 4-6 from phase 1).
- 3 additional walled offices.
- Addresses odd cube in finance.
- One medium-sized conference room upstairs for 10-12.

PROJECT SCHEDULE

- Permitting and bidding December through January
- September 2019 – City Council moves to fire bay.
- September 2019 – Council Chambers no longer available for meetings.
- October 2019 – Phase 3 completion. Remainder of engineering team relocates to City Hall.

Land Use Applications:

The City Hall project requires the approval of the following applications:

1. HR-2018-001: Exterior alteration of a landmark
2. DR-2018-002: Downtown Design Review
3. CSU-2018-016: Minor modification to a Community Service Use

Staff met with DLC on October 1, 2018, to request approval on application HR-2018-001. This approval would allow for the renovation of the fire bay at City Hall, including replacement roll-up doors, replacement of windows and construction of a new ADA accessible door and access at the rear of the building. Staff presented options on window replacement in garage bay. The DLC recommended the repair and restoration of the five windows.

The Planning Commission held a hearing on these applications on October 23, 2018, during which the DLC also provided comments on the proposal. The DLC was concerned about the proposal to replace the fire bay windows with fiberglass windows. It was also discussed that

Planning Commission should wait to render a decision until after State Historic Preservation Office (SHPO) provided their review, and discussion would be continued at the November 13, 2018 Planning Commission meeting.

SHPO initial comments were that the City should explore more appropriate replacement windows or repair of existing windows, but repair of the original windows was the preferred approach. SHPO provided a list of wood window preservation and repair specialists.

The Fleet and Facilities Supervisor submitted additional materials to Planning Department staff on November 2, 2018, which were submitted to the DLC for discussion at their November 5, 2018 meeting. The additional material addressed DLC and SHPO comments, including a new proposed replacement window that more closely matched the original windows.

Upon review of revised materials, SHPO still encouraged to explore window restoration, but that the new proposed replacement window is a better choice than the original proposal.

A Public Hearing was held at the November 13, 2018, Planning Commission meeting and the applications were approved with the following conditions.

1. The applicant shall submit a Type I Development Review application with final plans for construction of the building. The final plans shall address the following:
 - a) Final plans submitted for development permit review shall be in substantial conformance with plans approved by this action, which are the plans stamped received by the City on September 6, 2018, and revised on November 2, 2018, except as otherwise modified by these conditions.
2. The 6 original wood windows affected by the project, other than the window to be removed for the new accessible entrance, must be repaired and restored.
3. The proposed removeable bollards are to be located at the back of sidewalk.

BUDGET IMPACTS

Architect's fees for design work through construction documents will be \$40,000. Total construction costs are budgeted at \$370,000. A separate \$50,000 project has been identified for the conversion of Council Chambers and conference rooms to offices.

The requirement to repair and restore rather than replace the windows will result in initial savings of approximately \$2200 per window (\$13,200 for 6 windows), but an overall increase of \$900 per window per year in lifecycle and energy costs (\$5400 per year for 6 windows).

WORKLOAD IMPACTS

Efforts in managing the project can be absorbed across current facilities staffing.

COORDINATION, CONCURRENCE, OR DISSENT

Facilities has coordinated with the Finance department as well as the City Manager's office.

STAFF RECOMMENDATION

None. Informational only.

