MID-VALLEY
Local Resources for Local Issues
Oregon Local Emergency Planning Committees

Hazardous Material Emergency Response Plan
Mid-Valley Local Emergency Planning Committee

Prepared by

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Prepared for

Mid-Valley Local Emergency Planning Committee

In accordance with the Emergency Planning Community Right-to-Know Act, the Mid-Valley Local Emergency Planning Committee accepts and adopts the following Hazardous Materials Emergency Response Plan dated 21 Jul 2023.

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LEPC Chair

_____

LEPC Secretary

This plan was delivered to the following LEPC members and response organizations:

Organization	Name	Date Received

Organization	Name	Date Received

Mid-Valley LEPC Emergency Response Plan Document Control Log			
Version	**Details/Changes**	**Approved By**	**Approved Date**
1.0	Original Document excluding Attachment 5 (intended for the public)	Mid-Valley LEPC	21 Jul 2023

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1 EXECUTIVE SUMMARY

The Office of the State Fire Marshal, as the administrative agent on behalf of Mid-Valley Local Emergency Planning Committee (LEPC), contracted with Alliance Solutions Group, Inc. (ASG) to develop an Emergency Response Plan (ERP) that incorporates risk-based planning and response concepts to aid planners and responders in the prioritization of capabilities and resources for hazardous material (HAZMAT) response within Linn and Benton Counties in Oregon. This plan serves as a reference to each County's Emergency Operations Plan (EOP).

ASG obtained Tier II Reports and radioactive material (RAM) storage information from the Oregon Community Right to Know (CR2K) Hazardous Substance Manager online database. Analysts then developed an inventory of facilities that store, manufacture, or use extremely hazardous substances (EHS), assessed technological hazards at these EHS facilities, and provided this information to the LEPC separately in electronic format due to the sensitive nature of the information. The Federal Emergency Management Agency (FEMA) defines a technological hazard as a potential incident resulting from accidents or failures of systems or structures and includes hazards such as industrial chemicals or materials that may be toxic, biohazardous, explosive, or radioactive. ASG also analyzed HAZMAT transported via tanker trucks, pipelines, and railcars along transportation routes within Linn and Benton Counties.

To identify the top risks, ASG adopted chemical severity ratings from a 2011 report published by the Naval Research Laboratory titled, *Prioritization and Sensitivity Analysis of the Inhalation/Ocular Hazard of Industrial Chemicals*. This report provided a targeted list of 49 chemical hazards and assigned a Toxic Operational Hazard Score for each. Analysts identified these targeted chemicals on the HAZMAT inventory and multiplied the assigned Toxic Operational Score by the quantity stored at each site to obtain a cumulative risk rating score for each facility. Analysts ranked the facility listing scores from highest to lowest to formulate a facility listing based on risk to the health and safety of the surrounding population. ASG plume modeled the top risks at these facilities and expressed the severity in terms of the estimated population impacted by each hazard release scenario as determined by a Geographic Information System (GIS). We multiplied the probability of release by the severity for each release scenario to obtain a risk rating. ASG used the risk rating to rank and identify the top three hazards based on risk in the Mid-Valley LEPC region. The primary risks of concern within the region include chlorine, hydrogen chloride, and ammonia. Experts also analyzed socioeconomic indicators within the counties such as average income, education level, linguistically isolated groups, and persons older than 64 to identify socially vulnerable populations located near high-risk facilities to aid planners with community outreach efforts and enhancing equity among those most vulnerable to these risks.

Analysts identified response capabilities by compiling a list of emergency response equipment, responder training, and estimated response times for primary response agencies and follow-on Regional Hazardous Materials Response Teams (RHMRT). RHMRT Five (Linn/Benton) consisting of members from the Albany, Corvallis, and Lebanon Fire Departments serves the region and provide a well-trained, equipped resource. RHMRT two (Eugene) and RHMRT thirteen (Salem) can offer additional assistance if requested. Furthermore, the state's 102nd Civil Support Team (CST) based in Salem can be rapidly mobilized and provides advanced detection and analysis capabilities during a HAZMAT incident.

Based on the top risks, ASG identified potential capability gaps and provided recommendations for each potential issue identified (see Table 6-1: *Gap Analysis Results and Recommendations*). The greatest challenges included the lack of shelter-in-place and evacuation plans for vulnerable facilities and a lack of necessary detection equipment to identify high-risk, prevalent hazards stored and/or transported within the region. Linn and Benton County first responders offer limited defensive response capabilities during the initial phases of a hazard release to include

initial containment and implementing public protective actions. Prompt access to RHMRTs which provide advanced, offensive response capabilities is available upon request following the initial response. Within 10 to 45 minutes from the initial notification (location dependent), RHMRT Five located in Albany, Oregon can provide well-trained, equipped response capabilities. RHMRT Two based in Eugene and RHMRT Thirteen (Salem) can also support a HAZMAT incident within the region if additional resources are requested.

ASG is recommending the following to improve preparedness for a hazardous material release incident:

- Share hazard and impact information with affected vulnerable facilities and assist them with the development and exercising of Shelter-in-Place or evacuation plans.
- Conduct joint public-private sector training and exercises related to high-risk HAZMAT incidents.
- Ensure HAZMAT detection equipment capabilities are in place to rapidly detect and measure the top risks identified in this ERP.
- Develop outreach strategies to prepare underserved populations and disadvantaged communities with hazard awareness, appropriate notification and warning messages through accessible communication methods, and protective action awareness.

2 PURPOSE AND SCOPE OF THE PLAN

The purpose and scope of the plan is to address the following elements:

- Hazard Identification through analysis of Tier II reports, to include Radioactive Materials, and highway/railroad commodity density flow reports;
- Identification of routes likely to be used for the transportation of HAZMAT;
- Risk assessment to prioritize and align plans, training, and resources with risks;
- Identification of at-risk facilities such as nursing homes, schools, hospitals, etc.;
- Identify HAZMAT response methods and procedures to be followed by private sector facilities, local emergency and medical personnel;
- Designation of responsibilities to include a community emergency coordinator and facility emergency coordinators associated with planning and response;
- Outline of emergency notification and public information procedures from the initial phase of the incident to incident termination;
- Methods for determining the occurrence of a hazard release and the area or population likely to be affected by the release;
- Description of local emergency response equipment in the community and at facilities;
- Outline of evacuation plans, route identification, and plume modeling for critical areas;
- Training programs and resources for first responders;
- Methods and potential scheduled timeframes for exercising the plan; and
- Identification of existing emergency response plans and mutual aid agreements within the specific response area and implementation of those plans.

3 AUTHORITIES AND REFERENCES

The following authorities and references are applicable to this plan:

- Emergency Planning Community Right to Know Act (EPCRA), SARA Title III, Section 303, Emergency Planning
- Oregon Community Right to Know (CR2K), ORS 453.307-414
- National Incident Management System (NIMS)
- FEMA Comprehensive Preparedness Guidance 101 and 201
- Emergency Management Accreditation Program's (EMAP) Emergency Management Standard (ANSI/EMAP EMS 5-2019)
- Oregon State Fire Marshal Standards of Coverage for Regional Hazardous Material Emergency Response Teams, 2020
- State of Oregon Emergency Operations Plan, June 2019
- Oregon Office of State Fire Marshal Hazardous Materials Transportation by Rail State Agency Response Coordination Plan Appendix within Emergency Support Function # 10 of the State EOP
- Northwest Area Contingency Plan, 2020
- Benton Operational Area Emergency Operations Plan, September 2020
- Linn County, OR Emergency Operations Plan, June 2022
- Oregon DEQ Drinking Water Protection Program Interactive Mapping Tool: https://hdcgcx2.deq.state.or.us/Html5Viewer211/?viewer=drinkingwater
- Oregon Department of Transportation TransGIS Site: http://gis.odot.state.or.us/transgis/
- Community Right-to-Know (CR2K) Information Access and Downloads Site: https://oregon.hazconnect.com/Account/Login.aspx
- National pipeline Mapping System (NPSM) Public Viewer interactive mapping tool: https://www.npms.phmsa.dot.gov/
- U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) site: https://portal.phmsa.dot.gov/analytics/saw.dll?PortalPages
- Portland and Western Railroad Emergency Response Plan
- Union Pacific HAZMAT Emergency Response Plan, PB-20850, July 2017
- Prioritization and Sensitivity Analysis of the Inhalation/Ocular Hazard of Industrial Chemicals, Naval Research Lab 2011.
- Fast Local Emergency Evacuation Times (FLEET) Evacuation Model Tool: https://fleet.vmasc.odu.edu/
- EPA Environmental Justice Screening and Mapping Tool (Version 2.0): https://ejscreen.epa.gov/mapper/
- National Oceanic and Atmospheric Administration (NOAA) Storm Events Database: https://www.ncdc.noaa.gov/stormevents/

- Federal Emergency Management Agency (FEMA) Resilience Analysis and Planning Tool (RAPT): https://www.fema.gov/about/reports-and-data/resilience-analysis-planning-tool
- United States Nuclear Regulatory Commission Locations of Nonpower Production and Utilization Facilities: https://www.nrc.gov/info-finder/nonpower/index.html#research-test

4 ROLES AND RESPONSIBILITIES

4.1 Local Emergency Planning Committee

Under the EPCRA, the Mid-Valley LEPC is responsible for developing a HAZMAT ERP, reviewing this plan at least annually, and providing information about chemicals in the community to citizens. EPCRA Section 302 designated facilities (EHS facilities) are required to participate in the LEPC. Analysts assessed EPCRA Section 302 facilities within Benton and Linn Counties and included information for these facilities within this plan.

4.2 Regulated Facility Emergency Coordinator

Each facility regulated by the EPCRA that uses or stores EHS will designate an Emergency Coordinator. The Emergency Coordinator provides information to the LEPC and/or emergency response agencies as requested to support the emergency planning process. The Emergency Coordinator or facility designee performs the following tasks:

- Submits Tier II and Toxic Release Inventory Form R Reports annually through Oregon's Community Right-to-Know (CR2K) online database
- Provides current emergency contact numbers to local response agencies
- Ensures that timely notification of an emergency is made to local response agencies
- Carries out emergency response as outlined in the Emergency Action Plan or other facility emergency plan(s)
- Provides accident assessment information to responders following an incident
- Makes recommendations to local responders for containing a HAZMAT release and protecting the public
- Supports the establishment of a Unified Command as requested

4.3 Local and State Agencies

Section 3.2.3.1 of the 2020 Benton County EOP designates the Emergency Management Director as the Community Emergency Coordinator. Section 3.2.1.4 of the 2022 Linn County EOP designates the Emergency Manager as the Community Emergency Coordinator. Section three and corresponding Emergency Support Function Annexes within each EOP describe the roles and responsibilities of the following response and volunteer organizations at the local, state, and federal levels. Additionally, section four of the Oregon State HAZMAT Transportation by Rail State Agency Response Coordination Plan (Appendix within ESF 10 of the State EOP) outlines the roles and responsibilities of key state agencies during a rail hazard release. These are included by cross-reference to ensure consistency and interoperability among plans. Within the Mid-Valley Region, there are several cities that maintain an EOP and provide emergency management and response services within their jurisdiction (i.e., Albany, Corvallis, Lebanon, and others). During a HAZMAT incident, these responsibilities will not change; however, unique responsibilities may arise and are described below the following list of key local and state agencies. Figures 4-1 and 4-2 displays the Linn and Benton County fire districts and associated areas of responsibility for each. The Greenberry area located in east central Benton County does not have a specific fire protection district assigned. This area primarily consists of agricultural areas and is not densely populated. The Philomath Fire District, Corvallis, or Monroe Rural Fire Protection Districts will support an incident in this region depending on the incident's location.

City/County

- Benton County Sheriff's Office
- Board of Commissioners
- City and County Public Information Officers (PIO)
- City of Corvallis Fire Emergency Manager
- City Police Departments
- Community Health Centers of Linn-Benton Counties
- Corvallis Regional Communications Center
- County and City Managers
- County residents and households
- Disaster Policy Group to include both elected and appointed executives with legal responsibilities
- Dispatch Agency(s)
- Economic Development
- Elected Officials
- Emergency Management Organization (EMO)
- Emergency Management Director
- Emergency Managers
- Emergency Medical Services (EMS)
- Environmental Health
- EOC Director
- Finance Department
- Fire Defense Board
- Health Department
- Health Officer
- Health Services Department
- Hospitals, Nursing Facilities, and Assisted Living Facilities
- Information Technology
- Local Fire Departments and Districts
- Linn County Administrative Officer
- Linn County Sheriff's Office
- Local Municipalities
- Mid-Valley LEPC
- Nongovernmental and Faith-Based Organizations
- Planning Department
- Private Sector
- Public Health
- Public Works Department
- Radiation Protection Services
- Road Department
- School Districts

State

- Business Oregon
- Office of the State Fire Marshal
- Oregon Health Authority
- Oregon Department of Administrative Services
- Oregon Department of Agriculture
- Oregon Department of Energy
- Oregon Department of Environmental Quality
- Oregon Department of Forestry
- Oregon Department of Human Services
- Oregon Department of Justice
- Oregon Department of Transportation
- Oregon State Police
- Oregon Military Department
- Oregon National Guard
- Oregon Office of Emergency Management
- RHMRT # 5

Figure 4-1: Linn County Fire Districts Areas of Responsibility

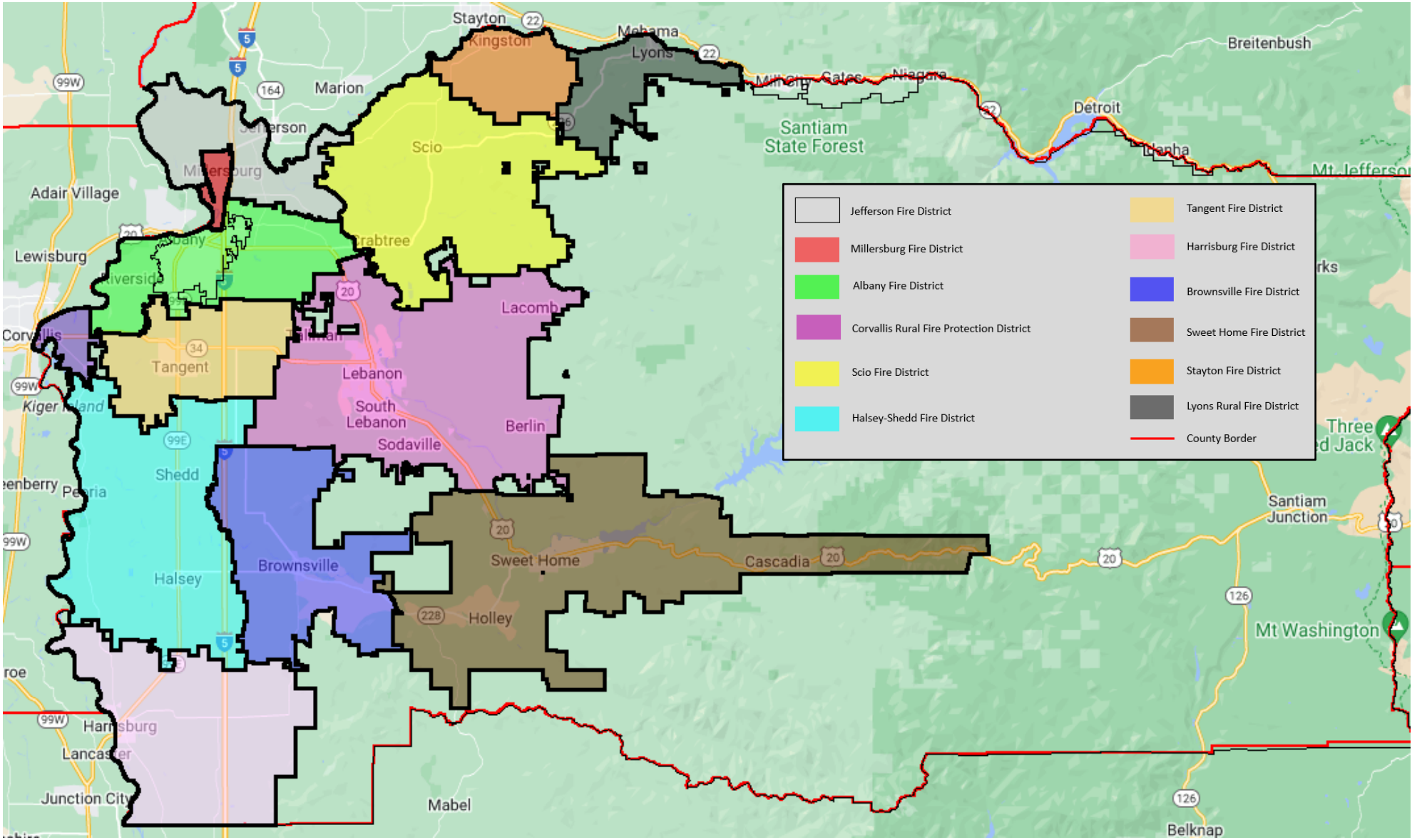
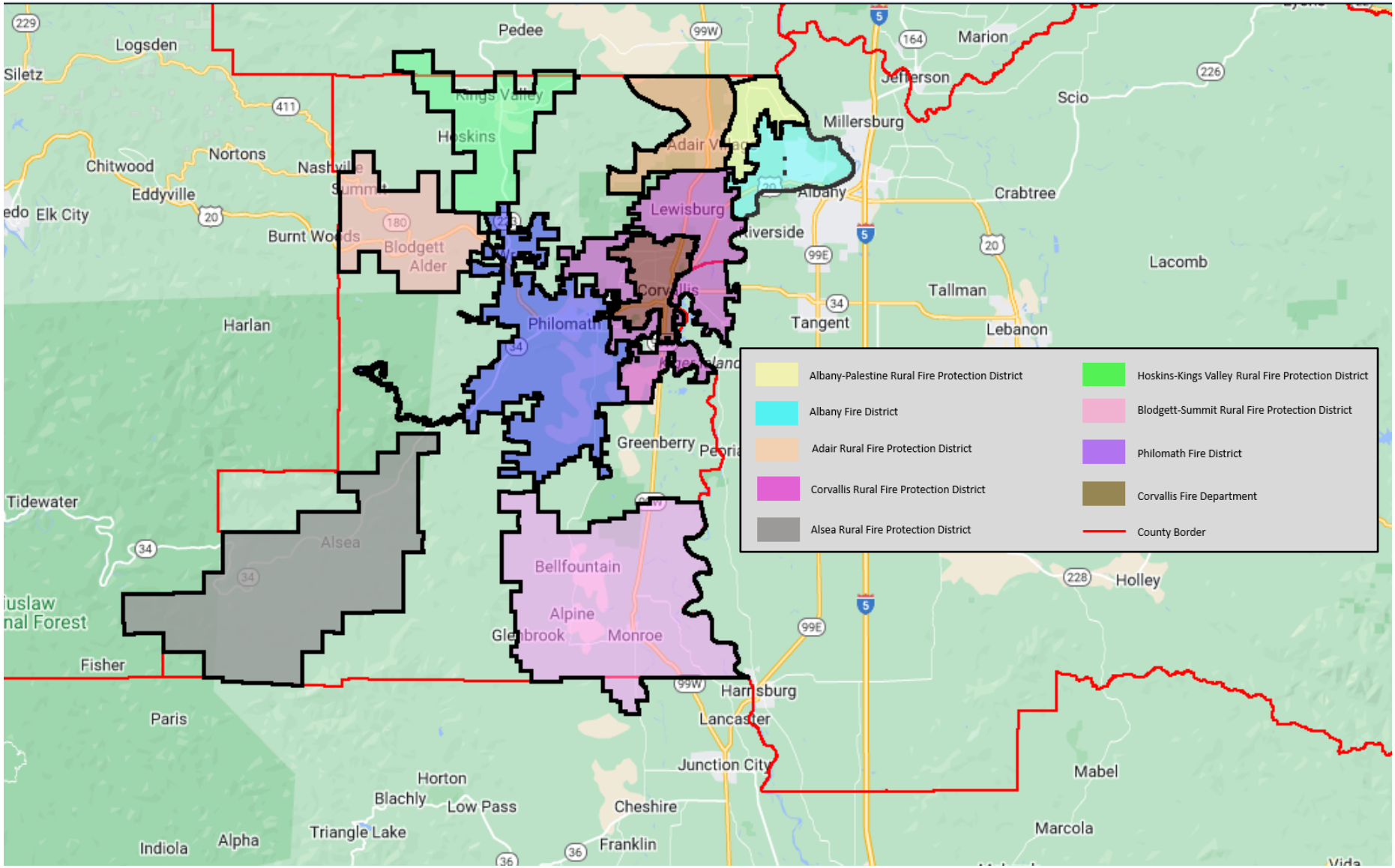


Figure 4-2: Benton County Fire Districts Areas of Responsibility



4.4 Regional HAZMAT Team Responses

When a HAZMAT incident occurs, additional resources may be required once first responder capabilities are exhausted. For public safety response agencies, this determination is often made with the information provided by the reporting party or responders on scene. Considerations on whether to activate a HAZMAT team include several factors such as: life safety hazard, whether the substance is unknown or known to be a significant threat, the type of release, and weather conditions.

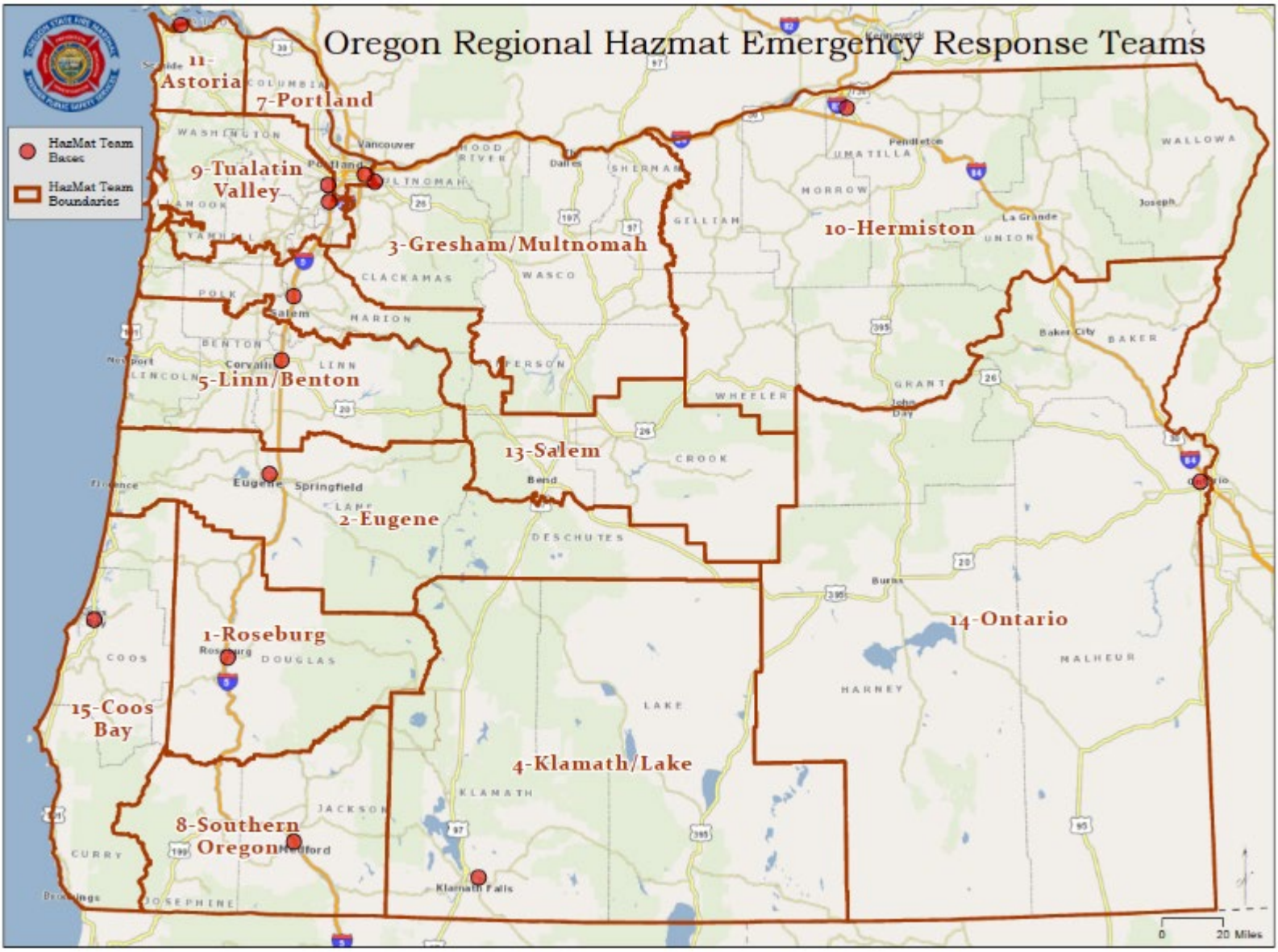
The state operates and funds thirteen RHMRTs; one of which directly serves the Mid-Valley LEPC Region. RHMRT 5 (Linn/Benton) is staffed by Albany, Corvallis, and Lebanon Fire Department personnel and is the designated state responder for Linn and Benton Counties. RHMRT 13 (Salem) and RHMRT 2 (Eugene) can offer additional HAZMAT response support and capabilities as needed based on an incident's location within the region. RHRMTs are requested through the local 9-1-1 dispatch, responsible party of the incident, or Incident Commander (IC) notifying the Oregon Emergency Response System (OERS). Figure 4-3 displays the areas of responsibility for each RHMRT.