ALTERNATIVES

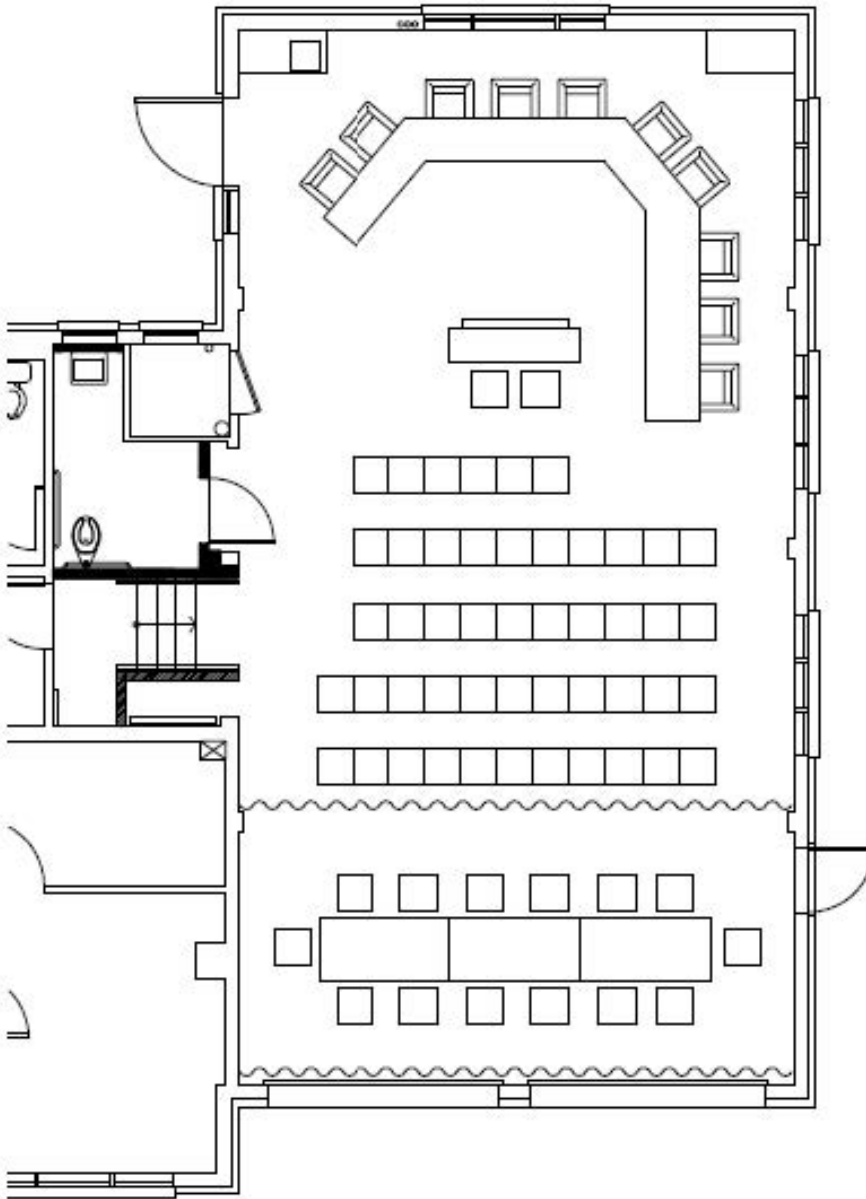
None

ATTACHMENTS

1. November 2, 2018, City Hall Design Drawings

COUNCIL STAFF REPORT, 12.4

Attachment 1



OPTION 4:
WORK SESSION LAYOUT
BOTH CURTAINS DRAWN

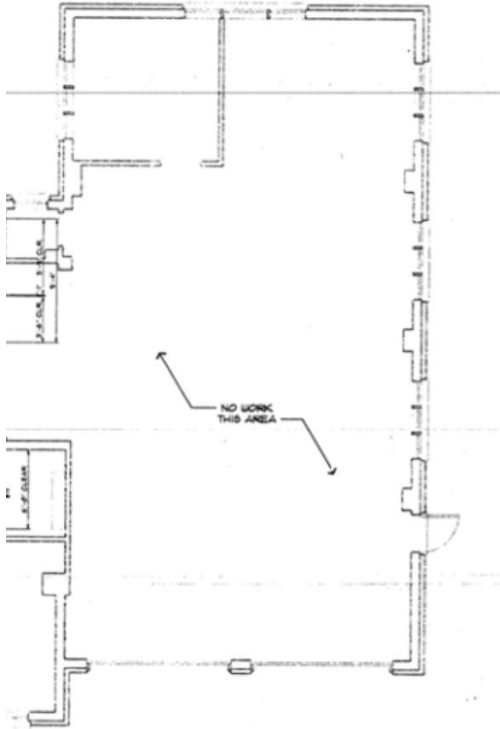


CITY OF MILWAUKIE

City Hall Garage Bay
Renovation Update
December 4, 2018



City Hall Garage Bay Renovation



- Safe Access for Everyone (SAFE) program staffing requirements and new in-house attorney has resulted in the need for increased employee office space.
 - Staff's goal is to add space for up to 11 employees
- City Hall Garage Bay underutilized as storage space.
- Total project costs are estimated at \$370,000 for the Garage Bay conversion.
- Additional \$50,000 budgeted for the conversion of Council Chambers and Conference rooms to office space.