While enroute, the HAZMAT team will contact the appropriate individual on-scene (e.g., incident commander, operations section chief) to acquire incident details and initiate research and planning. Upon arrival at the scene, the HAZMAT team typically operates under the Operations Section of the local incident command system. A representative from the team will liaise with the IC to obtain an incident action plan briefing and determine how the team will assist in achieving established incident objectives. The team conducts tactical operations at the incident site as directed to mitigate the adverse effects of a hazard release and achieve incident objectives. Such activities may include on-site reconnaissance, hazard sampling and identification, and conducting offensive operations to stop the hazard release.

4.5 Other State HAZMAT Resources

When a HAZMAT incident exceeds the capacity of the local first responders and the RHMRT, the IC may request additional resources from the state such as other RHMRTs or the 102nd Civil Support Team (CST). The RHMRTs are strategically distributed throughout the state while the CST is based in Salem, Oregon. Upon arrival at the scene, the CST will operate under the Operations Section of the incident command system. This highly trained and equipped 22-person team advises, assists, identifies, and assesses at the scene to support and execute established incident objectives. The IC may request additional resource support through the OERS.

Figure 4-3: Regional HAZMAT Response Team Area of Responsibility Map



4.6 Federal Agencies

When local and state resources are exhausted or specialized services are required, federal resources and response activities are coordinated and requested as outlined in the 2020 Northwest Area Contingency Plan (NWACP) developed by the Region 10 Regional Response Team and the Northwest Area Committee. The NWACP provides Federal Agency jurisdictional boundaries and outlines response authorities and policies for the region.

5 HAZARD IDENTIFICATION AND RISK ASSESSMENT

The following sections below provide the risk assessment supporting data. Attachment 1 describes the methodology used to complete this risk assessment. Attachment 5 incudes a risk profile sheet for every EHS facility in Linn and Benton County.

5.1 Stationary Sources

Analysts reviewed Tier II information maintained in Oregon's CR2K online database and conducted a risk assessment to formulate a listing of EHS facilities based upon risk. Attachment 5 displays the profile sheets for each EHS facility (listed alphabetically), facility response capabilities (when a facility completed and returned the questionnaire), at-risk/vulnerable facilities located within the estimated Acute Exposure Guideline Level (AEGL)-2 airborne concentration levels or within one-half mile (when plume modeling was not conducted) and the assigned fire department based on the facility's location and department's designated area of responsibility. When a facility did not complete a questionnaire, ASG entered the phone number and owner-operator email listed in the CR2K database into the Emergency Coordinator field of the facility profile sheet. Analysts obtained at-risk and vulnerable facilities from the Geographical Information System (GIS) Department. An at-risk facility refers to facilities with individuals or groups whose needs are not fully addressed or who feel they cannot safely use the standard resources offered during preparedness, response, and recovery efforts. These include the physically or mentally disabled, senior citizens, and/or children. A vulnerable facility refers to a facility whose individuals are subject to potential harm from a hazard such as a downwind chemical plume. Section 5-2 below describes socially vulnerable populations within the region who may require additional community outreach and engagement from planners and responders to minimize the adverse impacts of a HAZMAT release.

5.2 Social Vulnerability Lens

To assist planners with identifying socially vulnerable populations around high-risk facilities, analysts reviewed several socioeconomic data layers within the Environmental Protection Agency's (EPA) Environmental Justice Screening and Mapping Tool and the Federal Emergency Management Agency's (FEMA) Resilience Analysis and Planning Tool (RAPT). These layers provided block-level data for neighborhoods representative of low-income, linguistic isolation, limited education (less than a high school education), those over the age of 64, households with limited broadband access and households without a smartphone. Analysts selected these layers based on their association with disproportionate disaster outcomes compared with other populations. Additional services, outreach, coordination, and risk communication may be necessary to ensure equity in preparing the whole community for a HAZMAT incident. For example, implementation of public protection actions may require mobility assistance, risk message translation and contextualization, or financial assistance. Community outreach and engagement with socially vulnerable populations near high-risk facilities can improve equity in preparedness and achieve more equitable outcomes. Plans should also address specific methods used to assist socially vulnerable populations in preparing, responding, and recovering from disasters. Population data and statistics within the Environmental Justice Screening and Mapping Tool and the RAPT is based on U.S. Census Data. Figures 5-1 through 5-6 display the socioeconomic layers used in the analysis and the location of the EHS facilities identified in this ERP represented by an orange-colored dot on the map. These files have been provided to LEPC stakeholders engaged in awareness and outreach programs for additional planning. Planners can access this free GIS tool online and zoom into a specific area to view census data statistics for a user-selected layer.

Based on our analysis with the social vulnerability lens, we are recommending the following next steps to achieve more equitable outcomes from HAZMAT risks to at-risk populations:

- Corvallis and Lebanon contain census tracts indicating populations within the 90th percentile of low income based on Figure 5-1. This indicates that some residents may lack the financial capacity to evacuate, shelter adequately, and sustain their well-being during a prolonged HAZMAT incident. Work with emergency planners and outreach to determine more specific needs which may include transportation/evacuation assistance, establishing shelters for displaced residents, guidance on feasibility of shelter-in-place, and educational materials on how to access needed resources during a HAZMAT incident.
- In Figure 5-2, south of Lebanon, there is a high concentration of linguistically isolated populations. Work with social services to identify the various languages represented. Consistent with local policies related to translation needs, provide LEPC HAZMAT awareness, risk, and protective action literature in primary languages to ensure effective risk communication. Ensure notification, alerts, and warnings can be provided in these languages.
- Figure 5-3 illustrates an area that represents populations with less than a high school education. To ensure emergency messages are understood by the whole community, it is a good practice to standardize communications at an 8th grade reading level when communicating complex, technical information. Utilize ChatGPT as a resource to review and suggest written materials that will be understandable by the whole community.
- Figure 5-4 displays several areas where elderly populations are concentrated. Elderly populations may indicate dependency on others for basic needs to include transportation, assisted living, on-going medical care, and communication. The concentrated areas may include nursing or assisted live facilities with larger populations of elderly. Work with these facilities that are vulnerable to HAZMAT incidents to

ensure adequate evacuation and shelter-in-place plans exist along with notification methods. Coordinate with social services and community-based organizations to ensure viable communications and support can be provided to isolated elderly members of the community during a HAZMAT incident.

- Figure 5-5 displays the percentile of households with limited broadband access while Figure 5-6 shows the RAPT's estimate of household percentages without a smartphone. Residents that have a limited access to the internet or do not have a smartphone are less likely to receive prompt emergency notification messages via social media or smartphone emergency notification applications such as the Linn-Benton Alert text messaging system which could hinder response efforts. Planners need to ensure that alternate dissemination methods are available to enhance public protective action outcomes from a HAZMAT incident release.

Figure 5-1: Linn and Benton County Low Income Areas

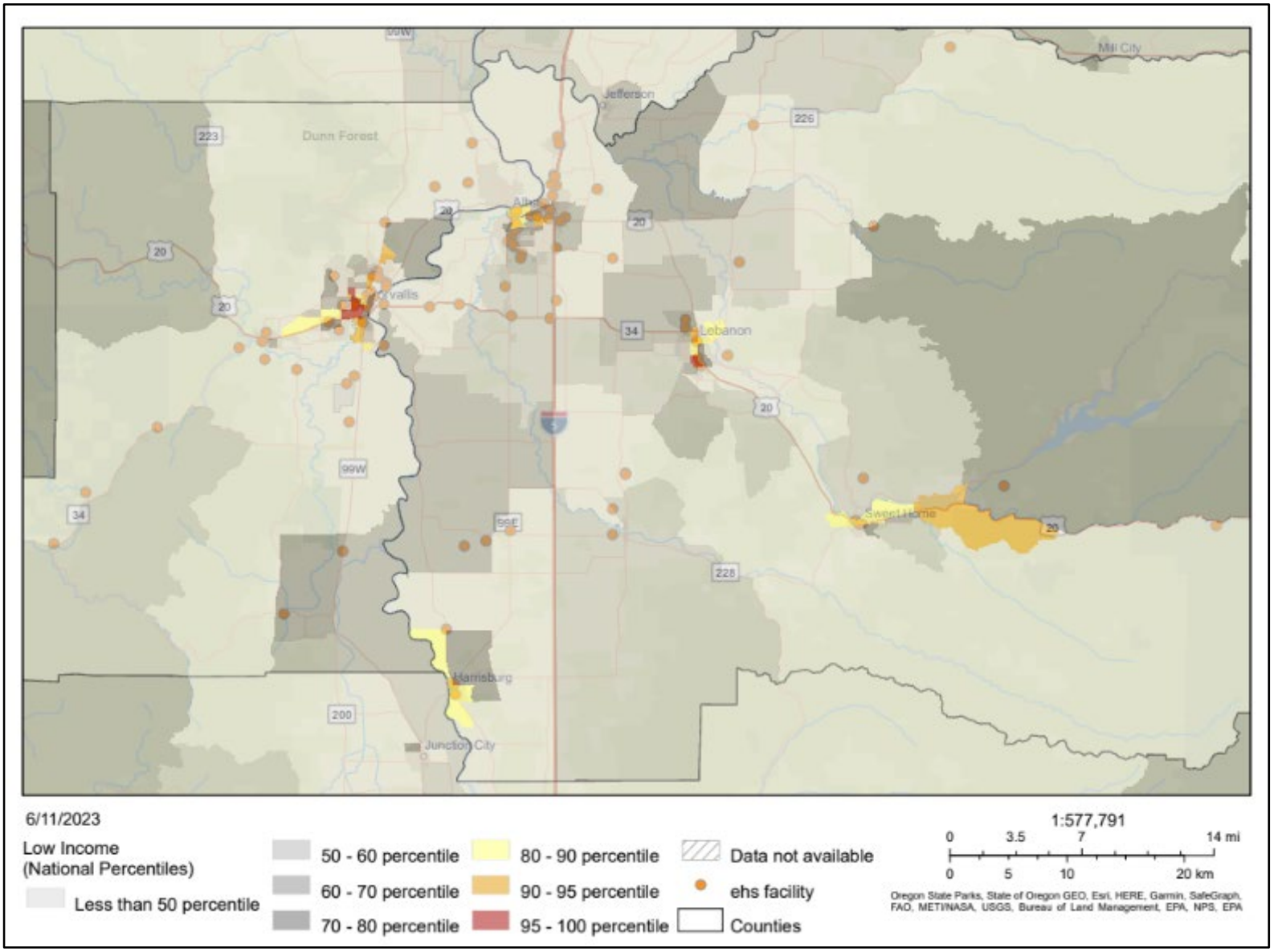


Figure 5-2: Linn and Benton County Linguistically Isolated Areas

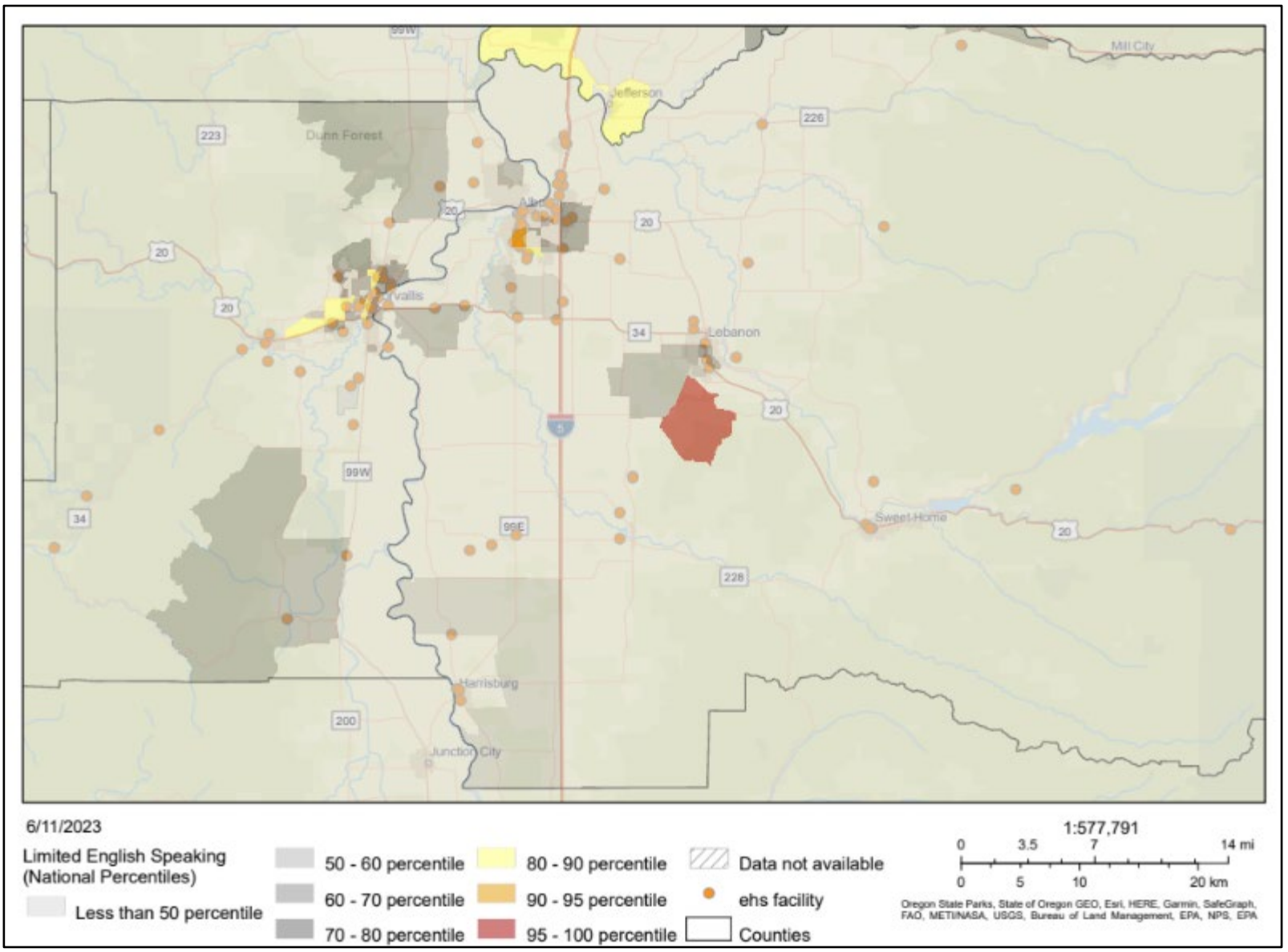


Figure 5-3: Linn and Benton County Populations with Less Than a High School Education