City Hall Garage Bay Renovation



- The Project involves relocation of Council Chambers and Conference Room downstairs to the Garage Bay, and the repurposing the existing Conference Room and Chambers to office space.
- Facilities has established an architectural services contract with DiLoreto Architecture to provide
 - Pre-design Schematic
 - Design Development
 - Preliminary Contractor Pricing
 - Construction Documents

Phase 1 Second Floor

- Reconfigure City Hall Conference Room
 - 4-6 cubes, cube walls between workstations.
- Completed, 9.1.18
- Cost: \$7,000



Phase 2

First Floor

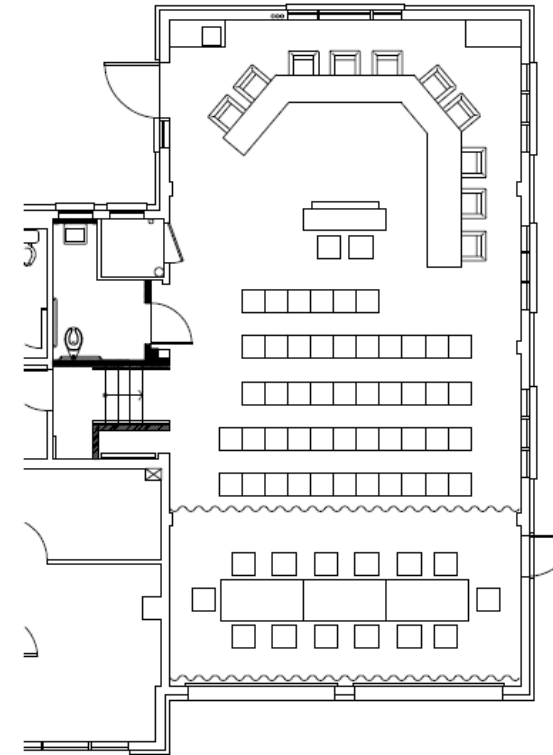
City Hall Renovation

Entry

- Improve communication with new glass and holes
- Install shallow counter for materials and writing
- Aesthetic update, materials and finishes reflect bays
- Remove interior counter for better office layout

Bays

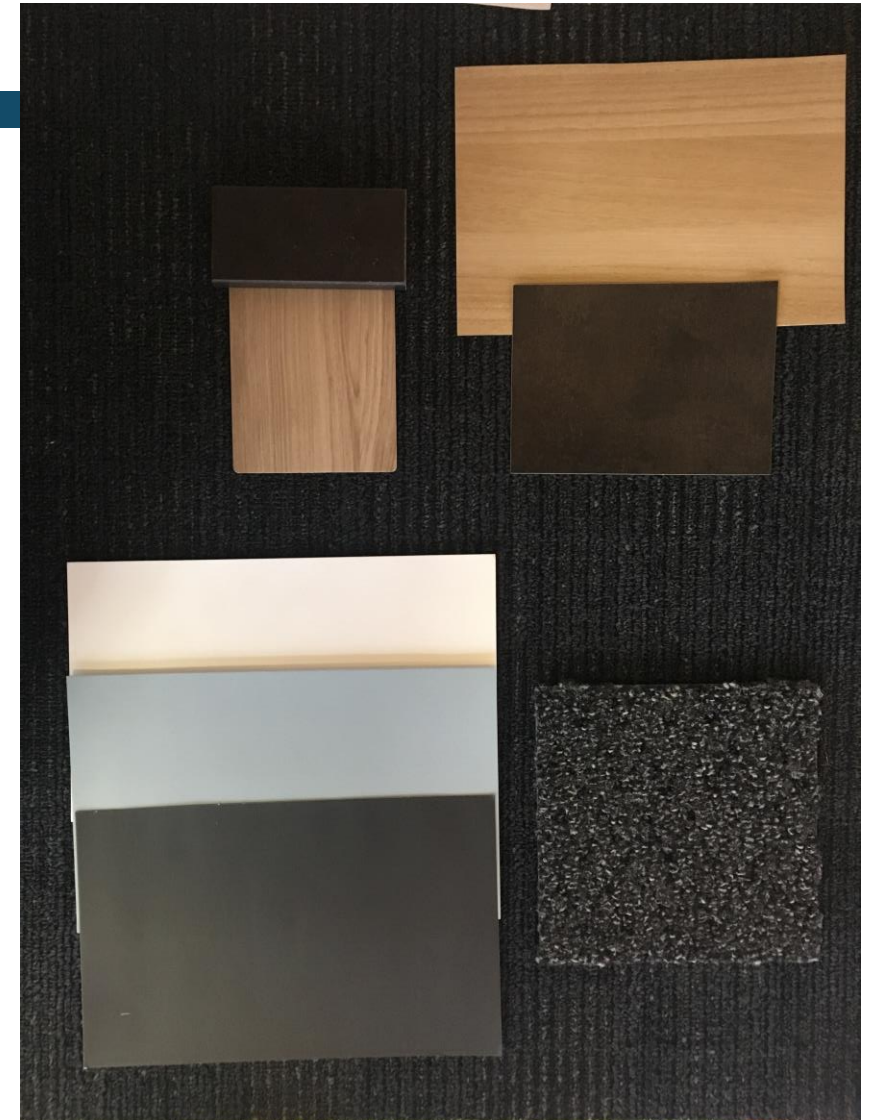
- Industrial chic, exposed conduit, sprinklers
- Preserve wood paneling on north wall
- Pallet: white paint, dark accents, light wood
- Dark carpet, matching 'walk off' at roll up door
- Restore original windows, add storm windows
- Add ADA restroom and ADA exit at rear
- Similar dais layout, dais reused, long leg reflected.
- Chambers plus meeting space in bays, curtain separates
- 50 chairs typical chambers, stackable/foldable 30 chairs
- Secondary meeting space 8-12
- Video control room to Jason's closet
- Independent HVAC for cost and efficiency
- Projection screen behind dais, shade with logo, screen at testimony table



OPTION 4:
WORK SESSION LAYOUT
BOTH CURTAINS DRAWN

Color Palette

- Dark carpet, 'walk off' durable carpet at garage doors
- White walls, dark accents
- Dais becomes light wood tone
- Dais top light or dark



Original Windows

- Among the changes proposed, staff proposed replacing the garage doors and original windows with modern equivalents. Our application was approved by Planning Commission November 13 on the condition that 6 original windows be restored rather than replaced
- The insulative value of a restored window is roughly half the insulative value of a modern window.
- By restoring rather than replacing original windows, we will not have the opportunity to insulate, flash and seal the openings to modern standards.
- We will need to inspect and repair the original windows frequently, increasing the lifecycle cost.