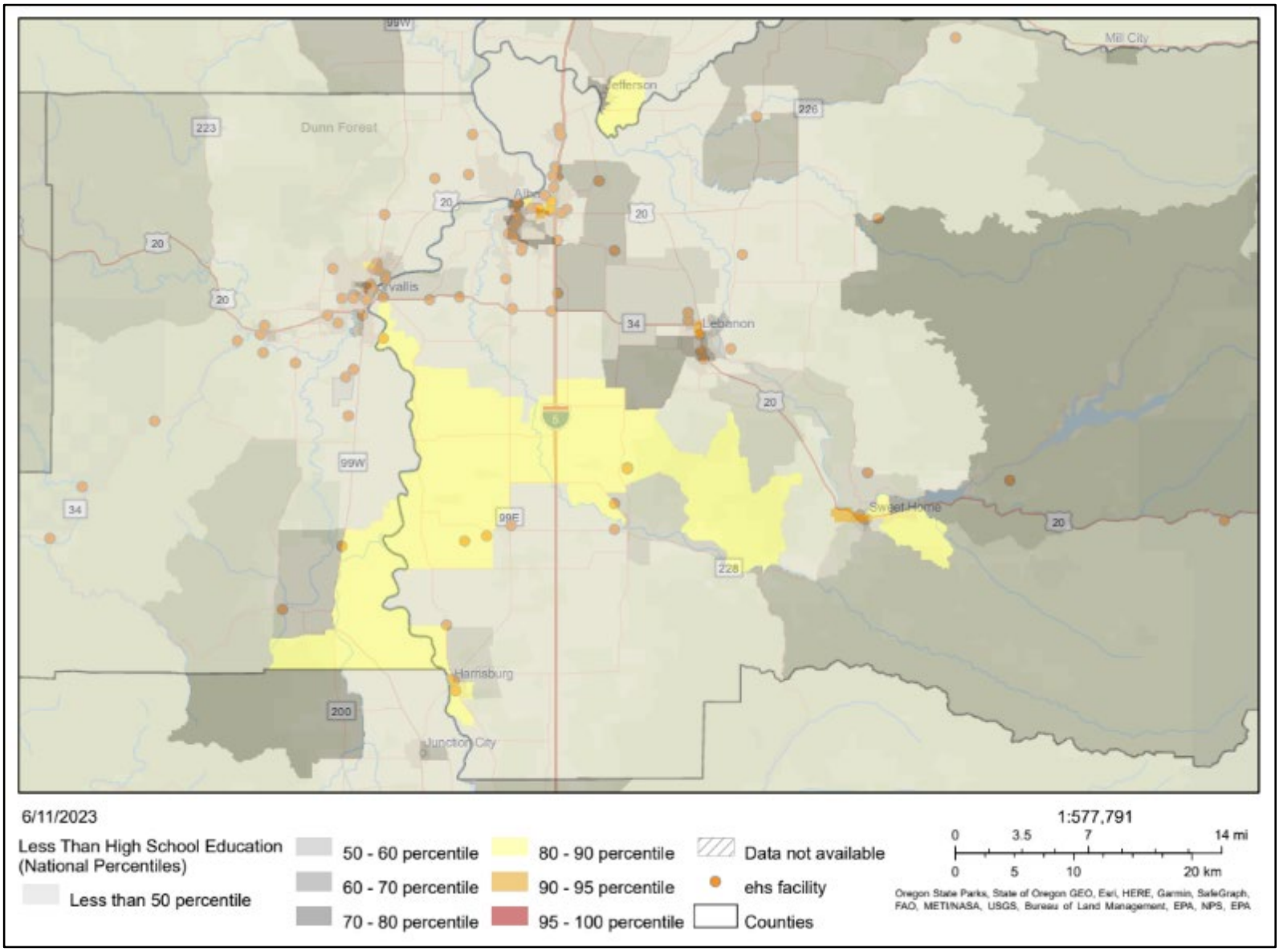


Figure 5-4: Linn and Benton County Populations Over Age 64

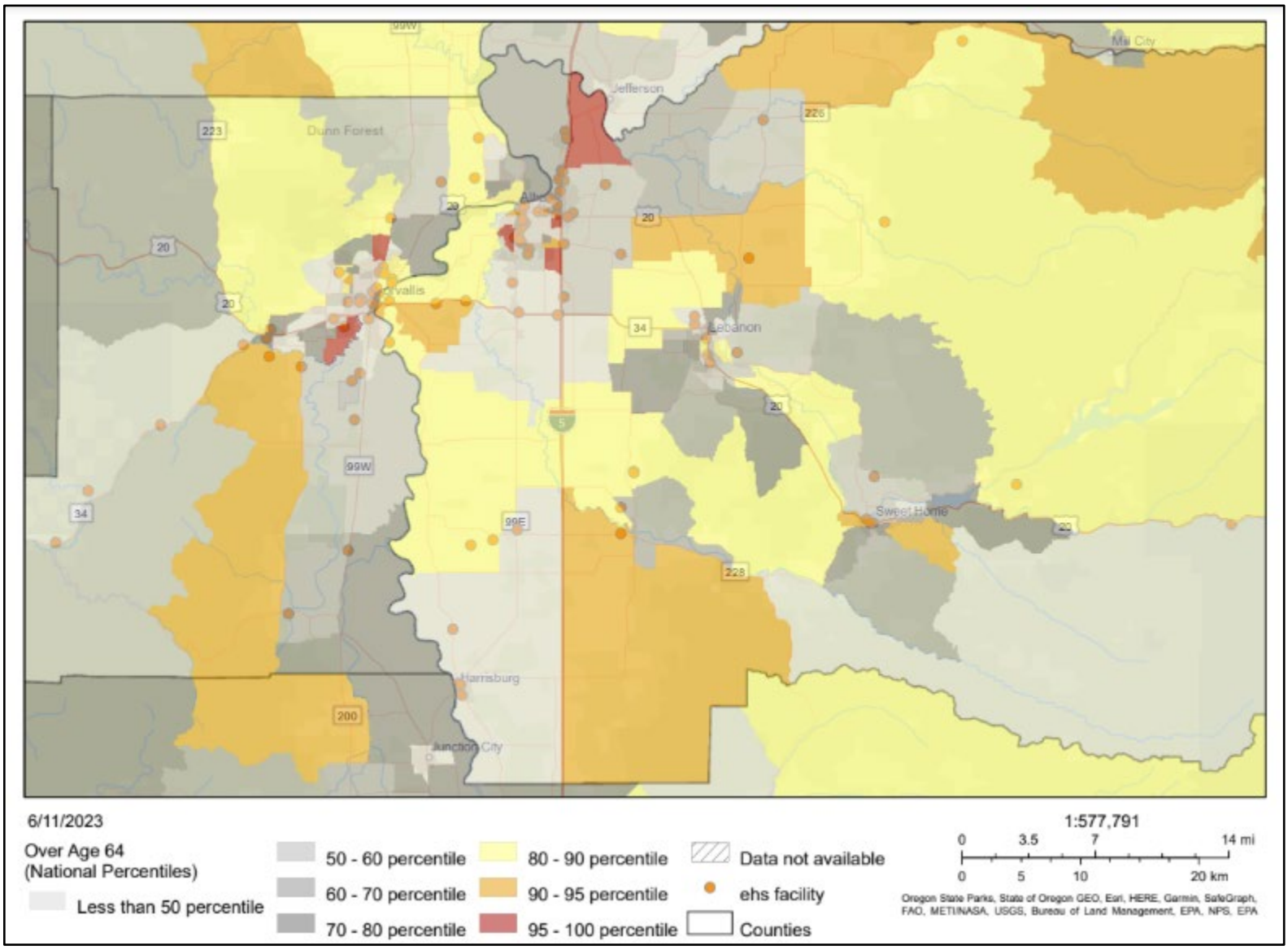


Figure 5-5: Linn and Benton County with Limited Broadband Access

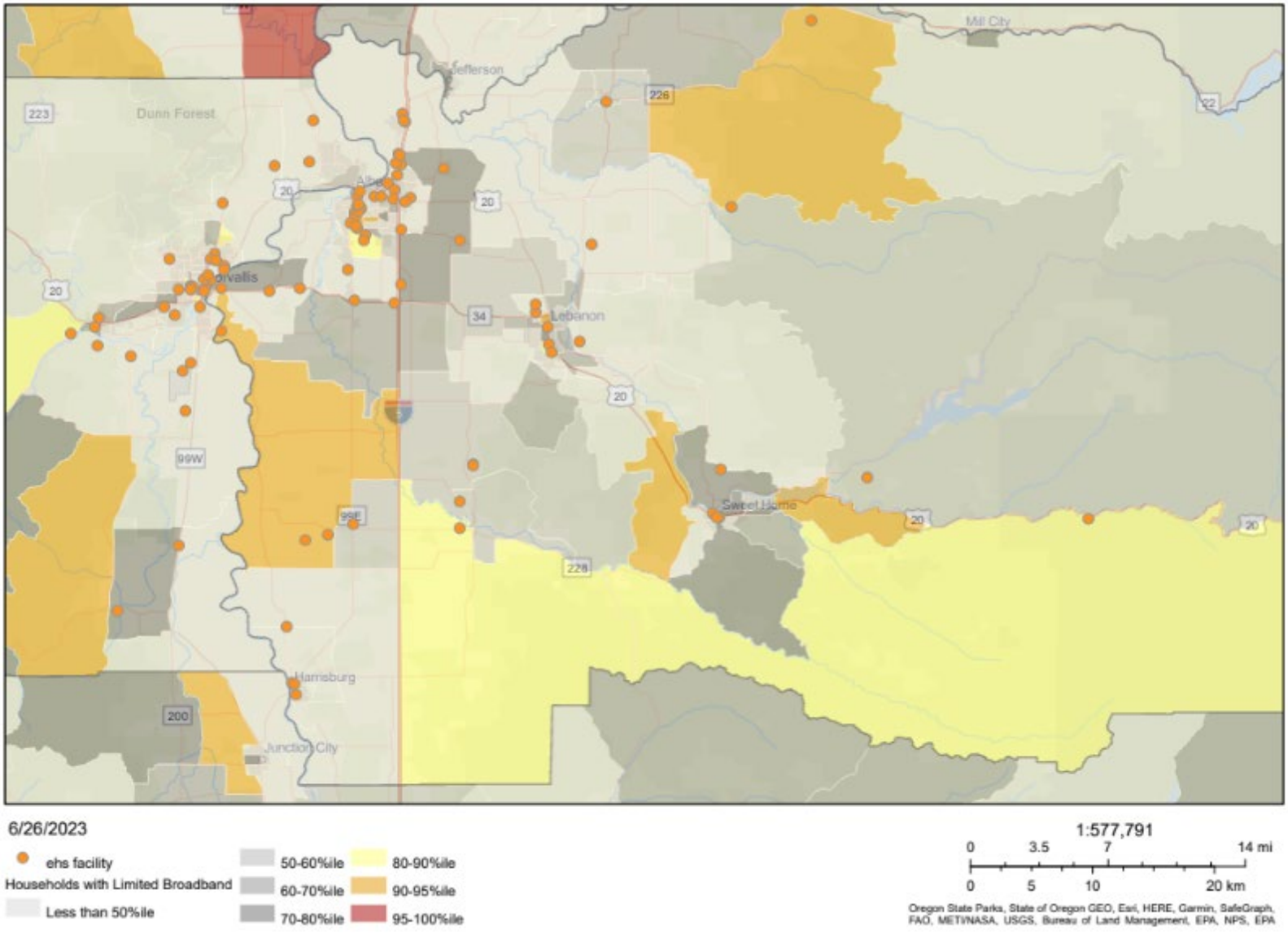
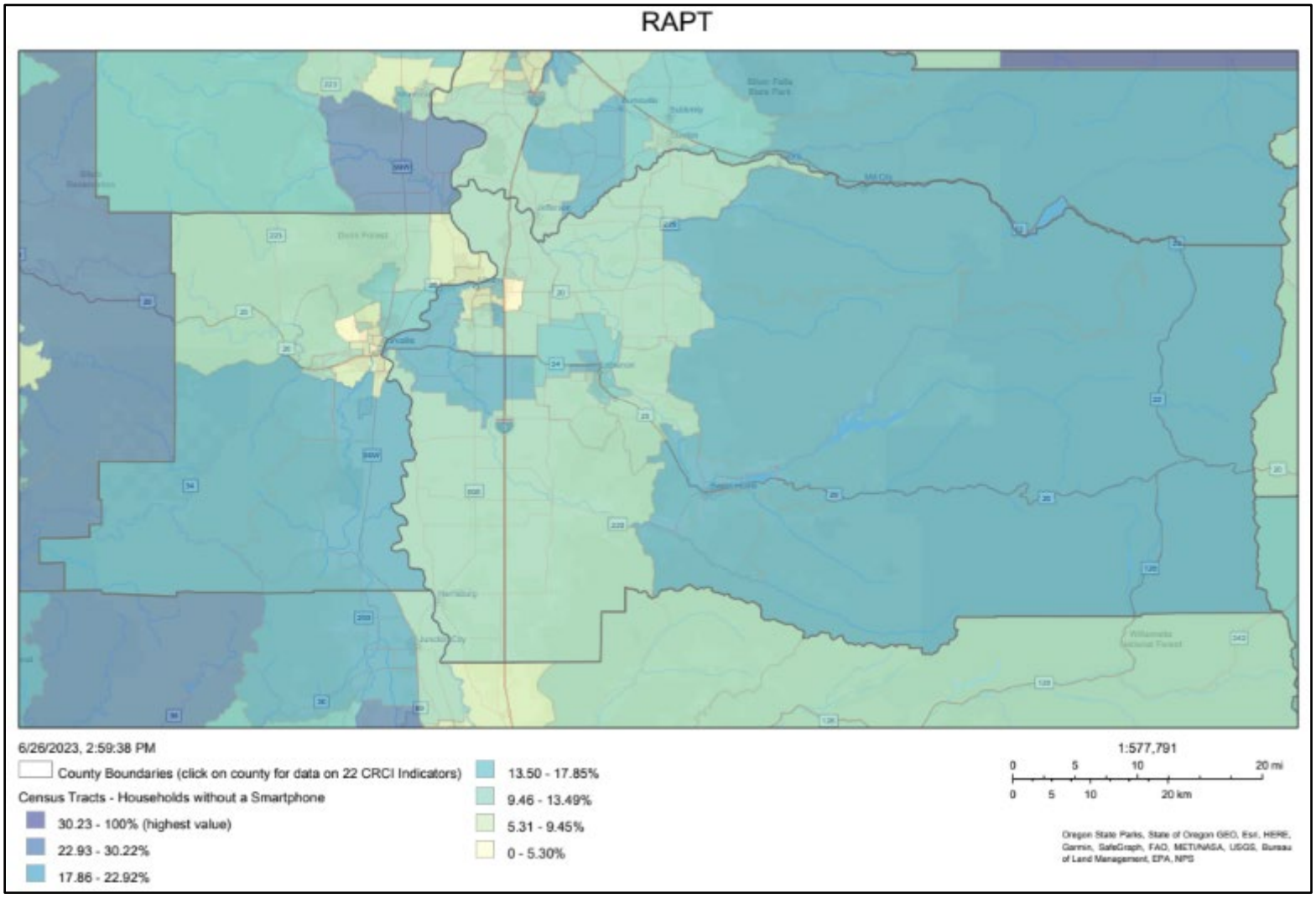


Figure 5-6: Linn and Benton County Households without a Smartphone



5.3 Model Outputs

Analysts used the Areal Locations of Hazardous Atmospheres (ALOHA) Program to conduct plume modeling and estimate the airborne concentrations in the event of a HAZMAT release. The results helped identify chlorine, hydrogen chloride, and ammonia as the top three risks to the Mid-Valley LEPC Region based on a review of Tier II data, accident probability, and populations at risk. Experts conducted plume modeling for selected chemical hazards at many EHS facilities identified in this plan to estimate impacts and the population at risk. Analysts did not conduct plume modeling for some facilities that primarily store solid or liquid-based fertilizers, lead/acid batteries, chemicals with low volatility properties, or chemicals not listed in the ALOHA program's library such as sulfuric acid. For each plume model, analysts used the hazard quantity reported on the Tier II report as the release amount and represents a bulk release. Plume models supporting this risk assessment assumed a worst-case, total release since there are many different scenarios that could cause a release such as a natural disaster, fire, explosion, deliberate act, or an accident.

The EPA establishes Acute Exposure Guideline Levels (AEGLs) for various chemicals to describe the human health effects from rare exposures to airborne chemicals. They are designed to protect the elderly and children, and other susceptible individuals. AEGLs are calculated for five relatively short, unprotected exposure periods to include 10-minutes, 30-minutes, one-hour, four-hours, and eight-hours. Three AEGL levels expressed as parts per million (ppm) or milligrams per cubic meter (mg/m^3) exist and are defined as follows:

- AEGL-1: represents the airborne concentration of a substance above which it is predicted the general public, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects (non-disabling and reversible).
- AEGL-2: represents the airborne concentration of a substance above which it is predicted the general public, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.
- AEGL-3: represents the airborne concentration of a substance above which it is predicted the general public, including susceptible individuals, could experience life-threatening health effects or death.

Figures 5-7 through 5-11 display the worst-case plume modeling result among the assessed EHS facilities when plume modeling was conducted (dependent upon reported facility hazards and whether the chemical of concern was included in the ALOHA plume modeling program's library) and vulnerable facilities. Analysts used the Mapping Application for Response, Planning, and Local Operational Tasks (MARPLOT) Program to obtain the total population within the orange-colored ring which represents the AEGL-2 airborne concentration contour. The populations within these areas represent the severity factor for the risk assessment. The red dots represent the vulnerable facilities while a yellow dot depicts an EHS facility. When analysts plume modeled multiple hazards from the same facility, the worst-case AEGL-2 contour is displayed. ALOHA model and MARPLOT files have been provided to the Linn County and Benton County Sheriff Offices and Albany Fire Department to support future response planning.