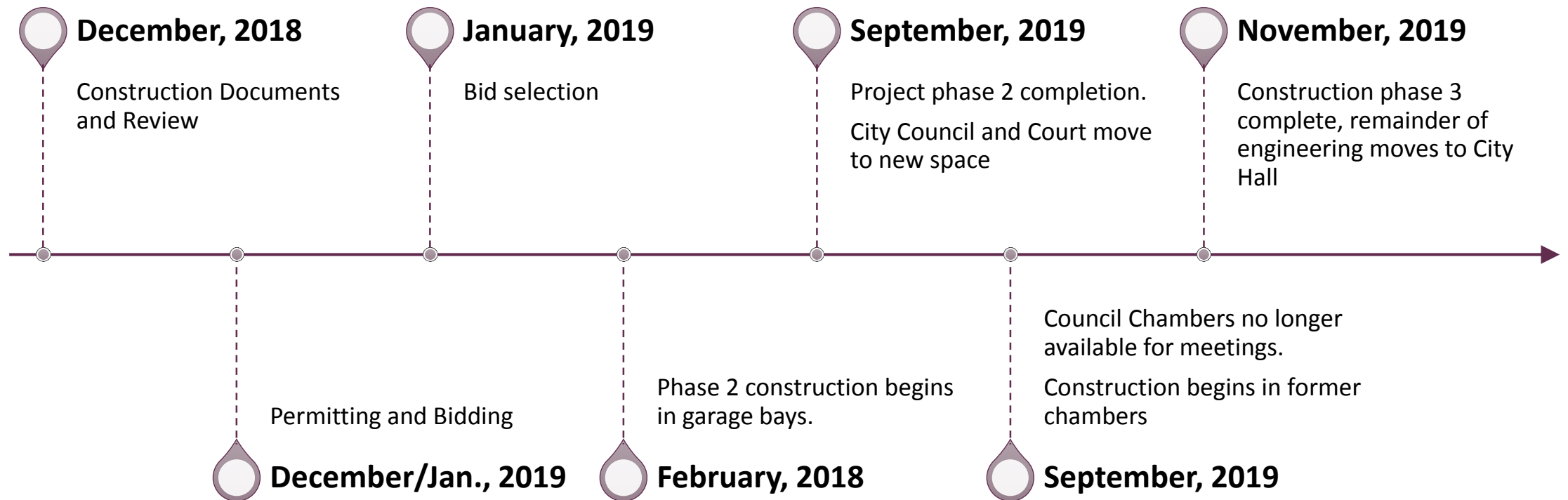


Second Floor Phase 3

- Reconfigure City Council Chambers and other City Hall spaces.
 - 8-10 cubes (includes the 4-6 above in phase 1).
 - 3 additional walled offices.
- Addresses office space in finance.
- Media room moves downstairs.
- One 'medium' conference room upstairs, 10-12
- Initial Space Needs Assessment Completed
 - Further Refinement for final configuration needed
- Moderate Phase 3 design component for walled office spaces



Project Schedule



Coordination Issues and other concerns

- Meeting Space Scheduling
 - City Council - PSB
 - Committee Meetings
 - Staff Meetings
- Court Operations
- Community events materials
- Secure Bike Parking
 - \$800-\$2000 per bike.
 - Goal 8 bikes



COUNCIL STAFF REPORT

To: Mayor and City Council
Ann Ober, City Manager

Reviewed: Christina Fadenrecht, Administrative Specialist

From: Kelly Brooks, Assistant City Manager

Subject: **Clackamas County Vehicle Registration Fee**

Date Written: Nov. 29, 2018

ACTION REQUESTED

Vote to approve sending a letter to Clackamas County Chair Jim Bernard in support of establishing a County vehicle registration fee.

ANALYSIS

The Board of County Commissioners is asking for cities, businesses, and communities to weigh in with support and questions before scheduling public hearings on establishing a \$30 per year vehicle fee for cars, pick-up trucks, motorcycles, vans, and other passenger vehicles.

In accordance with state law, the following vehicles would be exempt:

- Registered farm vehicles
- Heavy trucks (which already pay state weight-mile taxes)
- Snowmobiles and Class I all-terrain vehicles
- Fixed-load vehicles
- Vehicles registered to disabled veterans or former prisoners of war
- Vehicles registered as antique vehicles or as vehicles of special interest
- Government-owned or operated vehicles, including school buses or school activity vehicles and law enforcement undercover vehicles
- Travel trailers, campers, and motor homes

The funding would be split 60/40 between the County and the cities. Ten percent of the County's share of funds will be put in a strategic investment account to help leverage larger projects. Estimates indicate that the City of Milwaukie will receive \$413,000 a year, which would help us meet the safety and maintenance needs of the local street network.

BUDGET IMPACTS

Passage of a County vehicle registration fee would contribute approximately \$800,000 each biennium towards city transportation needs.