Figure 5-7: High-Risk EHS Facilities in Northern Linn and Benton Counties

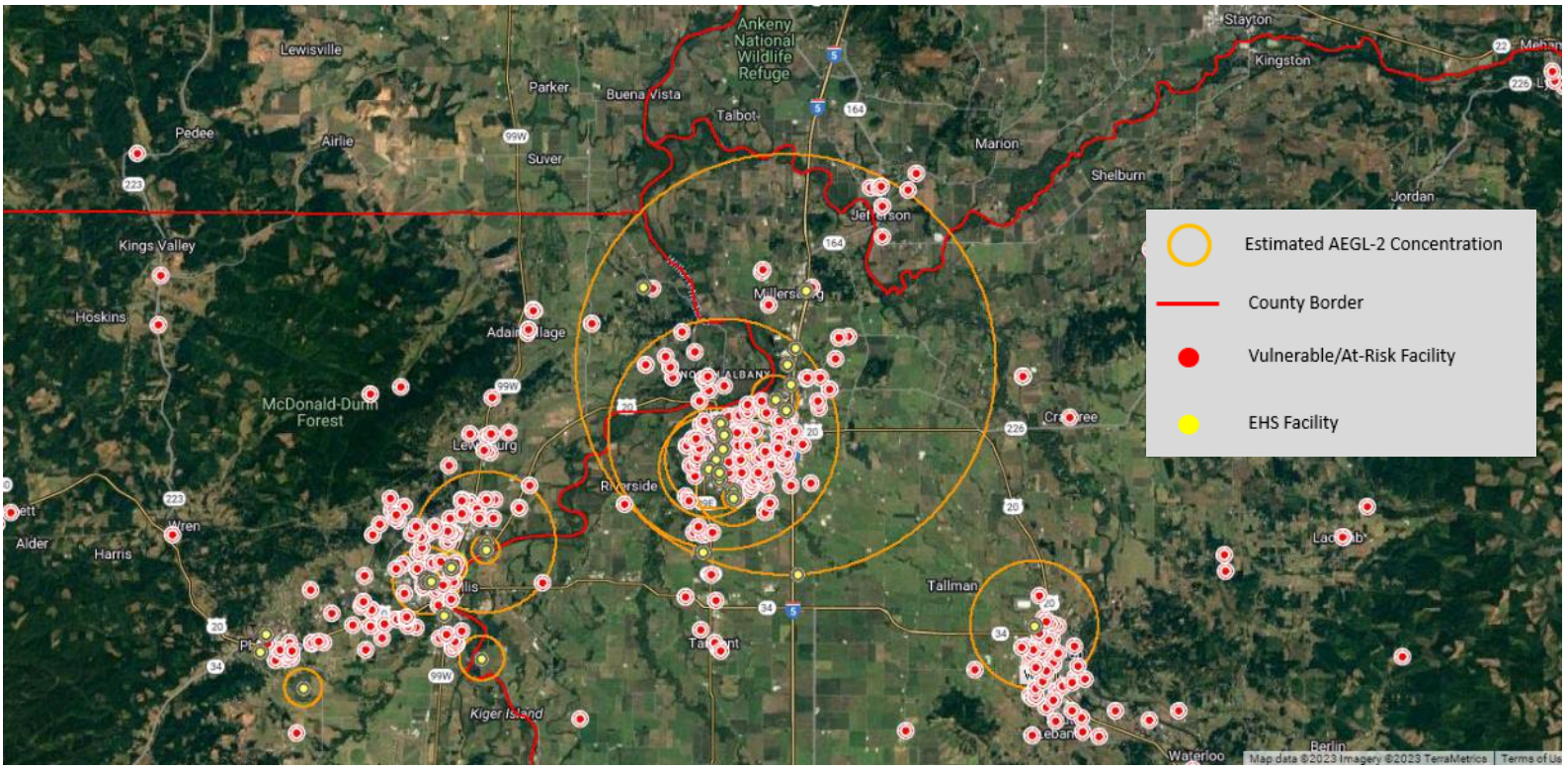


Figure 5-8: High Risk EHS Facilities in Southern Linn and Benton Counties

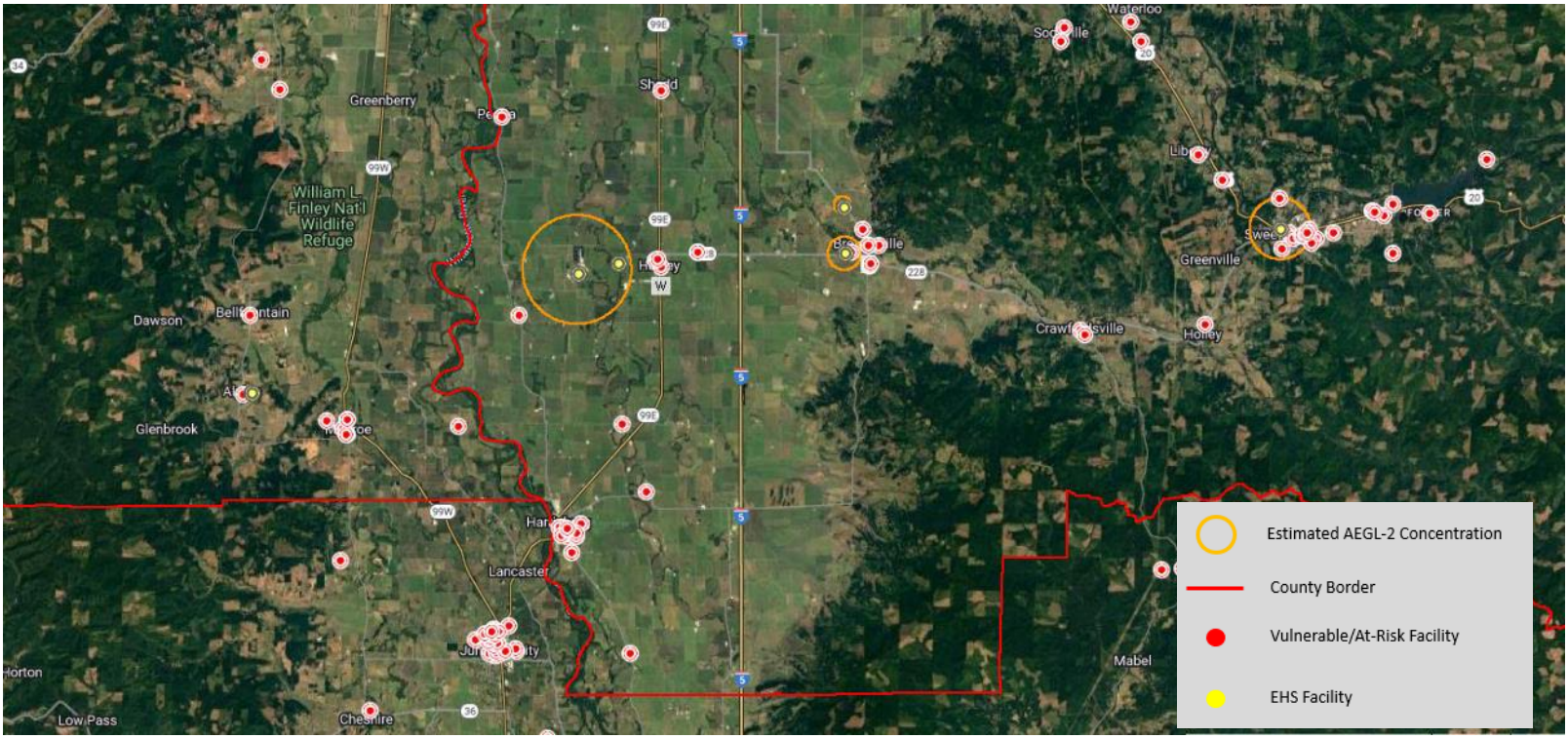


Figure 5-9: ATI Specialty Alloys and Components - 15,000 Gallon Chlorine Release

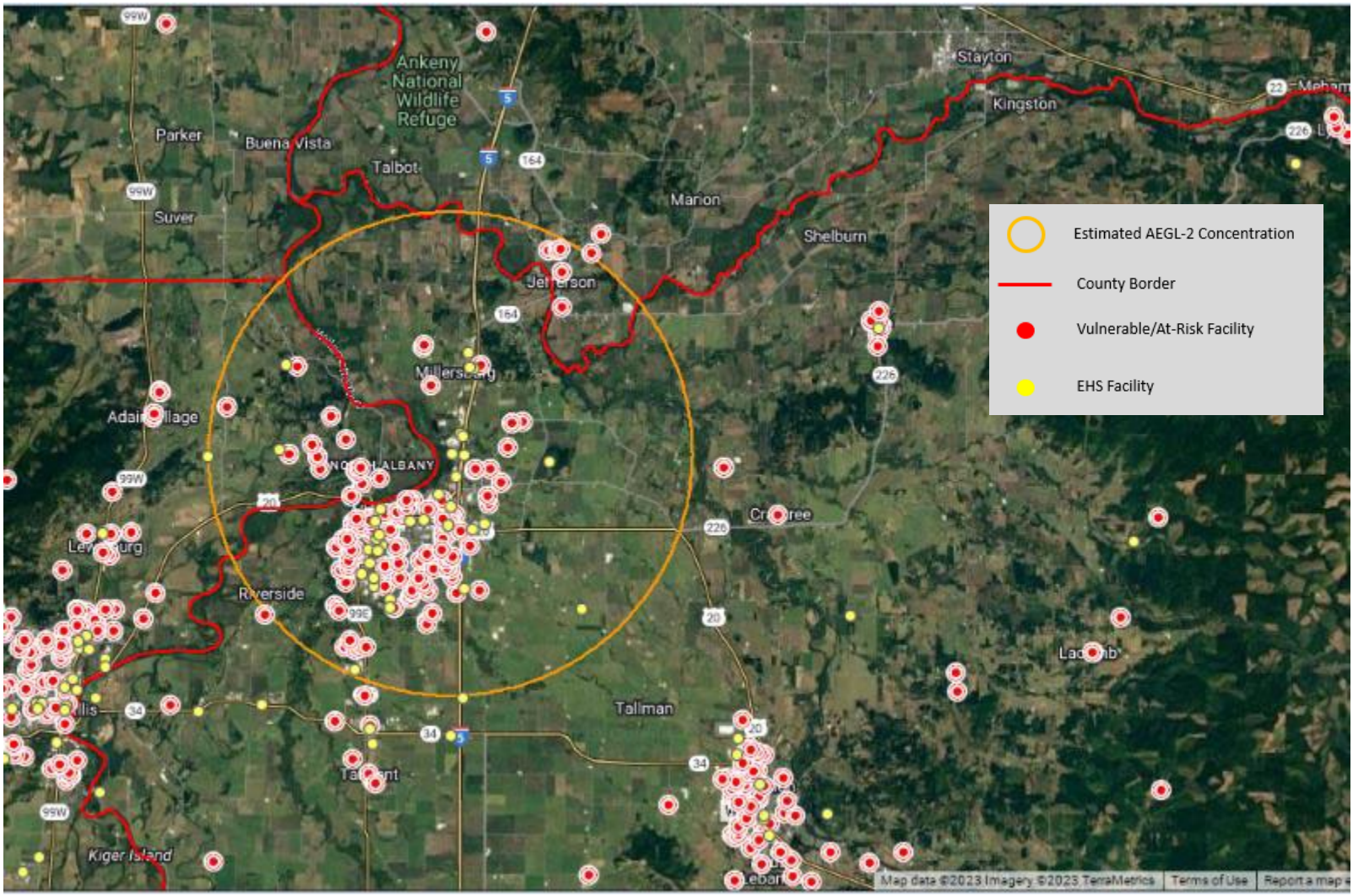


Figure 5-10: WR Grace & Co - 36,386 ft³ Hydrogen Chloride Release

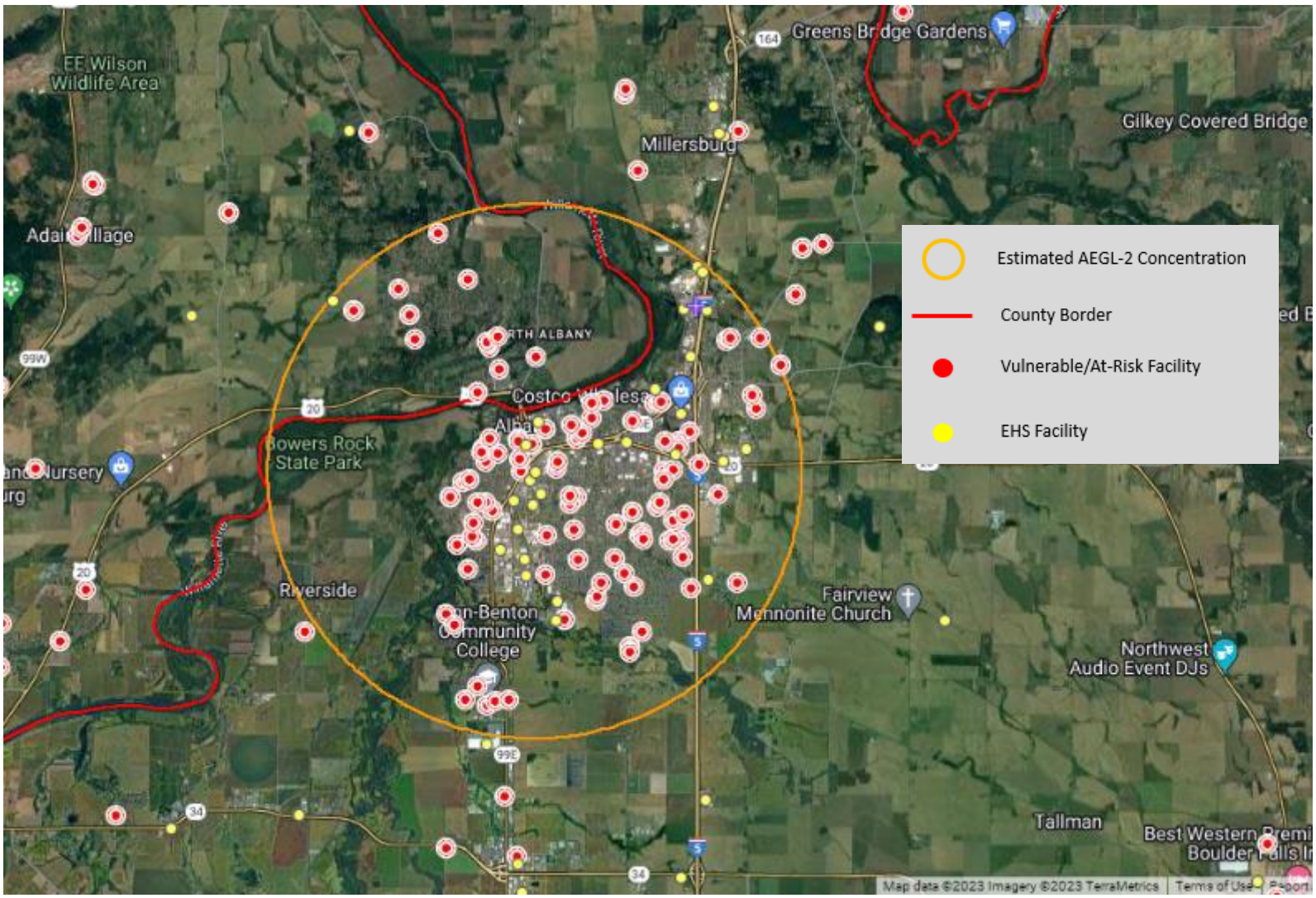
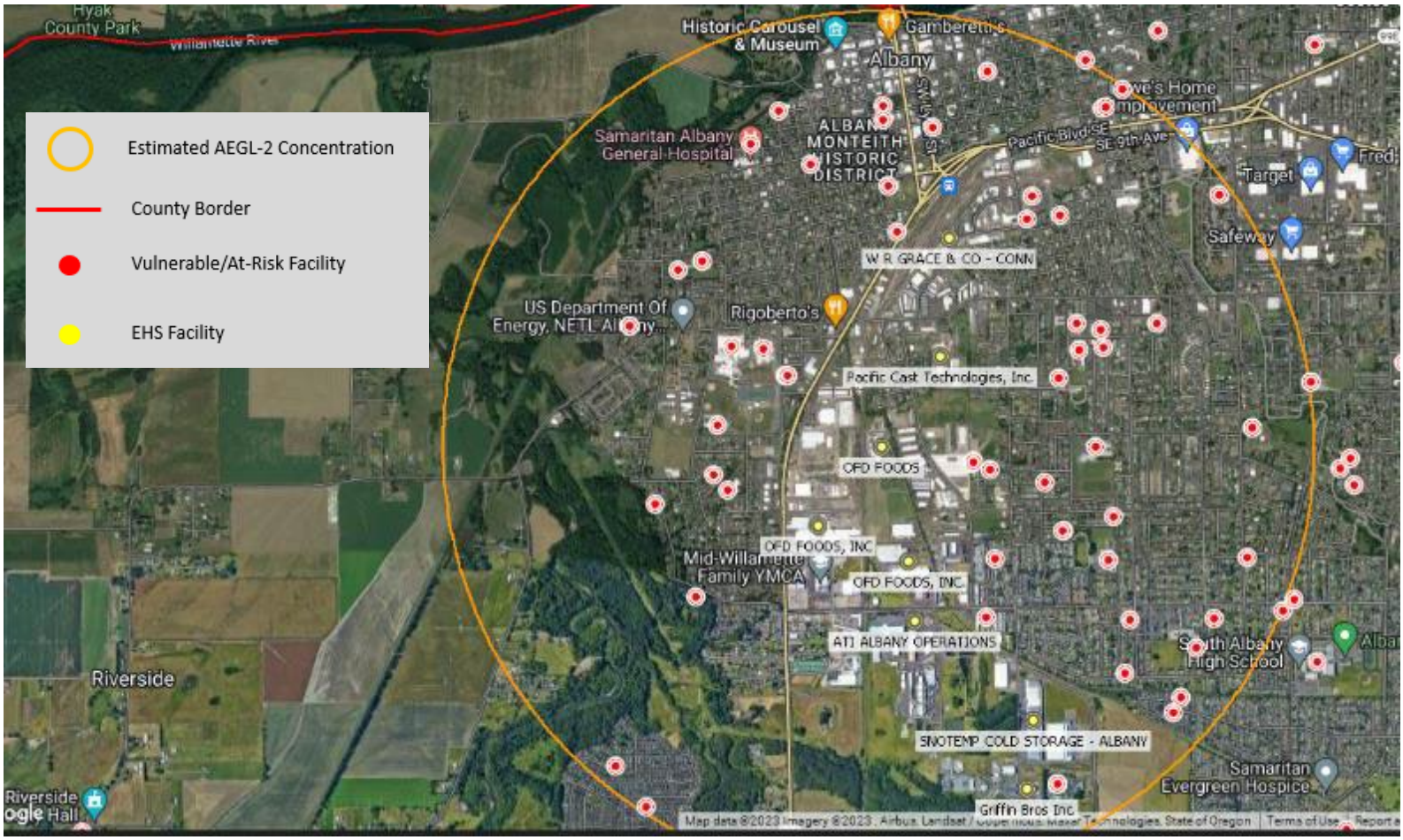


Figure 5-11: OFD Foods – 9,367 Gallon Ammonia Release



5.4 Transportation Routes for HAZMAT

Four railroad companies operate within Linn and Benton Counties. Figure 5-12 displays the railroad routes that pass through the region. Based on a phone interview, the Venell Farms Railroad Company maintains a contract with Albany & Eastern Railroad Company to transport grain and other agriculture products (non-HAZMAT) northward through Benton County. Union Pacific (UP), Portland and Western (P&W), and the Albany & Eastern railroad companies transport HAZMAT through the region.

Highway routes utilized by tanker trucks for the transportation of hazards are difficult to predict and are dependent upon where the commodity is originating from and the endpoint destination. Figure 5-13 displays the most probable highway routes to be used for the transportation of hazards through the counties. These routes include Interstate 5 and U.S. Highways 20, 34, 99E, 99W and 180.

Figure 5-12: Linn and Benton County Railroad Routes

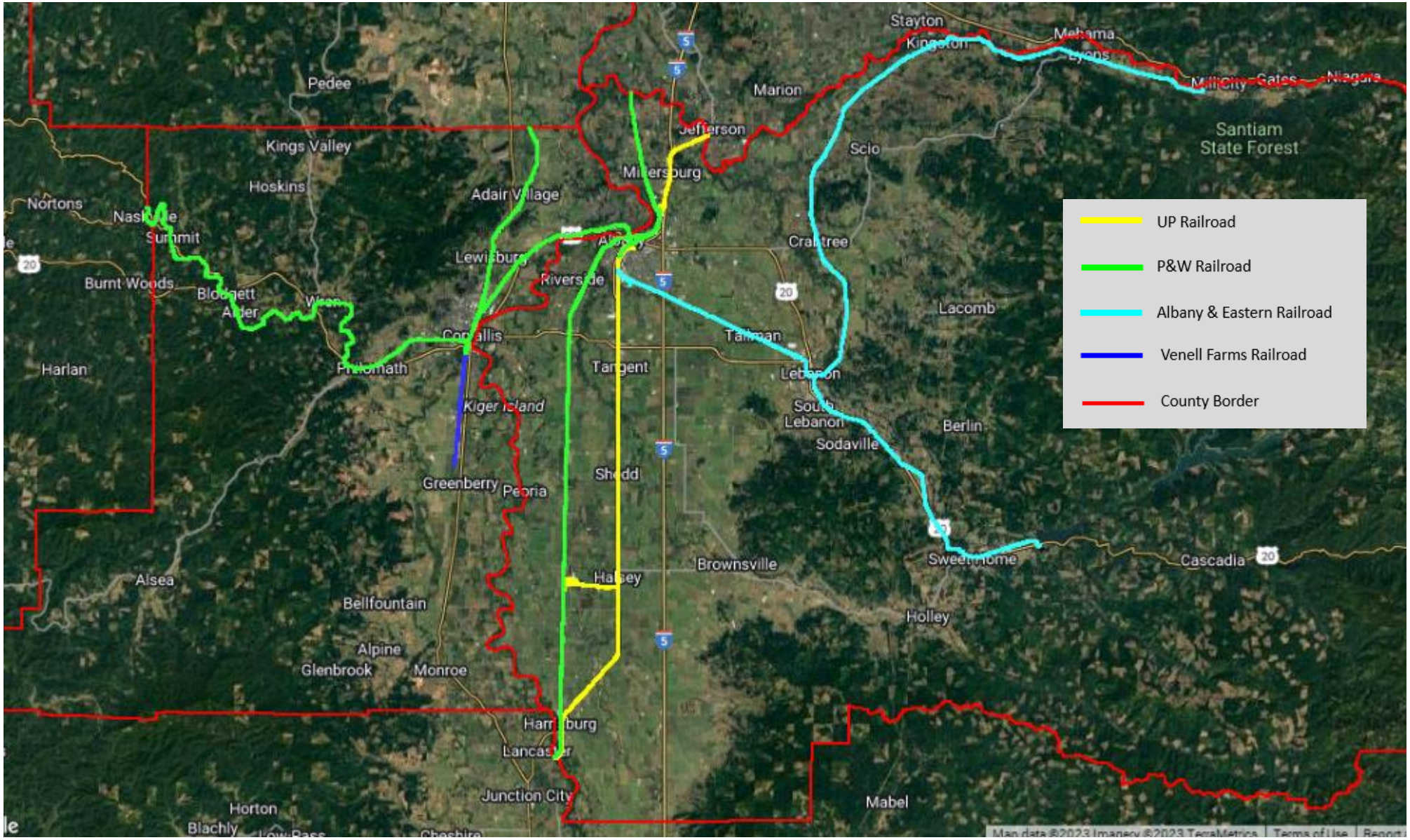
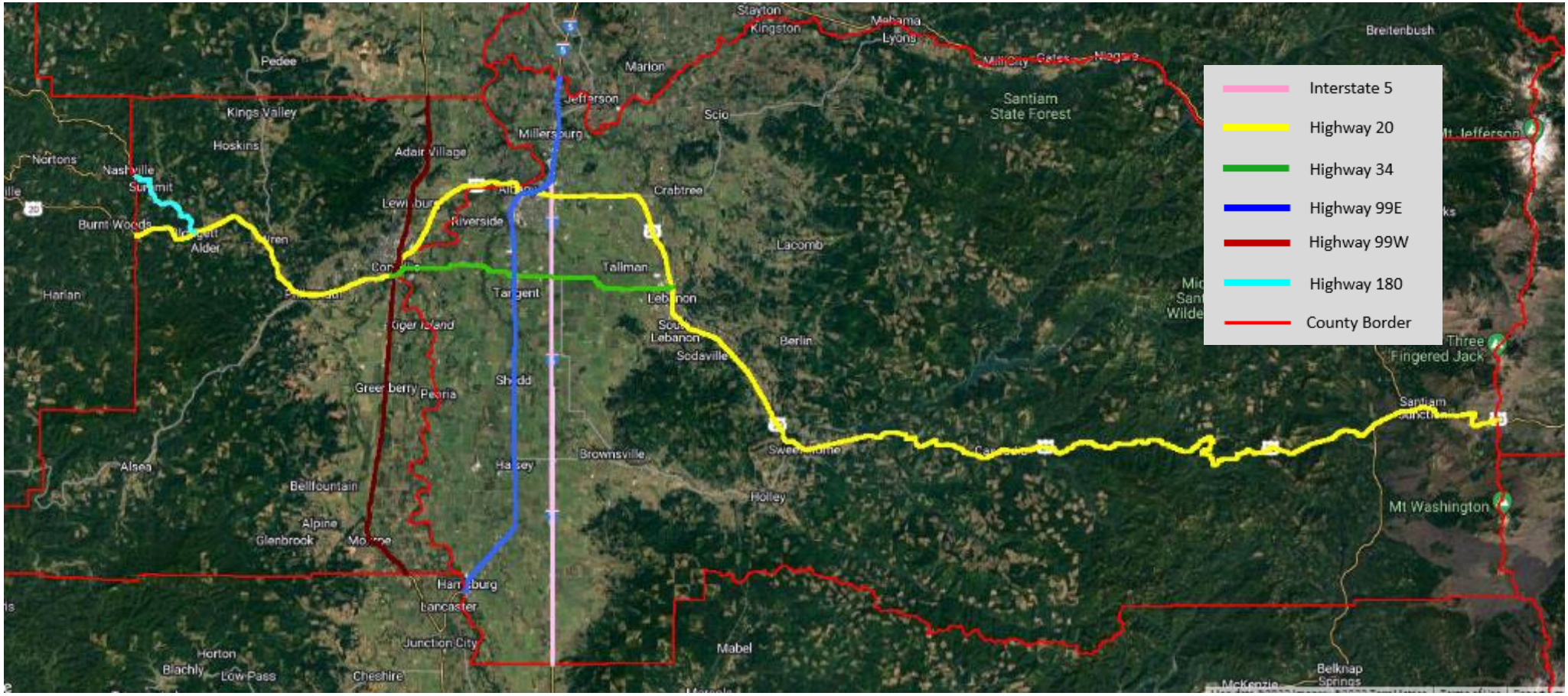


Figure 5-13: Linn and Benton County HAZMAT Highway Transportation Routes



5.5 Railroad Transportation Model Outputs

An analysis of the commodity flow density reports found that the UP Railroad, P&W Railroad, and the Albany & Eastern Railroad companies transported approximately 300 HAZMAT products accounting for more than 30,000 rail cars through Linn and Benton Counties in 2022. The top three commodities transported based on frequency included liquified petroleum gas (propane), chlorine, and ethanol. According to reports maintained by the OSFM, UP railroad transports up to two High Hazard Flammable Trains (HHFT) per week through Linn County. A HHFT is defined as a train comprised of 20 or more consecutive carloads of Class 3 flammable liquid, or 35 carloads intermittently connected throughout the entire train.

Commodity flow density report results used to support this risk assessment have not been included in this plan due to the sensitive nature of the information. Commodities and transport frequency change each year based on customer needs and demand. The 2022 reports have been provided to the Albany Fire Department, Linn County Sheriff's Office, and Benton County Sheriff's Office for reference.

Analysts used the ALOHA Program to conduct plume modeling for many chemicals identified on the commodity flow density reports to predict the severity they present if released. Table 5-14 displays the estimated downwind hazard distances as determined from the plume model release point. The orange shaded areas displayed along the railroad routes below represent the AEGL-2 airborne concentration as estimated by the ALOHA model. Analysts used the MARPLOT Program to obtain the total population within the orange shaded areas which represents the severity factor for the risk assessment. Figures 5-15 through 5-17 display the worst-case plume model results for the worst-case hazard based on severity and estimated AEGL-2 for the two primary railroad operators. Planners can zoom in on an area to identify specific facility names within the electronic MARPLOT file if desired. ALOHA model and MARPLOT files are on file at the Albany Fire Department, Linn County Sheriff's Office, and Benton County Sheriff's Office to support future response planning.

Table 5-14: ALOHA Plume Model Estimated Hazard Distances

Hazard	AEGL-1 Distance (miles)	AEGL-2 Distance (miles)	AEGL-3 Distance (miles)
15,000 Gallon Chlorine Rail Car	> 6	> 6	4
23,000 Gallon Sulfur Dioxide Rail Car	> 6	3.9	1.1
31,000 Gallon Anhydrous Ammonia Rail Car	> 6	3.7	1.9
20,000 Gallon Hydrochloric Acid (42%) Rail Car	3.4	1.1	0.6
20,000 Gallon Nitric Acid (98%) Rail Car	1	122 meters	60 meters
31,6000 Gallon Liquified Propane Rail Car	0.8	0.56	0.44
30,000 Gallon Carbon Disulfide rail car	0.78	320 meters	160 meters
30,000 Gallon Acetonitrile rail car	235 meters	120 meters	65 meters

Figure 5-15: P&W Railroad (Albany to Eugene) 15,000 Gallon Chlorine Railcar Release

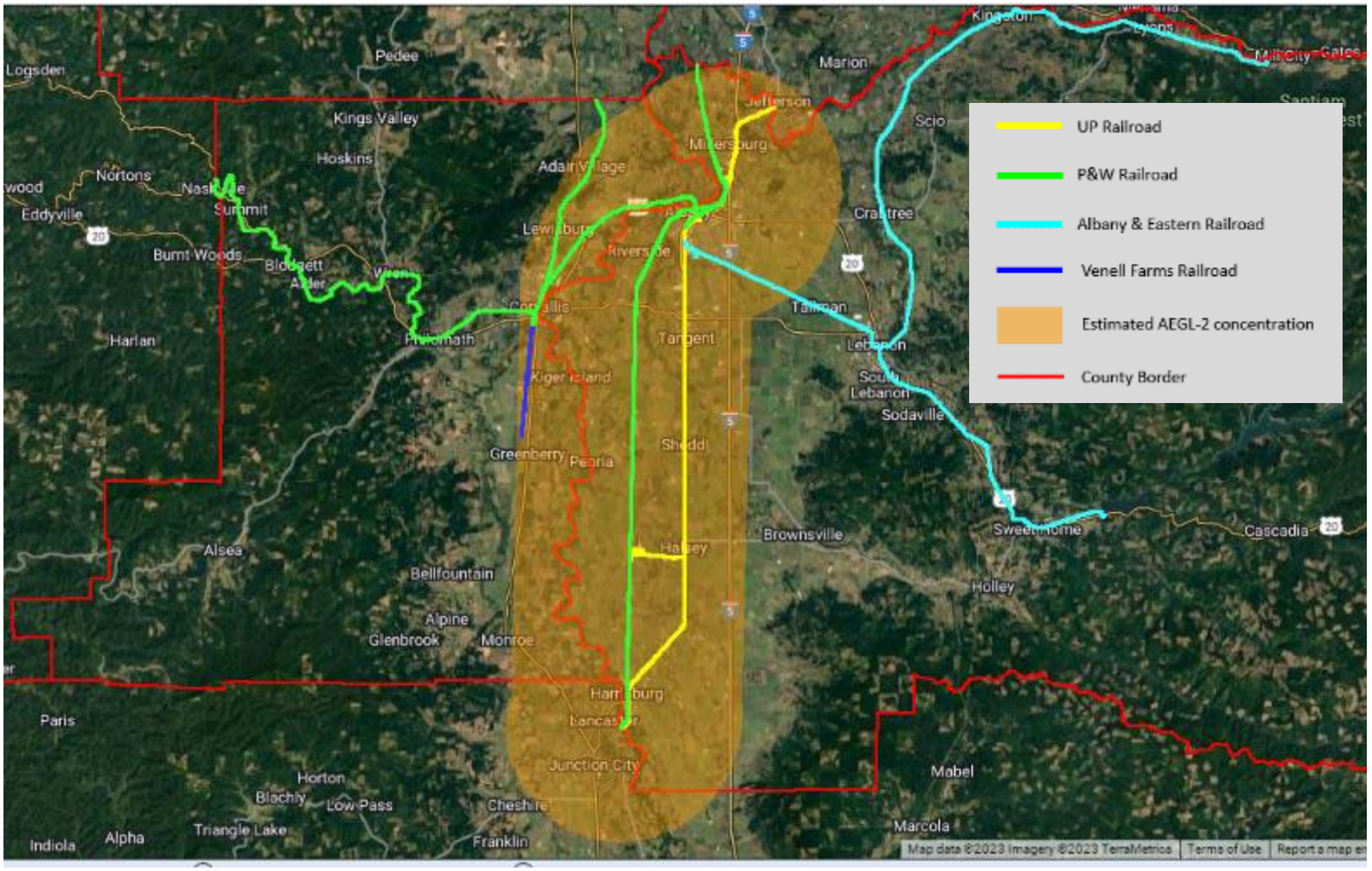


Figure 5-16: UP Railroad 23,000 Gallon Sulfur Dioxide Railcar Release

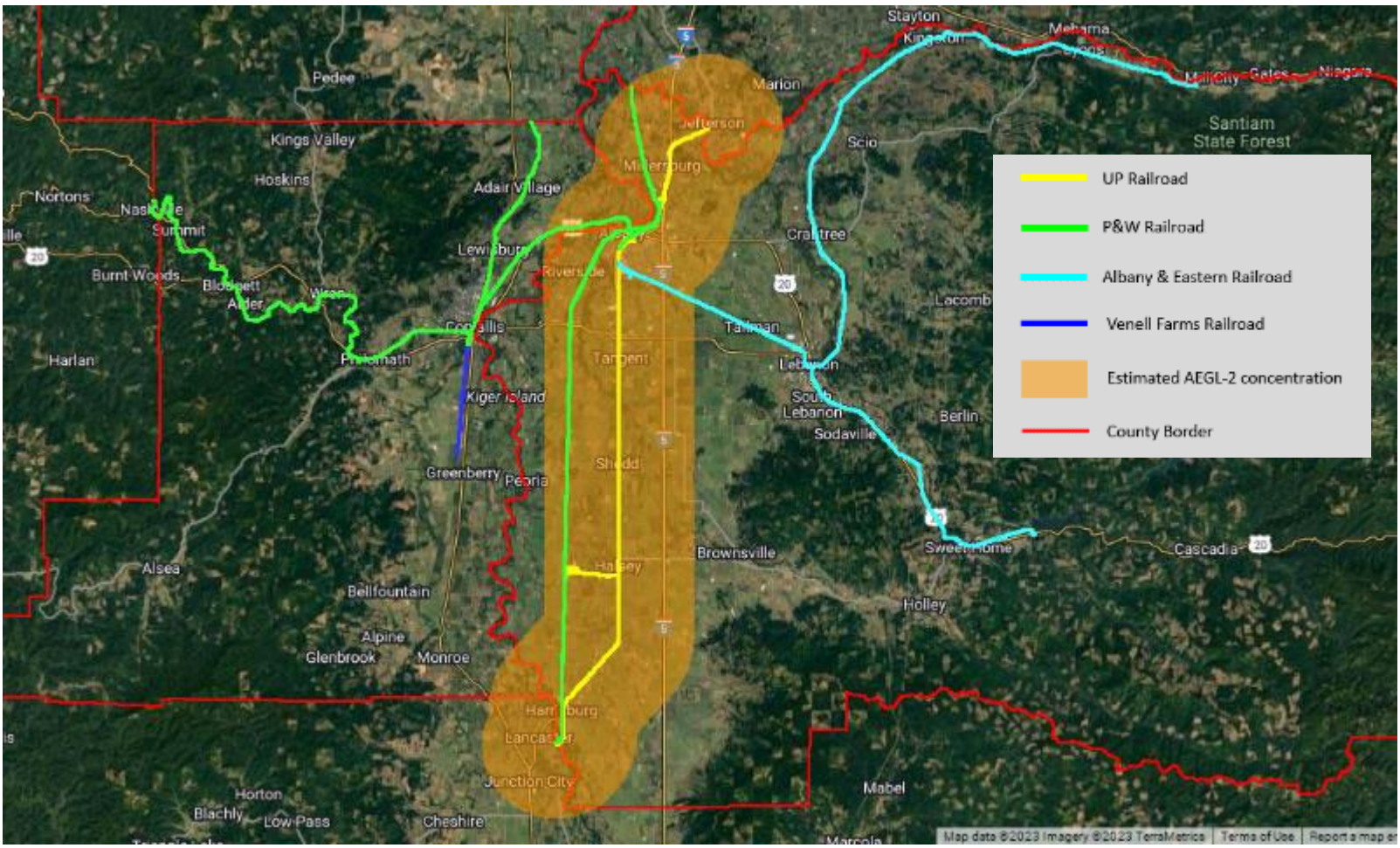
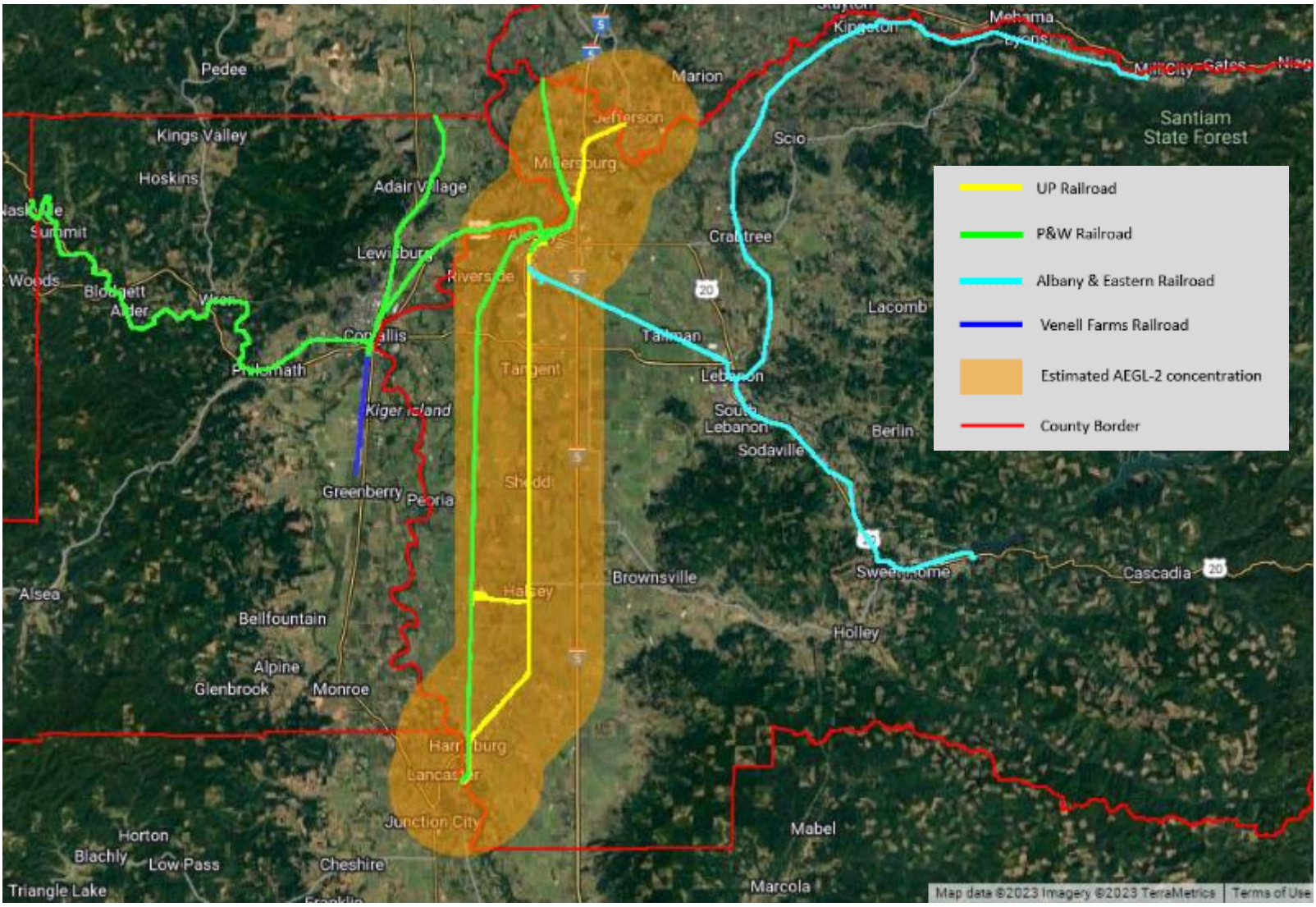


Figure 5-17: UP Railroad 31,700 Gallon Anhydrous Ammonia Railcar Release



5.6 Highway Transportation Model Outputs

Analysts conducted plume modeling for chemicals identified on submitted Tier II Reports and based on the potential toxic airborne hazards they present when released. Table 5-18 displays the estimated downwind hazard distances as determined from the plume model release point. The orange shaded areas displayed along the highway route below represent the Temporary Emergency Exposure Limit (TEEL)-2 airborne concentration contours as estimated by the ALOHA model. TEELs are established when other emergency limits such as an AEGL have not been assigned. A TEEL-2 is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, when exposed for more than one hour, could experience irreversible or other serious, long-lasting, adverse health effects or an impaired ability to escape.