WORKLOAD IMPACTS

None.

COORDINATION, CONCURRENCE, OR DISSENT

None.

STAFF RECOMMENDATION

Staff recommends sending the attached support letter.

ALTERNATIVES

Council could decide not to send the letter in support.

ATTACHMENTS

1. Support letter

December 5th, 2018

Clackamas County
2051 Kaen Road
Oregon City, OR 97045

RE: Support for Clackamas County to enact a Vehicle Registration Fee

Dear Board of County Commissioners:

On behalf of the City of Milwaukie, we support Clackamas County's proposal to enact a countywide vehicle registration fee (VRF). Such a fee would provide 40 percent of the revenue to Clackamas County cities which would help Milwaukie address safety and maintenance needs on our roads.

We know that a new, stable and locally controlled revenue will help the county and cities address maintenance needs on aging roadways and help deliver some of the larger-scale projects our residents need to keep moving. We support the Clackamas County Coordinating Committee's proposal for a \$30 fee which will generate revenue split between the county (60%) and cities (40%). We also support the concept of a strategic investment fund of 10% which will come from the county's share of the funds. The additional \$414,000 per year in funding from the VRF that will come directly Milwaukie will help us build more sidewalks, safe crossings and recreational trails.

One of the most substantial impacts such funding could have is to the city's paving program. At present, the city's Street Surface Maintenance Program (SSMP) largely focuses on our major streets and even with that focus, much of our major street network remains in need of repair due to cost. With additional funding we can make smart investments in both our major and residential street network to provide a smoother ride for all users and forestall major repair and maintenance costs.

We recognize and appreciate that passage of a local funding ordinance can be a challenge, but it is also necessary to respond to countywide needs such as deteriorating roads and ever-increasing commute times. We support Clackamas County making a bold decision today to address local funding needs through passage of a VRF by ordinance.

Sincerely,



THE ROAD AHEAD, 2018

Continuing the Conversation

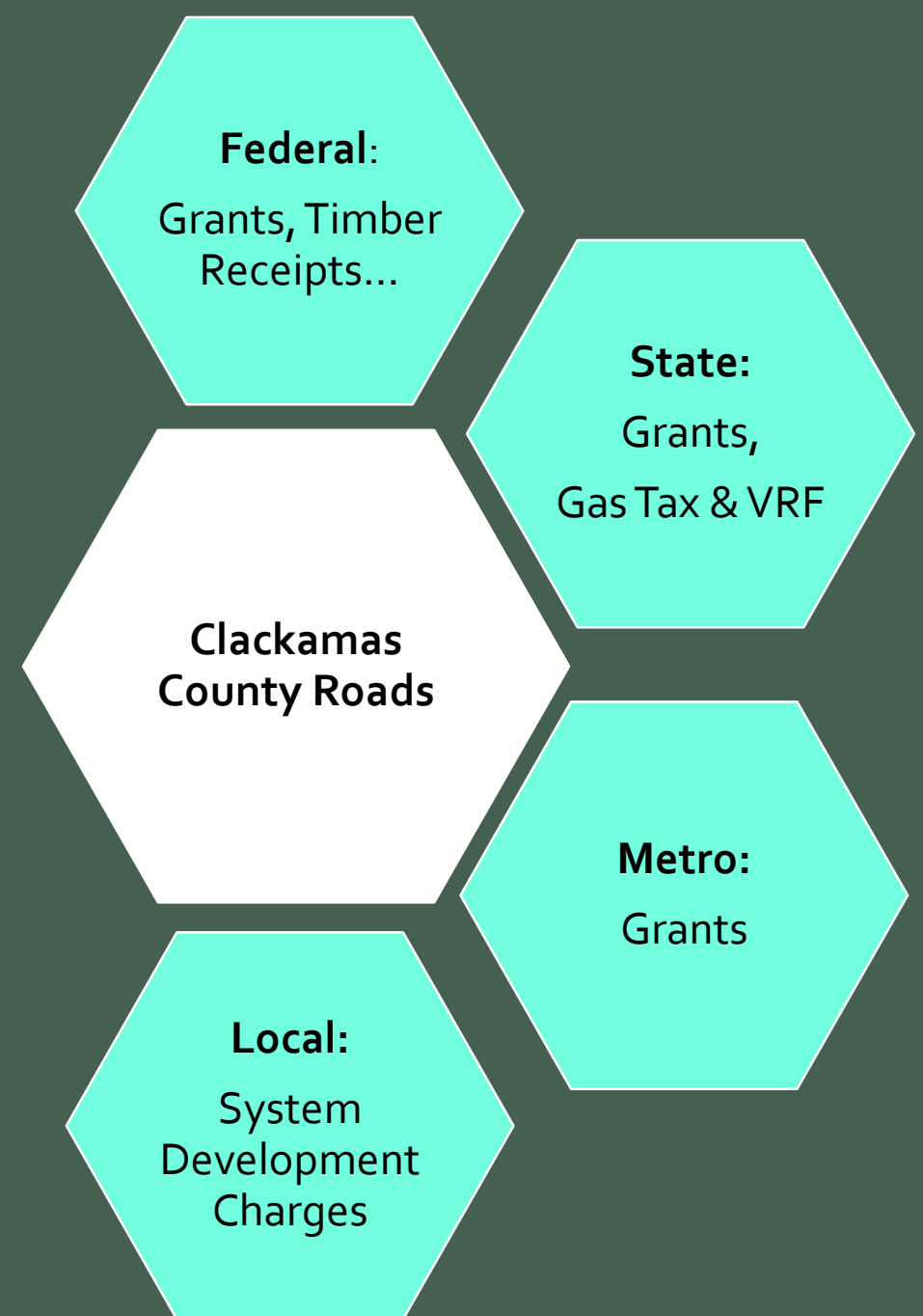
City of Milwaukie, City Council

December 4, 2018

Presented by Clackamas County Department of
Transportation & Development



We're missing
pieces of the
funding pie.



Road Funding by County – Portland Metro Region

For years, residents in neighboring counties have voted in additional local funding to support road maintenance in their communities. These local sources supplement state and federal funds. (The year each fee was established is shown for each fee.)

WASHINGTON COUNTY \$48.9 M Annual Collections	Road Miles 1,300	 1977 \$2.1 M / Yr.	 1987 \$3.7 M / Yr.	 1986 \$35 M / Yr.	 2018 \$8.1 M / Yr.
MULTNOMAH COUNTY \$17.9+ M Annual Collections	Road Miles 230	 1976 \$7 M / Yr.	 2009 \$10.9+ M / Yr.		
CLACKAMAS COUNTY	Road Miles 1,400+	 No Local Funding			

Transportation Temperature Check

We interviewed 29 business and community leaders in spring 2018.

They expressed support for:

Congestion relief projects

Maintenance program for **local roads**

More **safety** projects

Idea of ***strategic investment fund*** for local transportation needs

Idea of a ***vehicle registration fee (VRF)***

We talked with C4...

Clackamas County Coordinating Committee

Should we move forward with a vehicle registration fee (VRF) adopted by the Board of Commissioners?

YES

If yes, what's a reasonable rate?

\$30/year/vehicle

Is there interest in creating a *Strategic Investment Fund* (SIF)?

YES

If yes, how much?

10%

We talked with city staff...

They need funds for:

- Capital projects
- Paving & general maintenance
- Sidewalks and/or ADA curb ramps



We talked with community leadership

Committee for Community Involvement (CCI)

- Advisory group to Board of Commissioners
- Oversees CPO and Hamlet program
- Expressed support for a vehicle registration fee (VRF)
- Offered to host regional community meetings
 - Estacada
 - Molalla
 - Oak Grove
 - Welches

Clackamas County needs



- Maintain arterial and collector roads (HB 2017)
- Multi-use paths/bike paths/sidewalks (HB 2017)
- Replace/install curb ramps to meet ADA standards (HB 2017)
- **Safety** (HB 2017/VRF)
- **Local road maintenance** program (VRF)
- Construct **capital projects** to relieve congestion (VRF)
- Relocate **Transportation Maintenance** facilities