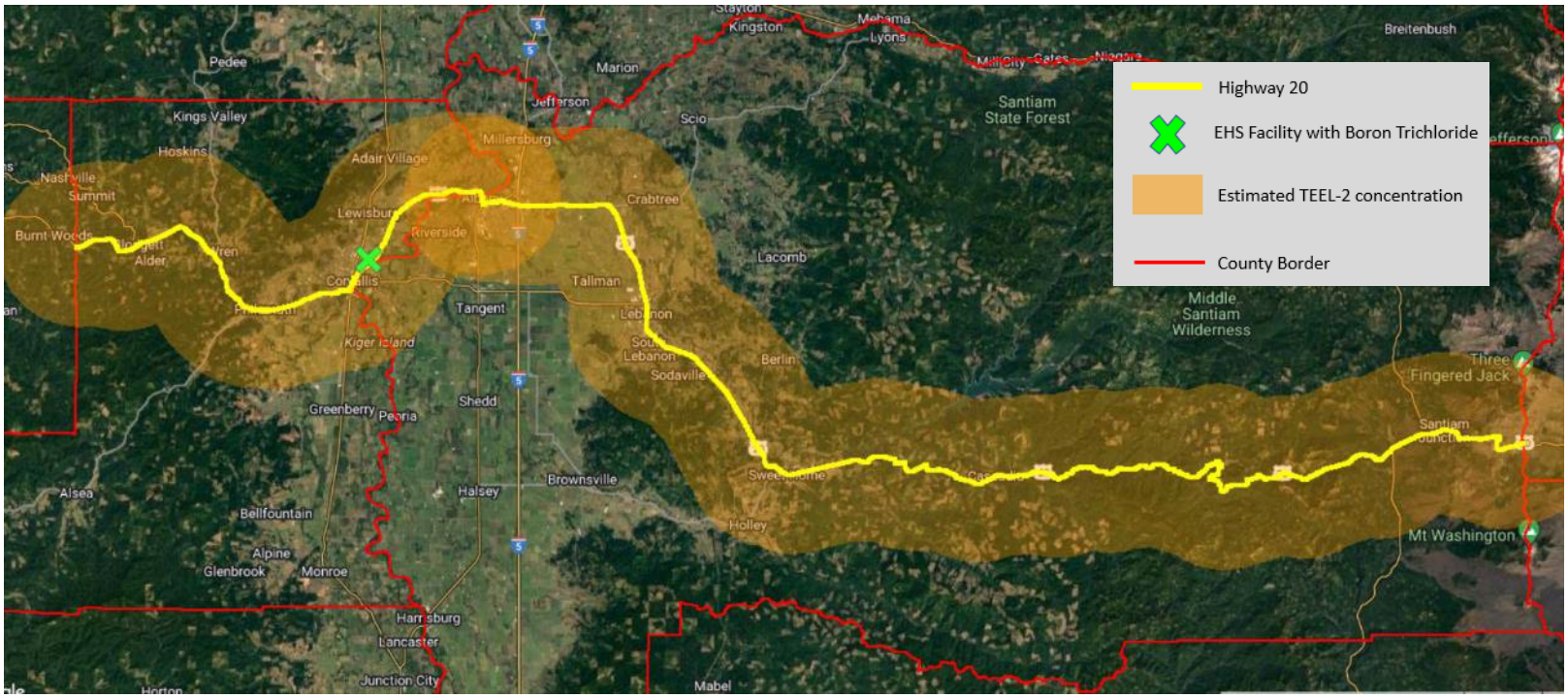
Analysts used the MARPLOT Program to obtain the total population within the orange shaded areas; the population within these areas represents the severity factor for the risk assessment. Analysts conducted plume modeling release scenarios along Interstate 5, and highways 20, 34 99W, 99E and 180. Figure 5-19 displays the worst-case plume model result for the top hazard based on severity and estimated TEEL-2 hazard areas. Planners can zoom in on an area to identify assess specific impacted areas within the electronic MARPLOT file if desired. ALOHA model and MARPLOT files are on file at the Albany Fire Department, Benton County Sheriff's Office, and Linn County Sheriff's Office to support future response planning.

Table 5-18: ALOHA Plume Model Estimated Hazard Distances

Hazard	AEGL-1 Distance (miles)	AEGL-2 Distance (miles)	AEGL-3 Distance (miles)
21,000-pound Boron Trichloride* Tanker Truck Release	> 6	4.7	0.75
8,000 Gallon Anhydrous Ammonia Tanker Truck Release	4.3	2.3	1.1
6,000 Gallon Hydrochloric Acid Tanker Truck Release	2.7	0.94	0.5
150 Pound Chlorine Cylinder Release	2	1.2	0.5
Tanker Truck Sulfur Dioxide Release (30-pound cylinder)	1.6	1	315 meters

*No AEGL established for this chemical; model results compared to the established TEEL values.

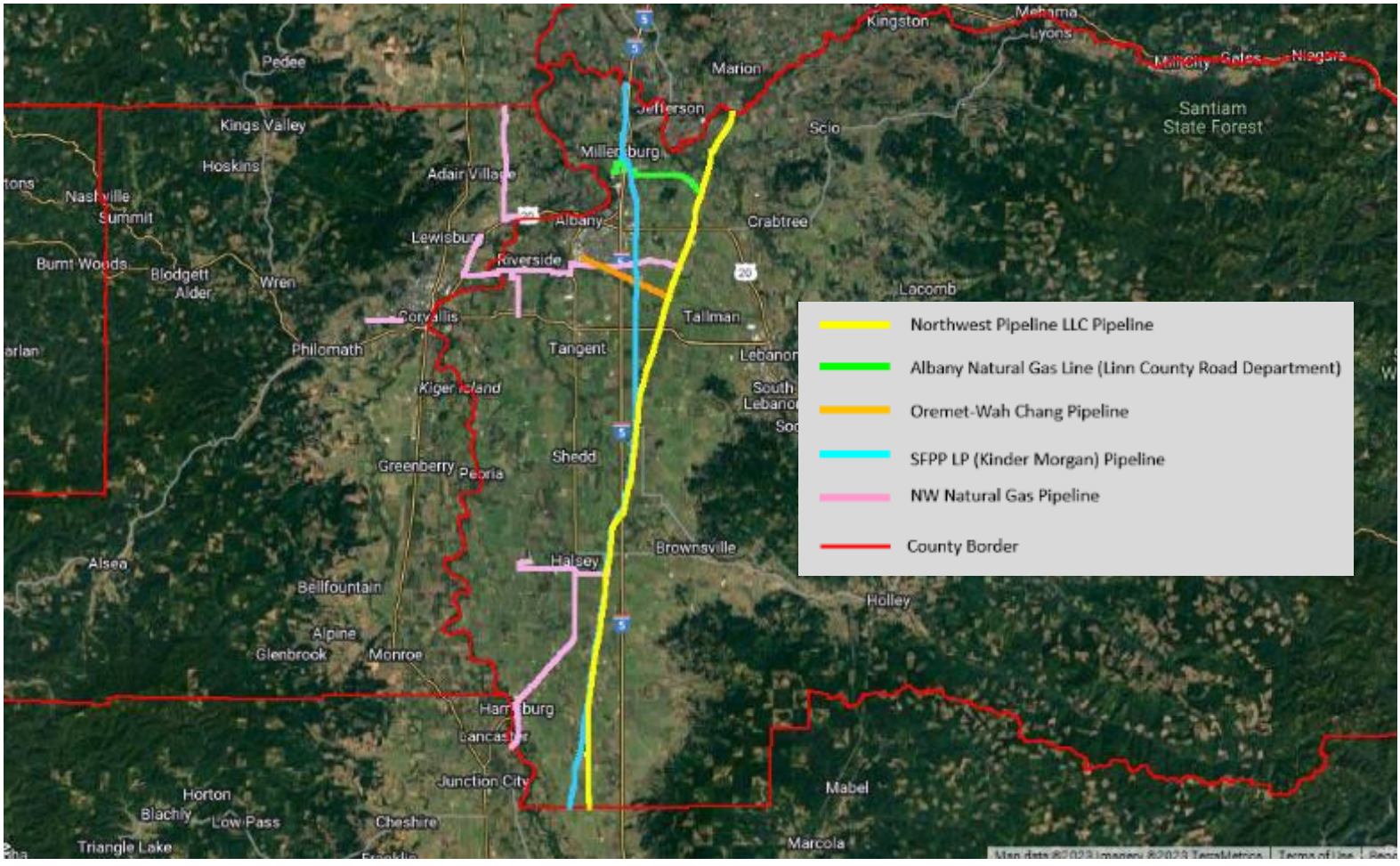
Figure 5-19: 21,000 Pound Boron Trichloride Tanker Truck Release on Highway 20



5.7 Pipelines

Several companies own and operate underground pipelines within Linn County to include Northwest Natural Gas Company, Northwest Pipeline LLC, Albany Natural Gas Line, Oremet Wah-Chang, and SFPP LP (Kinder Morgan). The Northwest Natural Gas Company also owns and operates pipeline in northern Benton County. Analysts reviewed the National Pipeline Mapping System (NPMS) Public Viewer interactive mapping tool to identify pipeline locations and commodities transported through each pipeline to include the following. The Northwest Natural Gas Company, Northwest Pipeline LLC, Albany Natural Gas Line (owned by the Linn County Road Department), and Oremat Wah-Chang pipelines are used to transport natural gas. Kinder Morgan utilizes the SPCC pipeline to transport diesel fuel (95% diesel, 5%biodiesel mixture) and unleaded gasoline. Figure 5-20 displays the underground pipeline routes within Linn and Benton Counties. Planners can zoom in on an area to identify specific route locations within the electronic MARPLOT file if desired. The MARPLOT GIS data is on file at the Albany Fire Department, Benton County Sheriff's Office, and the Linn County Sheriff's Office to support future response planning.

Figure 5-20: Benton and Linn County Pipeline Owners and Routes



5.8 Chemical Explosion and Detonations

This analysis considered the potential for flammable materials such as gasoline or propane stored in above ground storage tanks or tanker trucks to explode because of fire, detonation, accident, or other means. Based upon calculated overpressure radii distance results, a diesel fuel explosion from a railroad tanker car represents a worst-case transportation scenario with the one pound per square inch (psi) impact area estimated at 731 meters, 365 meters for the 8-psi impacted area, and 146 meters for the 100-psi impact area. The red shaded areas in figures 5-21 through 5-24 represent the 8-psi impact areas for a diesel fuel railcar explosion along county rail routes. Figures 5-25 and 5-26 display the worst-case stationary source explosion scenarios for gasoline and propane. Analysts selected these facilities based on the large quantities reported on submitted Tier II Reports and the presence of above ground storage tanks identified through satellite imagery analysis. Analysts provided the explosive overpressure calculation spreadsheet and corresponding results to the Albany Fire Department, Benton County Sheriff's Office, and Linn County Sheriff's Office to support disaster planning.

Figure 5-21: 30,000 Gallon Diesel Fuel Rail Car Explosion 8-psi Impact Area – Northern Mid-Valley LEPC Region

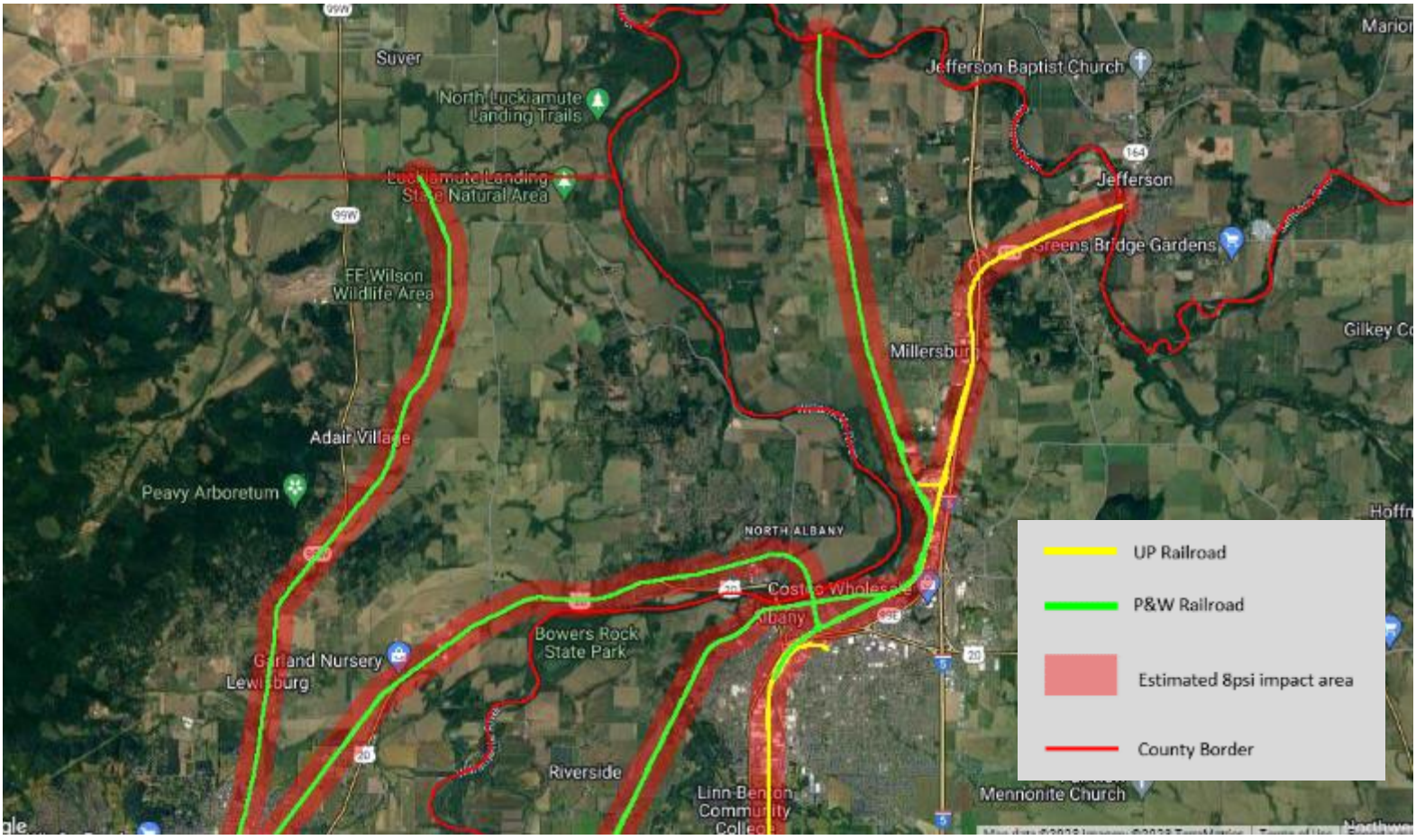


Figure 5-22: 30,000 Gallon Diesel Fuel Rail Car Explosion 8-psi Impact Area – Central Mid-Valley LEPC Region

Figure 5-23: 30,000 Gallon Diesel Fuel Rail Car Explosion 8-psi Impact Area – Southern Mid-Valley LEPC Region

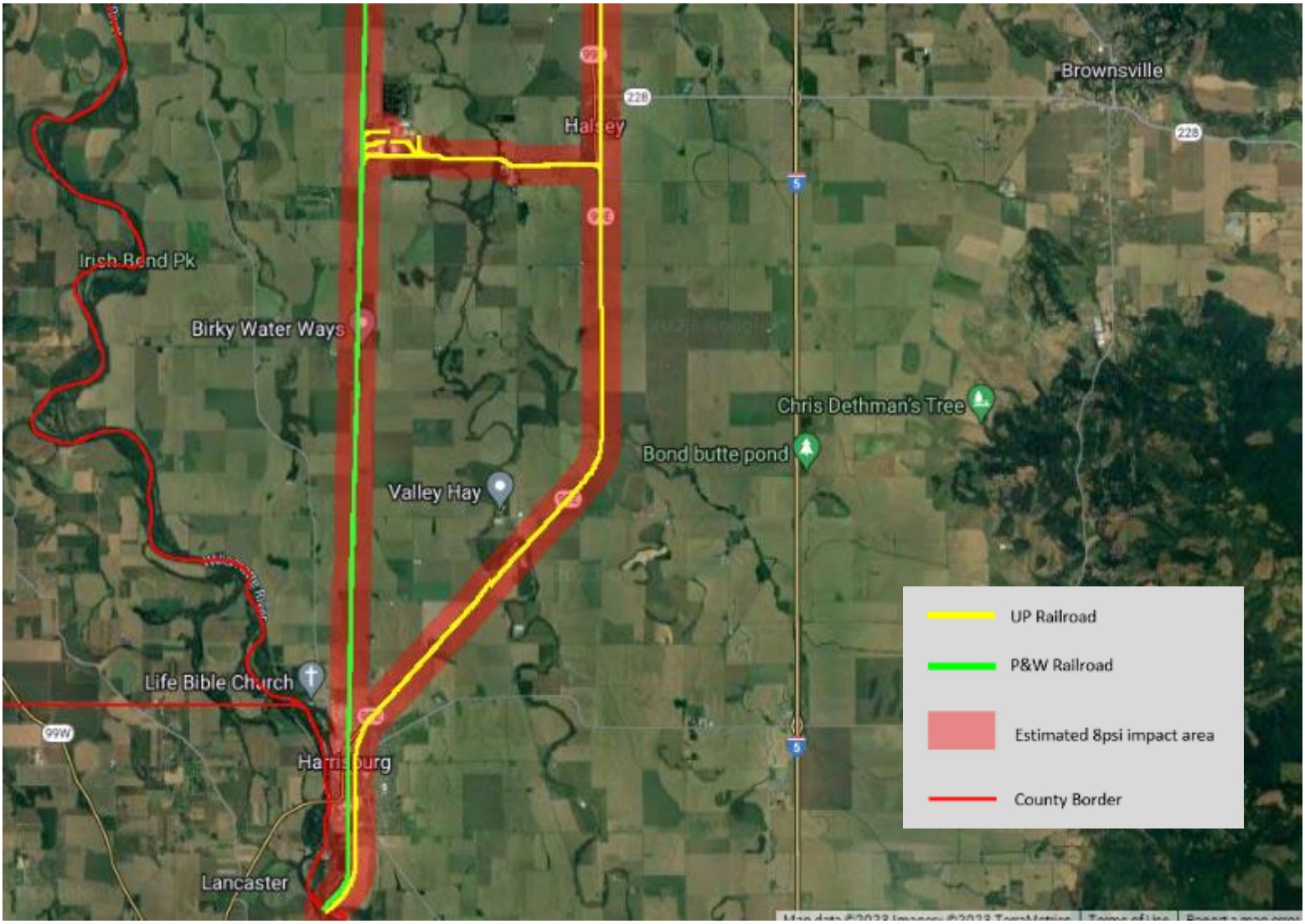


Figure 5-24: 30,000 Gallon Diesel Fuel Rail Car Explosion 8-psi Impact Area – Eastern Mid-Valley LEPC Region

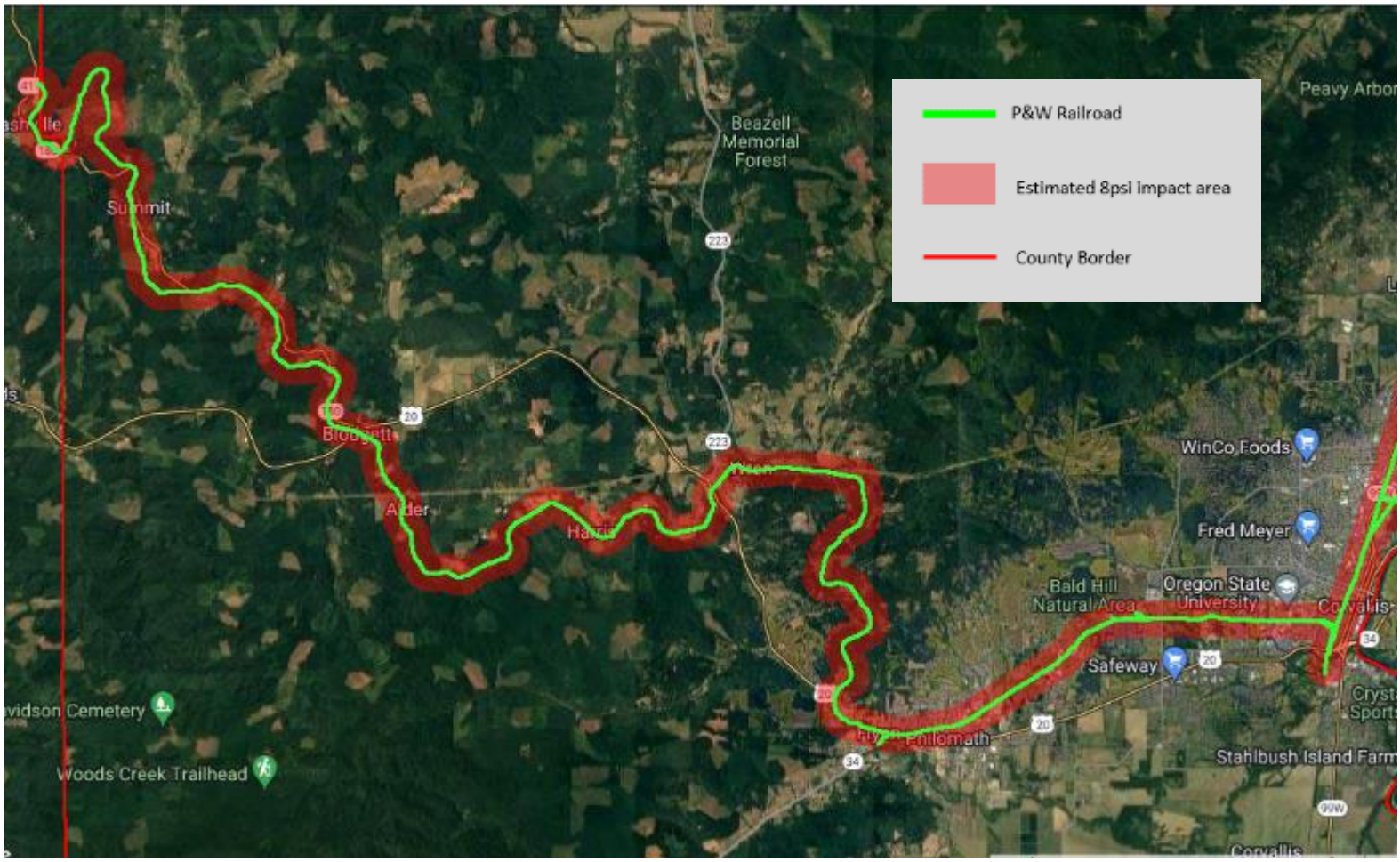


Figure 5-25: Pratum Co-op - 90,000 Gallon Gasoline Explosion

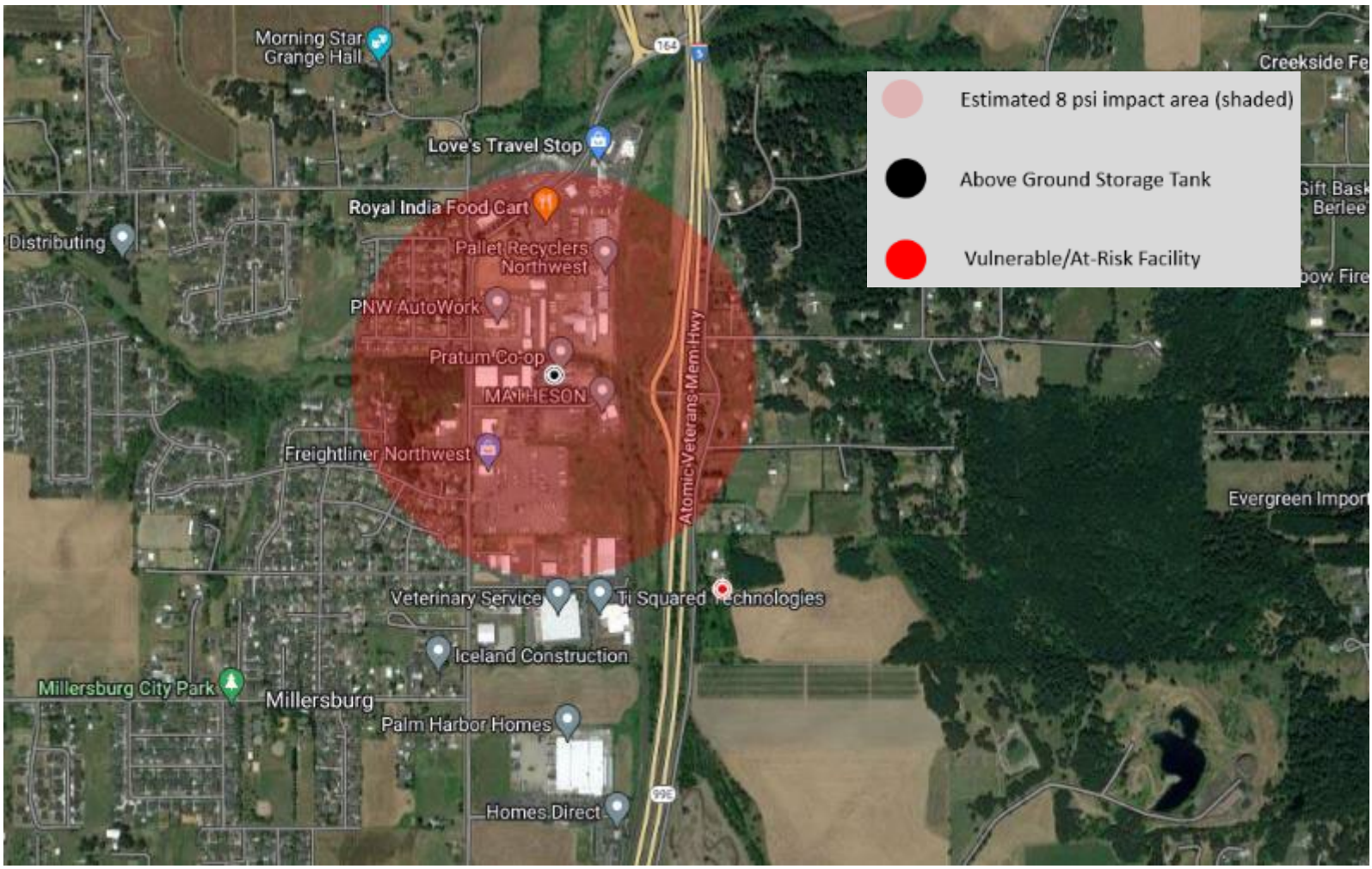
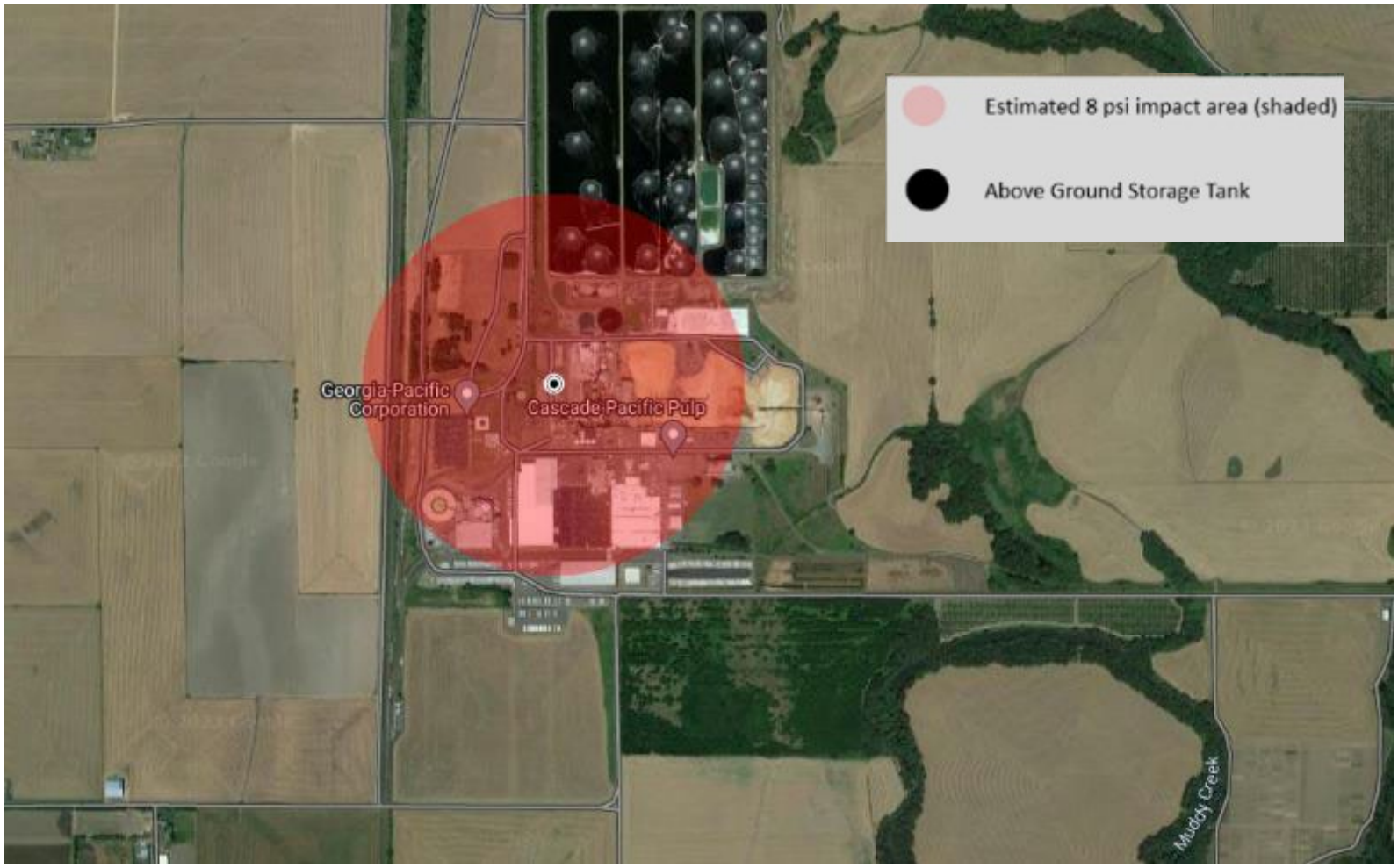


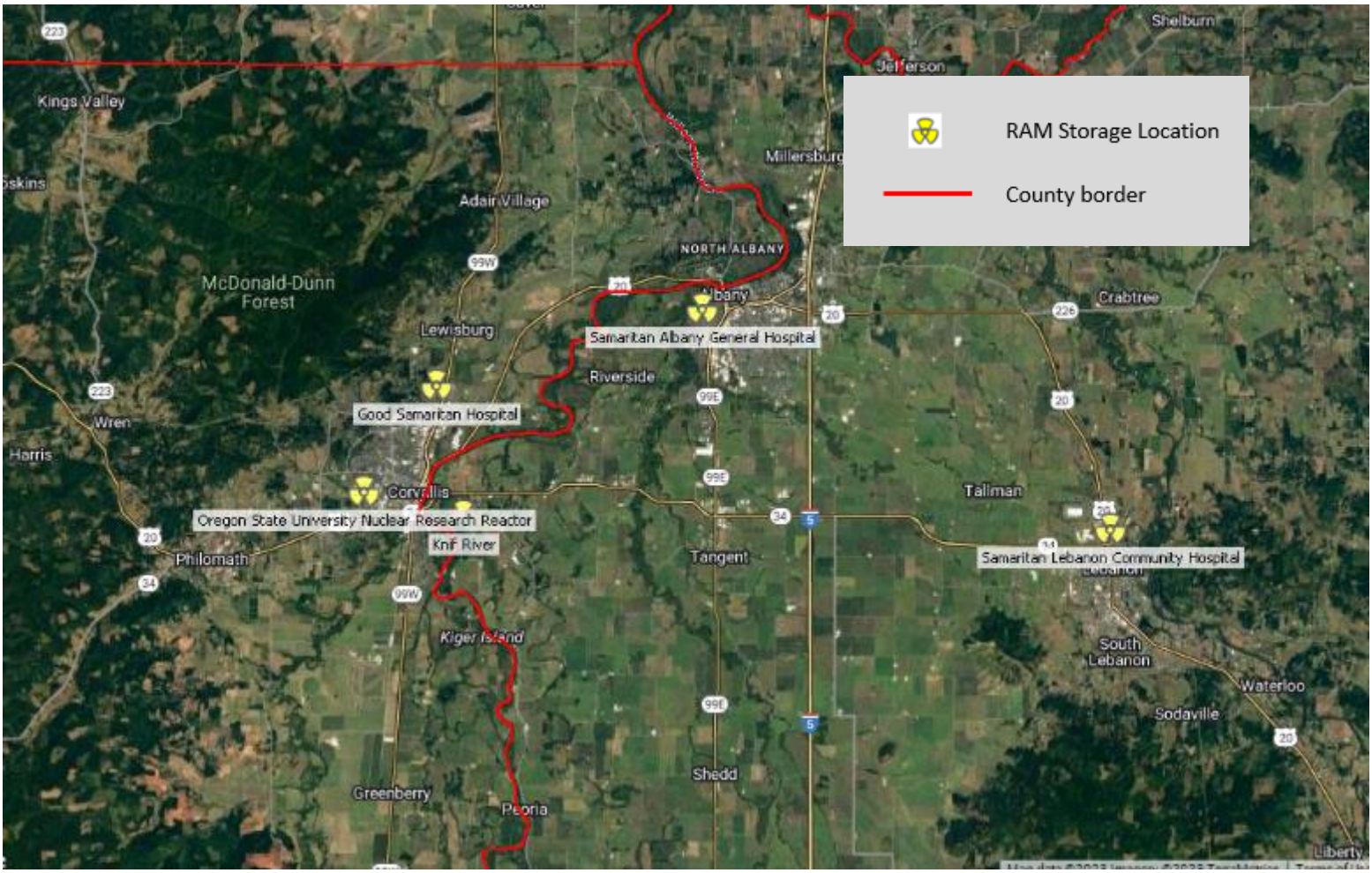
Figure 5-26: Cascade Pacific Pulp LLC - 102,850 Gallon Propane Explosion



5.9 Radioactive Materials

Figure 5-27 displays the location of Radioactive Materials (RAM) stored in Linn and Benton County based on CR2K data. The RAM identified consisted of small quantity sources found in surveying gauges. However, the Oregon State University campus maintains a Training, Research, Isotopes, General Atomics (TRIGA) reactor to train students, conduct various research products, and produce isotopes. Large medical centers likely maintain x-ray equipment and cancer treatment chemotherapy drugs containing radiation sources even though the CR2K data does not include these facilities (non-EHS). Analysts identified these facilities in the MARPLOT electronic file and included the locations in the figure below.

Figure 5-27: Linn and Benton County RAM Storage Locations



5.10 Public Protective Actions (PPAs)

When a hazard release occurs, there are two likely PPAs available to the risk manager: evacuate or shelter-in-place. Evacuation has been used to minimize public exposure to dangerous levels of chemicals for many years. When an enough time exists to safely evacuate threatened areas, it is the optimal choice. Shelter-in-place (SIP) is preferable when a leak is fast, quickly overtakes a community, or the health hazard is low.

This analysis used the Fast Local Emergency Evacuation Times (FLEET) (formerly known as the Real Time Evacuation Planning Model) Program to analyze the feasibility and evacuation impact to communities from a hazard release incident. This program estimates vehicle traffic evacuation times in the event of a disaster to include a hazard release incident. The model predicts how long it will take to evacuate a defined geographical area based on user defined input and model parameter assumptions. The model output provides responders with this estimate to support PPA decisions. For each scenario, analysts selected the following parameters:

- An evacuation participation rate of 90% of the population using all available roads with no shelters open;
- 97% of the participating population using their own vehicles (three persons per vehicle) and 3% walking from the area; and
- Daytime, work-week population with a medium non-evacuation related competing traffic flow.

FLEET captures the entire population from predetermined U.S. Census population blocks. The FLEET population data is more conservative for planning, as a buffer zone around the hazard areas will also require evacuation.

ASG analysts assessed the locations of EHS facilities identified within this plan and conducted evacuation models for three selected areas based on high-risk EHS facilities present, reported onsite hazards, and populated areas within close proximity to the facilities. These areas included: 1) residential areas just east of the ATI Specialty Alloys and Components facility; 2) residential areas east and west of the WR Grace & Co, Pacific Cast Technologies, Inc, and ODC Food facilities; and 3) residential areas located near the Entek International LLC facility in Lebanon Oregon. The FLEET models estimate that evacuating 90% of the population from each area will require approximately one to two hours. Based on this estimate, SIP is a more viable option for a HAZMAT incident occurring at facilities within these areas when worst-case winds move airborne concentrations toward populated areas. Additional factors that make SIP a more desirable option for these scenarios include the length of time required to make notifications.

Based upon the calculated average annual wind speed (5.2 mph), residents located two miles downwind of a HAZMAT release incident site will have approximately 30 minutes to safely evacuate while populations five miles away will have about 75 minutes to safely evacuate. Figures 5-28 through 5-31 display the evacuation time estimates following a HAZMAT incident for selected area.

Figure 5-28: FLEET Evacuation Estimate for Areas Near the ATI Specialty Alloys & Components Facility

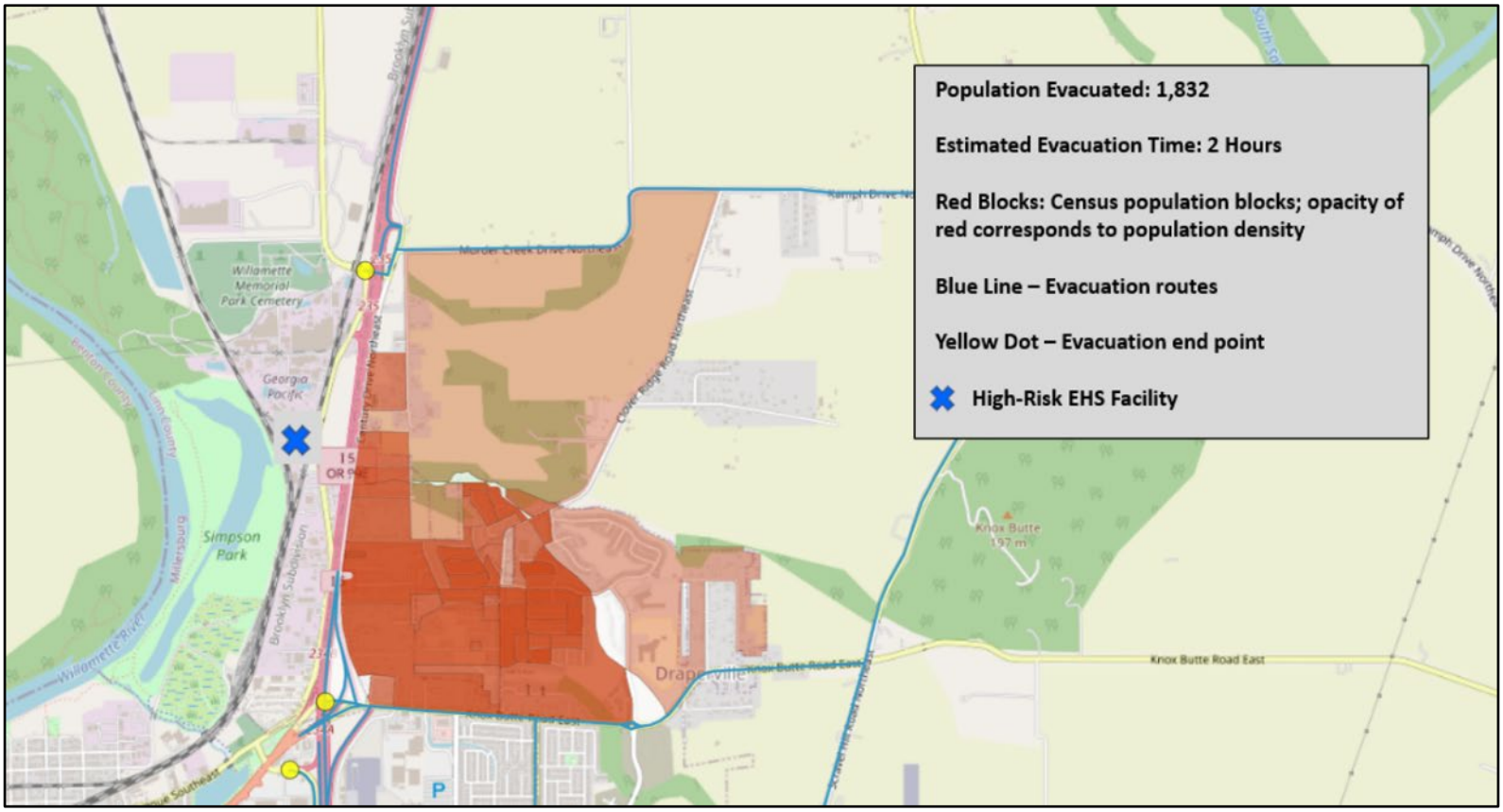


Figure 5-29: FLEET Evacuation Estimate for Residential Areas Located East of High-Risk EHS Facilities (W.R Grace & Co, Pacific Cast Technologies, Inc, and OFC Food Facilities)

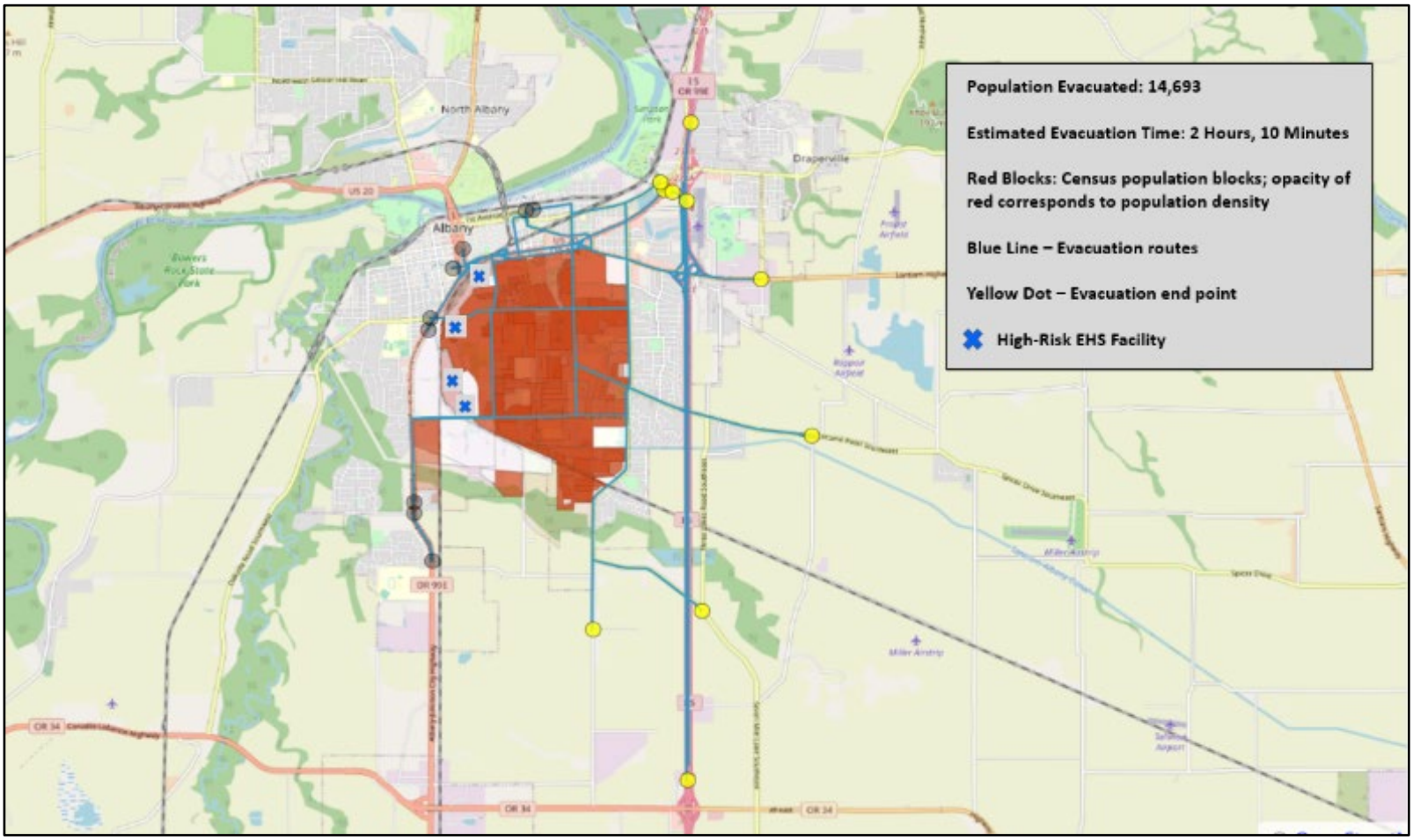


Figure 5-30: FLEET Evacuation Estimate for Residential Areas Located West of High-Risk EHS Facilities (W.R Grace & Co, Pacific Cast Technologies, Inc, and OFC Food Facilities)