Potential VRF Annual Revenue

City	Population (July 1, 2017)	Annual Revenue*	City	Population (July 1, 2017)	Annual Revenue*
Lake Oswego**	34,855	\$703,222	Damascus***	10,625	\$214,364
Oregon City	34,240	\$690,807	Molalla	9,085	\$183,294
West Linn	25,615	\$516,794	Estacada	3,155	\$63,654
Wilsonville**	21,260	\$428,938	Tualatin**	2,911	\$58,741
Milwaukie	20,510	\$413,798	Portland**	766	\$15,455
Happy Valley	18,680	\$376,877	Johnson City	565	\$11,399
Canby	16,420	\$331,281	Rivergrove**	459	\$9,253
Gladstone	11,660	\$235,246	Barlow	135	\$2,724
Sandy	10,655	\$214,969	County		\$5,588,520

Strategic Investment Fund (SIF): \$1,117,704

*Based on population, per state law

**Part of this city is outside Clackamas County

***Per state law, funds that would have gone to the former city go to the county for 10 years

SIF: Congestion Relief



Capital projects that benefit multiple jurisdictions

When: Every 2-5 years

Who: Clackamas County Coordinating Committee (C₄)

How: Identify and prioritize *cross-jurisdictional* projects

SIF: Maintenance/Road Transfers

Transfer jurisdiction of county-maintained roads within city boundaries to the cities within which they are located.

When: Annually

Who: Clackamas County Coordinating Committee (C4)

How: County and cities *identify county roads* in cities to transfer

All transfers are contingent upon official approval of the Board of County Commissioners and the city's council, per state law.

VRF Impact on Motorists

- **\$30 per vehicle per year**
 - Paid every other year when motorists renew vehicle registration
 - Not applicable to one-time permanent vehicle registrations
- **Included:** motorcycles (at \$15); cars, pick-up trucks, vans and other passenger vehicles
- **Excluded:**
 - Unregistered farm equipment
 - Heavy trucks (they pay weight-mile tax)

Steps Taken

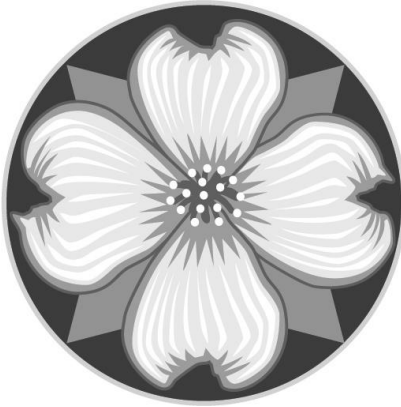


- We've reached out to businesses
- We've reached out to the community
- We're coordinating with C4
- We're meeting with the Board of Commissioners



QUESTIONS?

Visit our website for more information:
www.Clackamas.us/transportation/VRF



RS Agenda Item

7

Information

Mayor's Announcements – Dec. 4, 2018

- **Housing Forum** – Thu., Dec. 6 (6 – 8 PM)
- **Free Leaf Drops** – Dec. 8 & 15 (7 AM – 2 PM)
- **Winter Celebrations Event** – Sat., Dec. 8 (9:30 AM – 12 PM)
- **NCUWC Tree Sale** – Sat. Dec. 8 (11 AM – 3 PM)
- **Christmas at the Museum** – Sat., Dec. 8 (11 AM – 3 PM)
- **Winter Solstice and Christmas Ships** – Sat., Dec. 15 (4:30 – 7:30 PM)
- **Ledding Library, City Hall, and Johnson Creek Blvd. Building closed on Mon., Dec. 24 for Christmas Eve and Tue., Dec. 25 for Christmas Day**
- **Ledding Library closes at 6 PM on Mon., Dec. 31 for New Years Eve**
- **Ledding Library, City Hall, and Johnson Creek Blvd. Building closed on Tue., Jan. 1 for New Years Day**
- **LEARN MORE AT WWW.MILWAUKIEOREGON.GOV**