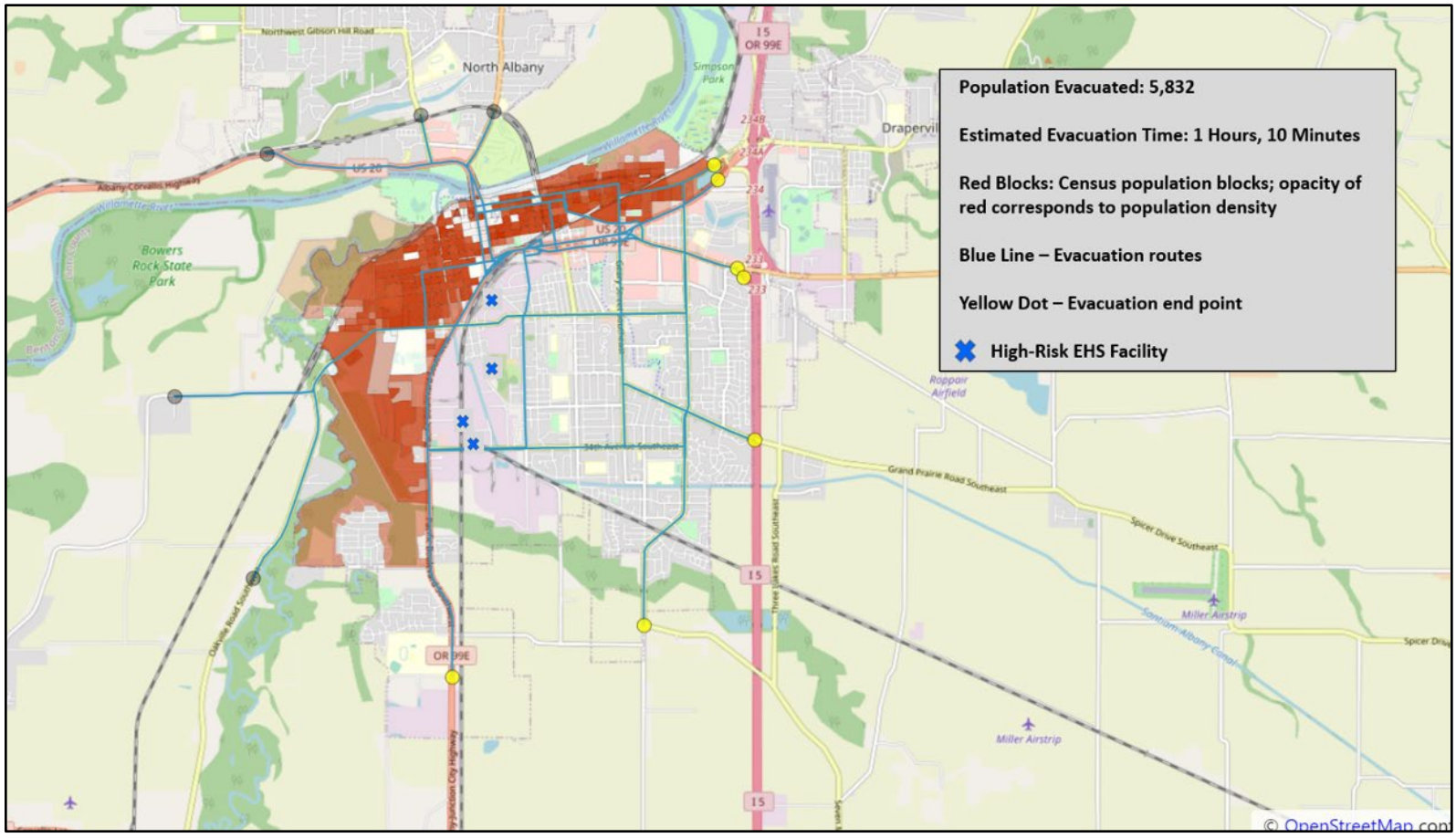
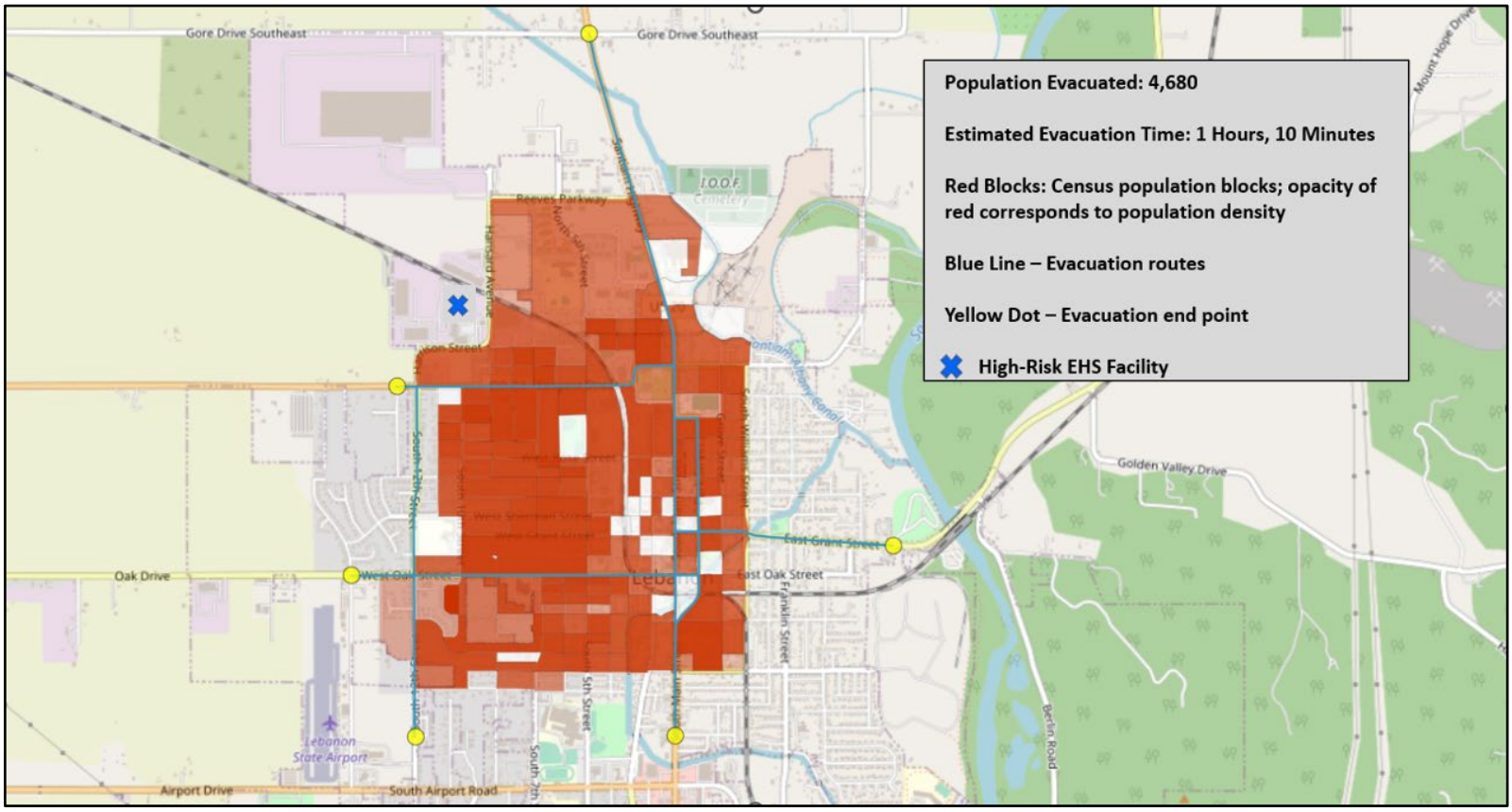


Figure 5-31: FLEET Evacuation Estimate for Areas near the Entek International LLC Facility



5.11 Drinking Water Vulnerability

A review of the Oregon Drinking Water Protection Program online interactive mapping tool revealed that both groundwater supplied by wells and surface water serve as the primary drinking water sources for many areas within Linn and Benton Counties. Based on research, approximately 8,800 household rely on individual household wells for drinking water in Benton County. Fifty-three public water systems serve remaining residents. Public drinking water systems utilize water from aquifers, lakes, reservoirs, and rivers.

ASG obtained community water system (CWS) wells and smaller service well locations from the Benton County GIS Office and imported this data as a layer into the MARPLOT GIS tool. Figures 5-33 through 5-36 below display the approximate locations of groundwater well locations and EHS facilities in the Mid-Valley LEPC region. While the figures display many CWS and service well locations along primary HAZMAT transportation routes and populated areas, they do not account for all wells within the region such as a residential or business well. An analysis revealed that many EHS facilities are situated within designated source water protection areas. Analysts queried the Oregon Water Resources Department records and identified a large variation in well depths across the region. Impacts to groundwater sources from a HAZMAT spill are dependent on the spill location's proximity to the well, well depth, and soil composition. The risk of HAZMAT contamination to the water supply following a spill is minimal when cleaned up promptly. Table 5-32 displays a listing of EHS facilities that are located within a designated well water protection area.

Many municipalities such as Albany, Corvallis, Lebanon, and Philomath (not all inclusive) rely on surface water as the primary source for drinking water. These include surface water intake points along the Santiam River, Santiam-Albany Canal, Willamette River, and Rock Creek Watershed (listing not all inclusive). Analysts were not able to verify exact intake locations; however, these are maintained by the Oregon Health Authority (OHA) who makes emergency notification to a CWS in the event of a HAZMAT release as described in Section 7.2 below. ASG provided the MARPLOT Program file to the Albany Fire Department, Benton County OEM, and the Linn County OEM and enables response stakeholders to zoom into the well locations and designated well protection areas if desired.

Table 5-32: High-Risk EHS Facilities Located within Designated Well Water Protection Areas

Facility Name	County	Address
B&R Auto Wrecking	Linn	1052 Goldfish Farm Road SE Albany, OR 97322
Brar Inc.	Linn	33166 SE Highway 34 Albany, OR 97322
City of Philomath	Benton	524 N 11th Street Philomath, OR 97370
Comcast of Oregon	Benton	150 NW Lewisburg Ave. Corvallis, OR 97330
Falls Creek Hydroelectric Facility	Linn	50440 Long Ranch Roach Cascadia, OR 97329
Fir View Water Company	Benton	4175 NW Ridgecrest Ave. Albany, OR 97321
Gheen Irrigation Works, Inc.	Linn	455 Peoria Road Harrisburg, OR 97446
Nutrien Ag Solutions	Linn	32092 E Old Highway 34

Facility Name	County	Address
		Tangent, OR 97389
Stahlbush Island Farms, Inc.	Benton	3122c Stahlbush Island Road Corvallis, OR 97333
T-Mobile	Benton	100 W Alder Street Alsea, OR 97324
T-Mobile	Linn	495 Territorial Street Harrisburg, OR 97446
T-Mobile	Linn	29844 Highway 34 SW
T-Mobile	Linn	1259-1555 Linwood Drive Albany, OR 97321
T-Mobile	Linn	3626 Three Lakes Drive Albany, OR 97322
Valley Agronomics LLC	Linn	560 Lassalle Street Harrisburg, OR 97446
Wilco Farmers	Linn	2950 S Santiam Highway Lebanon, OR 97355

Figure 5-33: Northern Benton County Drinking Water Well Locations

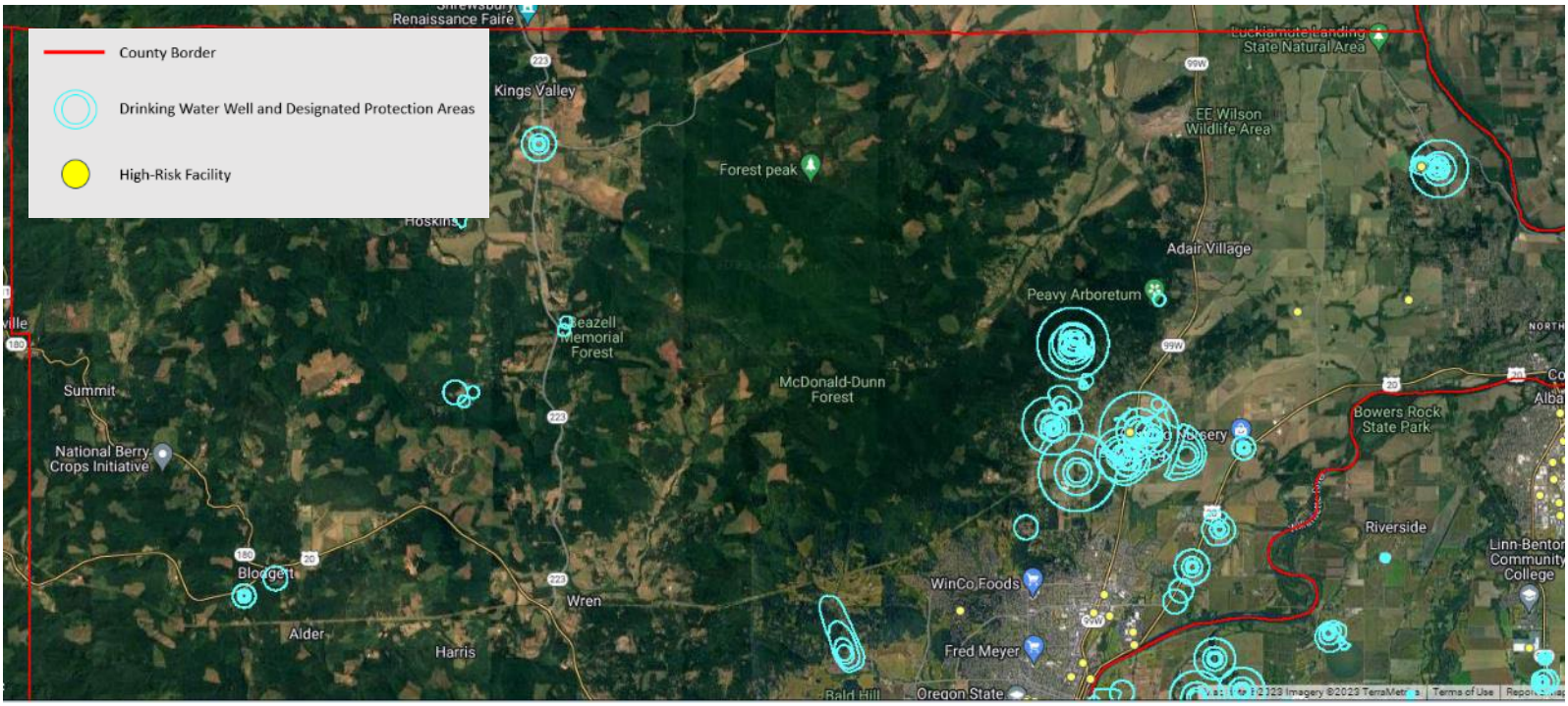


Figure 5-34: Southern Benton County Drinking Water Well Locations

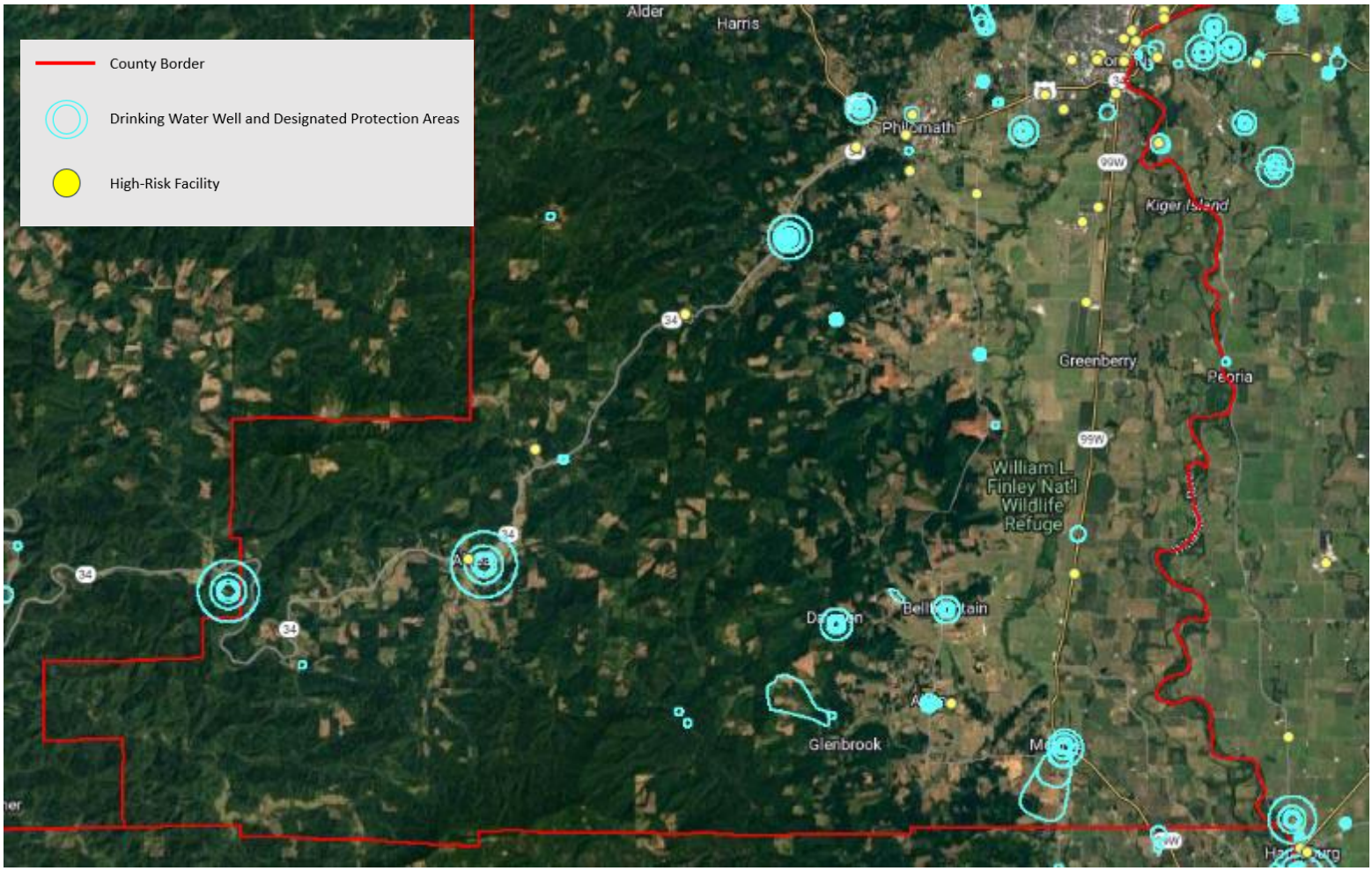


Figure 5-35: Northern Linn County Drinking Water Well Locations

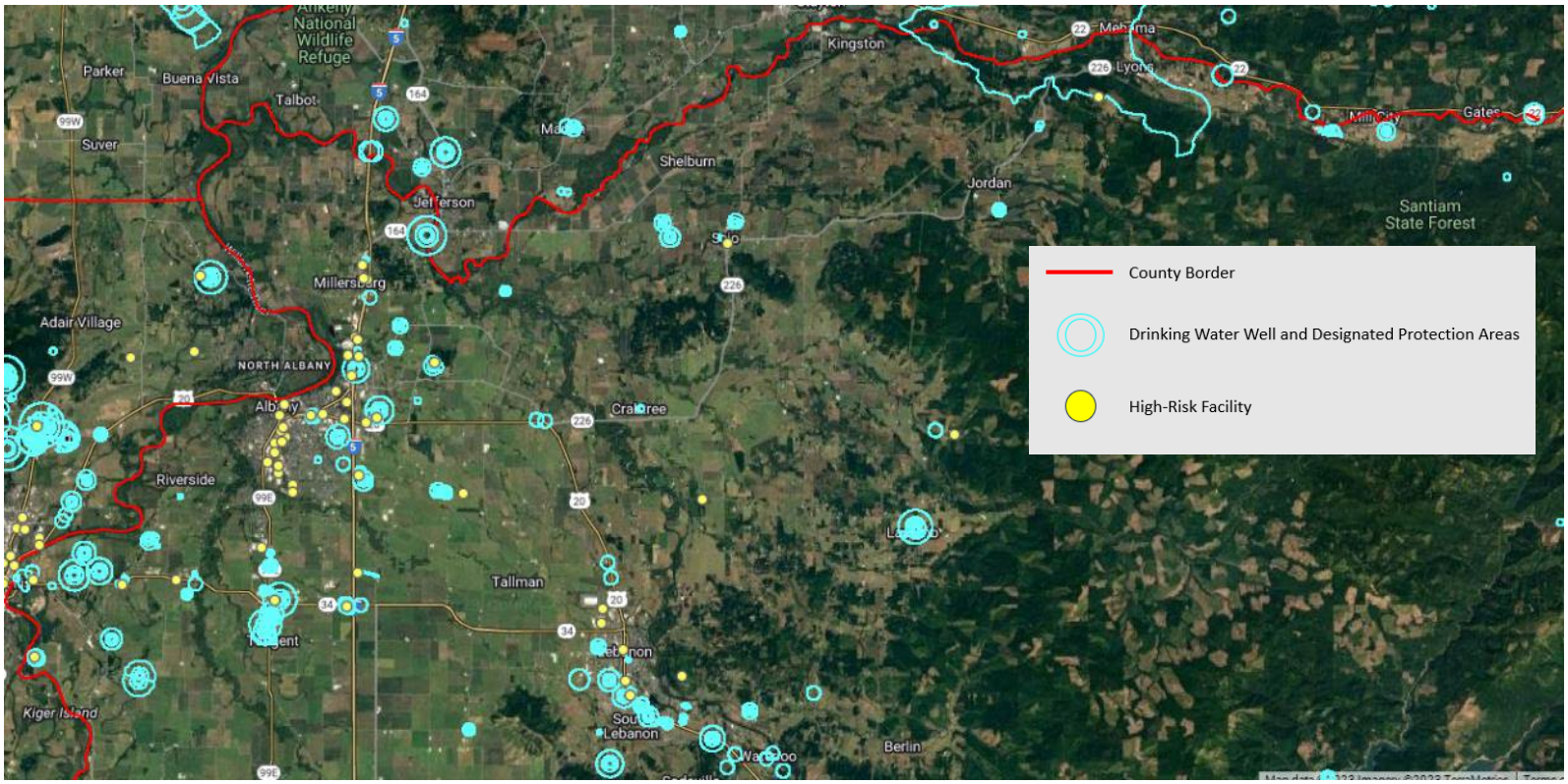
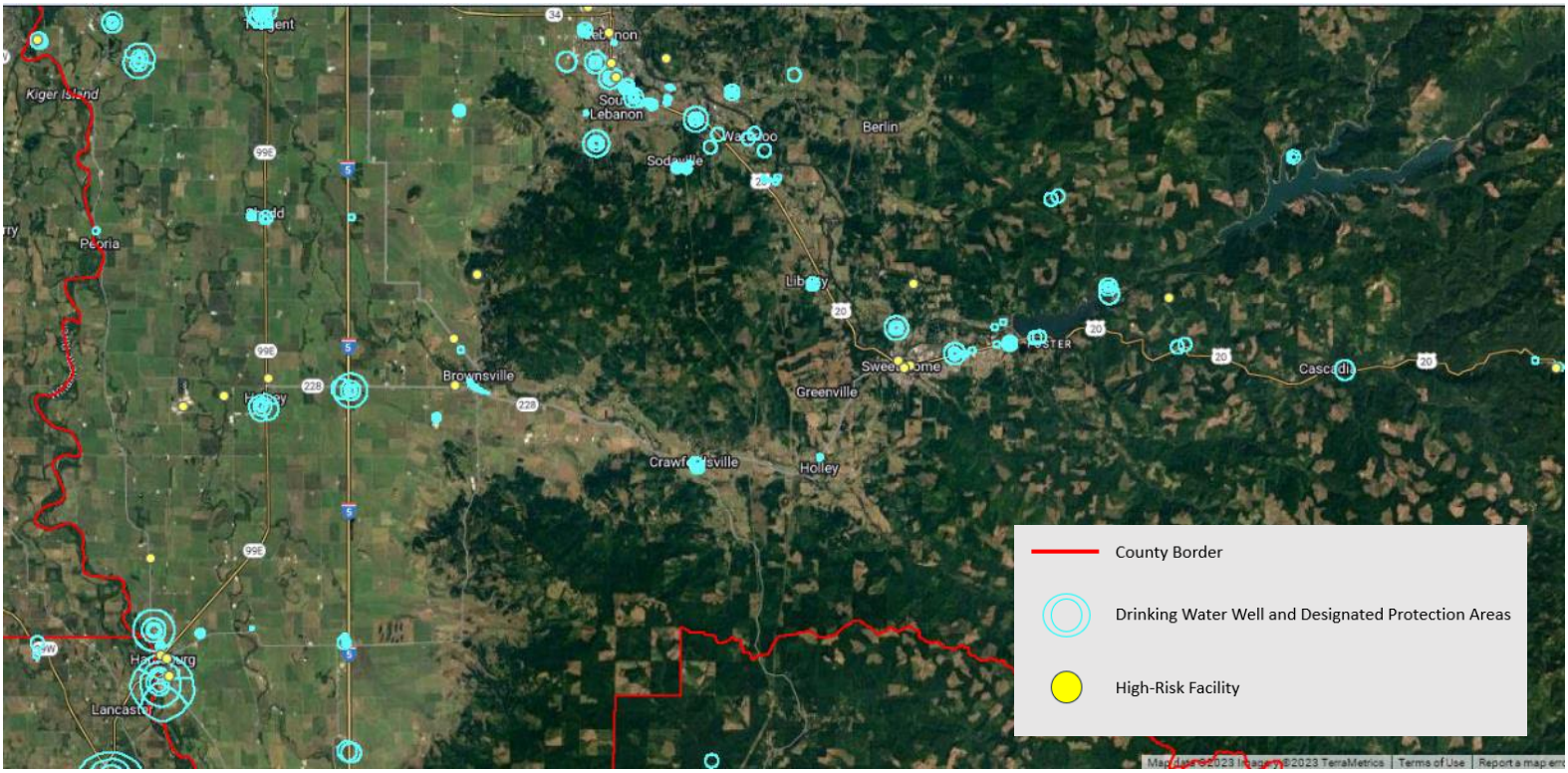


Figure 5-36: Central Linn County Drinking Water Well Locations



5.12 Environmentally Sensitive Areas

In addition to the drinking water vulnerability assessment addresses in Section 5.11 above, analysts reviewed the Oregon Department of Transportation's TransGIS site to identify environmentally sensitive areas within Linn and Benton Counties. Environmentally sensitive areas include lakes, irrigation canals, rivers, streams, and large wetland areas. Many of these waterways contain fish, support waterfowl, aquatic organisms, and wildlife. Maintaining awareness of these sensitive areas is critical to minimizing the environmental impacts that may occur during a HAZMAT release incident. Figures 5-37 through 5-39 display the environmentally sensitive areas, railroad routes, and EHS facility locations. Furthermore, many roadways used to transport HAZMAT transit through these sensitive areas. County officials can zoom into a selected area of interest on the MARPLOT electronic file to identify environmentally sensitive areas in relation to a HAZMAT release. ASG provided the electronic MARPLOT file to the Linn County Sheriff's Office, Benton County Sheriff's Office, and the Albany Fire Department.

Figure 5-37: Environmentally Sensitive Areas – Northern Benton County

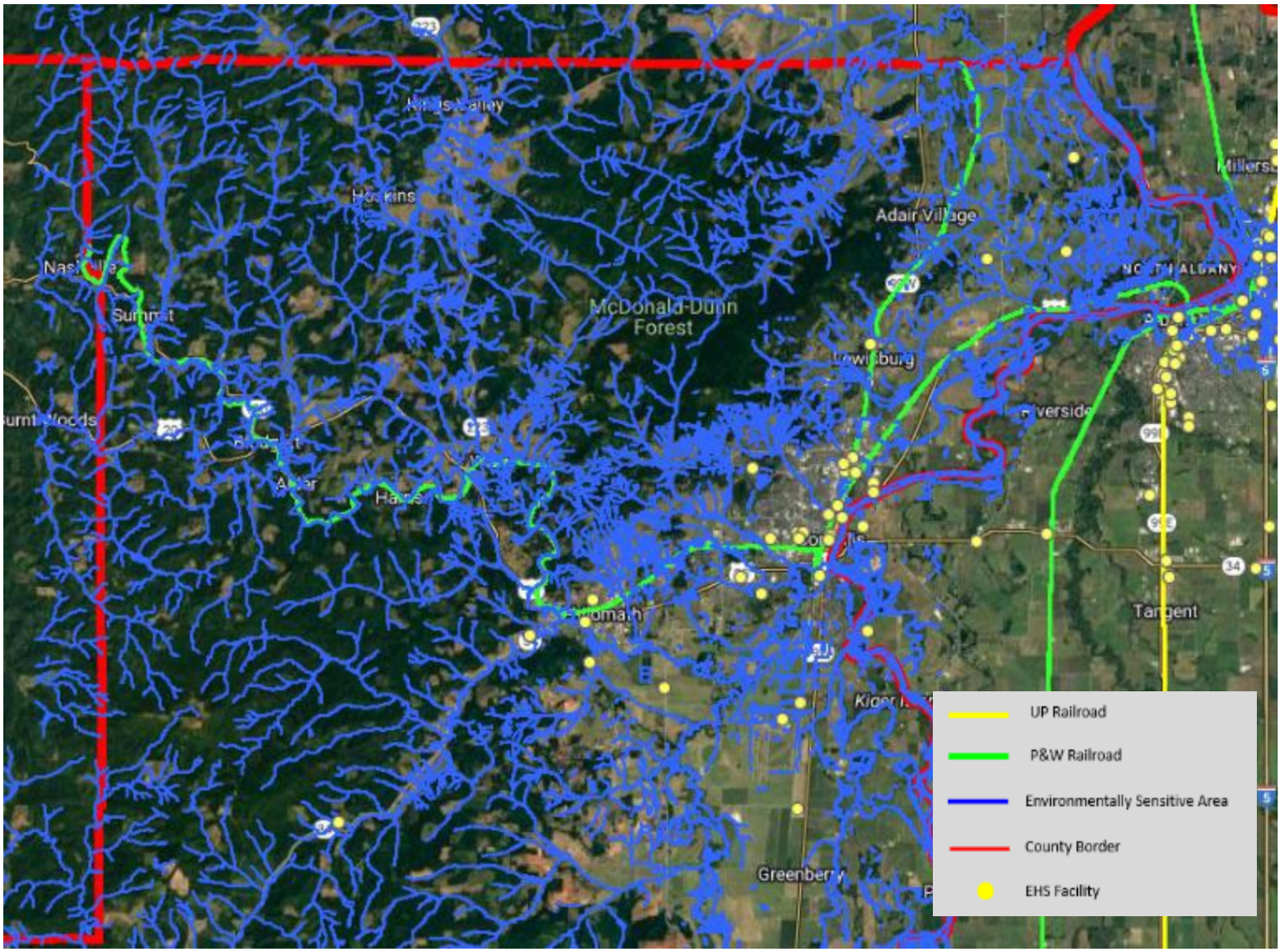


Figure 5-38: Environmentally Sensitive Areas – Southern Benton County

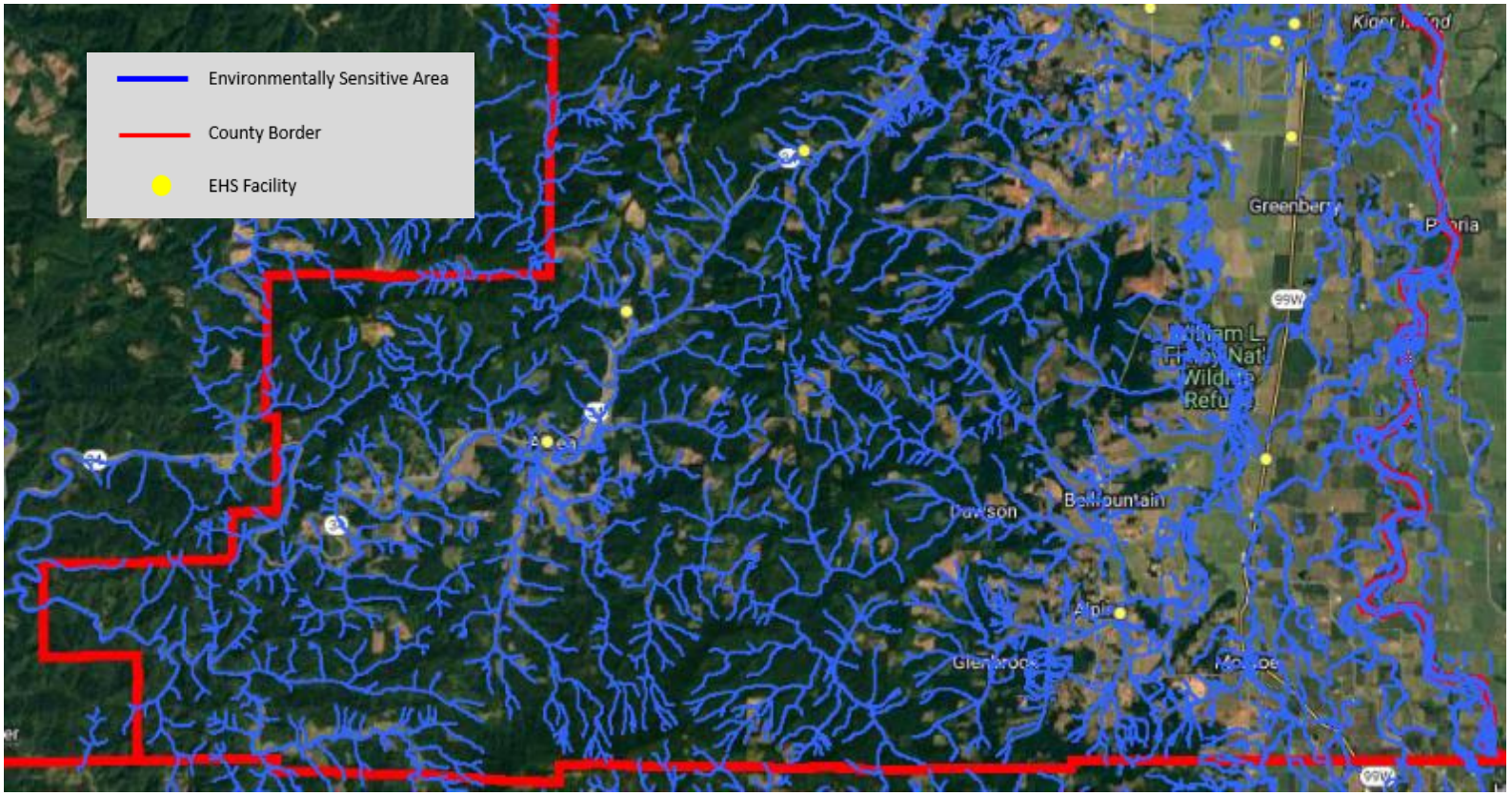
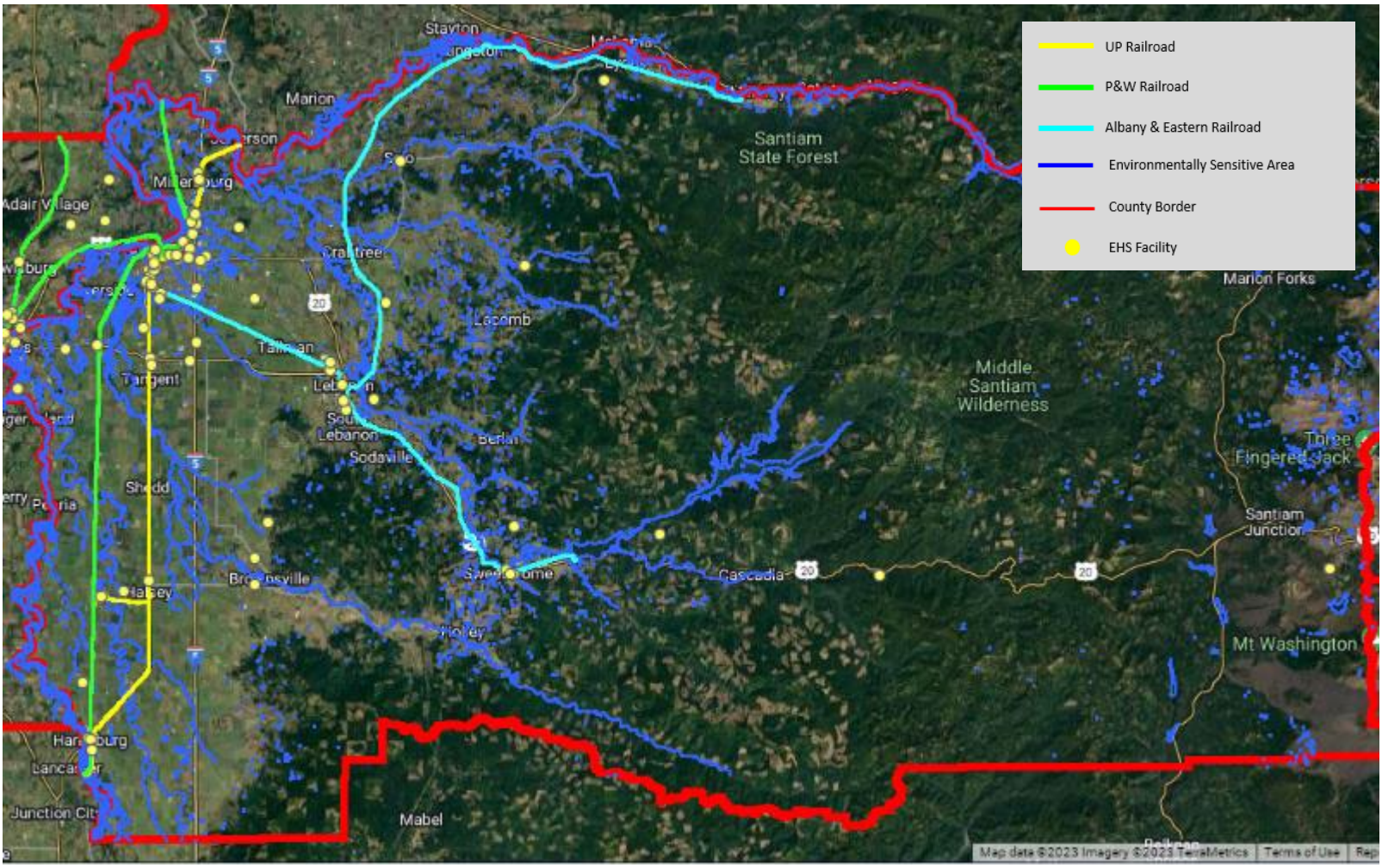


Figure 5-39: Environmentally Sensitive Areas – Linn County



5.13 Risk Assessment Results

Specific risk assessment results have not been included in this plan due to the sensitive nature of the information. Based upon the risk assessment results, scenarios involving the release of a hazard posing a significant airborne inhalation hazard such as chlorine, hydrogen chloride or ammonia present the greatest risk to the region. The risk of a chemical explosion from common petroleum-based hazards such as propane or diesel fuel was lower due to the low probability and corresponding severity of an event. Analysts provided all supporting risk assessment materials used to identify the top threats electronically to the Albany Fire Department, Linn County Sheriff's Office, and the Benton County Sheriff's Office for future reference and planning.

6 ANALYZING RISK CONTROLS AND RECOMMENDATIONS BASED ON SCENARIOS

Analysts used the Plans, Organization, Equipment, Training, Exercises (POETE) framework to identify shortfalls, limiting factors, and risk control measures for each HAZMAT release scenario. To support the analysis, ASG conducted interviews or corresponded through email with the following response stakeholders: Albany Fire Department, Philomath Fire and Rescue, RHMRT #5, NFWW Environmental (response contractor), P&W, Albany & Eastern, and UP Railroad Companies. Analysts conducted follow-up phone interviews with several of the assessed facilities to inquire about Emergency Action Plans, response capabilities and procedures, available personal protective equipment and employee training related to HAZMAT. Based on a gap analysis of the returned questionnaires and phone interviews, we identified the following potential shortfalls and limiting factors that could inhibit a responder's ability to respond or counter a HAZMAT release incident. Recommendations are associated with each shortfall and limiting factor to improve the community's response posture and resilience. Each recommendation is rank ordered from 1 through 4 (1=highest priority) to establish priority actions to address the gaps.

Table 6-1: Gap Analysis Results and Recommendations

Category	Limiting Factor/Shortfall	Recommendations	Priority
Equipment	The RHMRTs may not have the necessary equipment to detect high-risk hazards in the region following a HAZMAT release incident. A few unique hazards used/stored in the local area cannot be detected by a PID.	Research and procure handheld detection equipment or colorimetric tubes/chips capable of detecting and measuring hydrogen chloride and boron trichloride.	1
Plans	Many facilities designated as critical/vulnerable have not developed evacuation or shelter-in-place plans or have not shared them with their County Emergency Management Program. Hazard models estimate that many of these facilities may be impacted by a HAZMAT release or explosion hazard.	Share information about potential hazards and impacts to vulnerable facilities and multi-agency partners. As appropriate, assist facility owners in developing and exercising evacuation and/or shelter-in-place plans.	1
Organization	Several socially vulnerable populations were identified that could be adversely impacted by a HAZMAT incident. Based on this initial assessment, it is unknown how these vulnerabilities have been addressed in and through preparedness activities.	Review the recommendations outlined in Section 5.2 Social Vulnerability Lens to assess implementation and any remaining gaps.	1

Category	Limiting Factor/Shortfall	Recommendations	Priority
Training	Response stakeholders have not conducted training with all high-risk EHS facilities to ensure that both parties understand their respective roles, responsibilities, and resources available for managing an incident.	Conduct incident command training with high-risk facilities to ensure that both parties understand their respective roles, responsibilities, and resources available for managing an incident under a Unified Command.	2
Training/ Exercises	Based on returned questionnaires from response organizations, some agencies identified a need for additional training and exercises in the following areas: functional response capabilities, command and control (C2), surveillance and analysis, shelter-in-place versus evacuation, patient treatment/ stabilization, and mass prophylaxis.	Develop and implement a training and exercise plan that addresses the risks identified in this plan. After completion of training, conduct tabletop exercises, drills, and/or functional exercises on a routine basis to enhance regional response capabilities and preparedness. Utilize the analyses provided in this plan to develop risk-based training and exercises across these functions.	2
Training	Mandatory county first responder training does not include FEMA's IS-5.a: "An Introduction to Hazardous Materials" training course.	Consider adding FEMA's IS-5a training course to the mandatory first responder training package to enhance HAZMAT awareness amongst first responders.	3

7 INCIDENT AND PUBLIC NOTIFICATION

7.1 Initial Emergency Notification Process

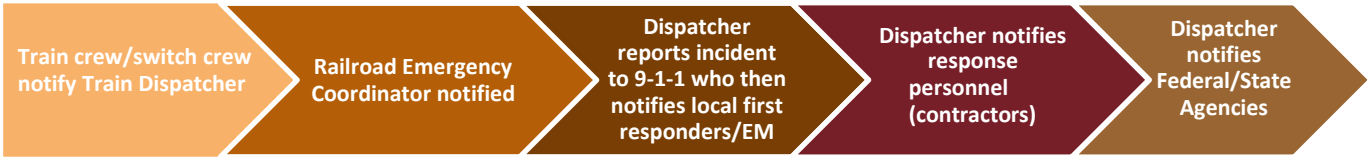
Timely emergency notification is essential for minimizing the adverse effects caused by a HAZMAT release incident. Experts reviewed the county EOPs and conducted interviews with key stakeholders to assess the adequacy of public notification procedures following an incident. Analysts traced the emergency notification process from the reporting source to responder notification to ensure that the EOP adequately addresses incident notification procedures. The Corvallis Regional Communications Center (CRCC) serves as the 9-1-1 dispatch for Benton County while the Linn County Sheriff's Office provides 9-1-1 dispatch services for Linn County.

The flow charts below illustrate from left to right, the incident notification procedures as identified in the County EOPs and locally developed procedures. During a major incident, the CRCC sends radio and pager notifications to the appropriate responders and county, or city emergency management based on the incident's severity and location. Typically, CRCC will not notify emergency management of small-scale incidents. The Linn County Sheriff's Office dispatch follows these same procedures. Analysts validated these procedures. Analysts assessed railroad notification procedures through interviews with railroad representatives. A rail incident may be reported locally by a citizen before rail company notification to the local 9-1-1 occurs since county rails lines transit populated areas. Analysts made multiple requests for Albany & Eastern Railroad incident reporting procedures, but the information was not provided. The emergency notification procedures outlined below help ensure a timely, organized response.

Incident Reporting Source: **Public citizen**

Incident reporting source: **Industrial Facility**

Incident Reporting Source: **P&W Railroad Company**



Incident Reporting Source: **Union Pacific Railroad Company**

*Response Management Communications Center

Depending upon the location of a HAZMAT release within the region, local fire department response times range from 5 to 30 minutes. If the IC requests RHMRT support, response times range from 15 to 90 minutes from the initial notification. The OSFM Standards of Coverage for RHMRTs guidance document establishes a response time goal of two hours for at least one RHMRT to respond to an incident occurring in rural areas of the state. In most cases, initial response times are expected to be less than one hour. However, due to the extensive network of rail and highway transportation routes within the region, response times could take up to 90 minutes when responding to incidents in western Benton County. Based on the information obtained, the incident notification procedures outlined above are effective in supporting a timely response to an incident in Linn and Benton Counties.

7.2 Community Water System Notification Procedures

Analysts traced established notification procedures to ensure that a Community Water System (CWS) is promptly notified of a HAZMAT release so that the CWS can implement procedures (e.g., shut off drinking water source intakes) to avoid cross contamination to the water treatment plant and supporting infrastructure. The flow chart below illustrates from left to right, the CWS notification procedures as identified through interviews with WTP operators and the Oregon Health Authority (OHA). When the OHA receives the initial notification from the OERS, they will determine if CWS notification is necessary based on the spill location, quantity and material released, and proximity to downstream users. These procedures are effective for ensuring that a CWS is promptly notified of a HAZMAT release in their jurisdiction.

7.3 Public Notification Procedures

When a HAZMAT incident occurs, the dispatch organization and Emergency Manager will coordinate with the on-scene Incident Commander to make public notifications and warnings during life threatening events. Once the life-threatening response has been stabilized, additional public notifications and warnings will be coordinated through Emergency Management and the appropriate Public Information Officers (PIO). When a HAZMAT incident poses an immediate threat to life, the acting IC or any authorized public official may issue emergency information or warning employing the method displayed below.

The IC must notify and update the appropriate 9-1-1 dispatch center as soon as possible to facilitate further notifications and actions (e.g., mass notification). Ultimately, the assigned PIO develops and coordinates the release of information to incident personnel, media, and the public throughout the incident until termination. The PIO participates in a Joint Information Center if established. Linn and Benton Counties utilizes the following methods to disseminate warning information to emergency service coordinators, cities, and public and private sectors:

- National Warning System (NAWAS) is the primary method of communicating alert and warning messages between state and local authorities
- Oregon Emergency Response System provides 24-hour alert, warning, and notification service to county/local warning points
- Linn-Benton Alert (Everbridge emergency notification system with reverse 9-1-1 capability for a selected area)
- Albany-Alert (Nixle emergency notification system owned by the city and requires user subscription)
- Corvallis-Alert (Nixle emergency notification system owned by the city and requires user subscription)
- Emergency Alert System (EAS) utilizes AM and FM radio and television broadcast stations to disseminate emergency information (tied into Everbridge)
- Wireless Emergency Alerts (WEA) emergency notification system
- Social media networks to include Facebook, Twitter, Instagram, and other platforms that may become available
- Highway Advisory Alert System (ODOT)
- Vehicles equipped with sirens and public-address systems may be used for warning the public during localized, small-scale HAZMAT release by rail emergencies
- Door to door contact if time and emergency conditions allow

7.4 Incident Termination

For small-scale HAZMAT incidents (no EOC activation), the on-scene IC has authority to terminate operations. When the County has activated the EOC and the response phase of the incident has been completed, County or City Emergency Management (determined by incident location) has the final approval authority to deactivate the EOC. EOC deactivation notifications must be disseminated to the same agencies that were notified of its activation.

8 EXERCISE AND TRAINING

8.1 Training Analysis

ASG conducted an analysis of HAZMAT training offered to County responders to determine adequacy and recommend additional training as needed to match desired capability targets. Primary fire agency personnel receive HAZMAT Awareness training, and many receive HAZMAT Operations Level training. The majority of RHMRT members are trained to the HAZMAT Technician or Specialist Level.

The OSFM offers advanced HAZMAT courses (optional) to include the following:

- HAZMAT Rail Emergency Response Awareness: a 3-hour course designed to provide responders with basic knowledge and awareness level training related to a HAZMAT rail response.
- HAZMAT Rail Emergency Response Operations: an 8-hour course designed to provide operations level training in response to a HAZMAT by rail incident.
- HAZMAT Tank Car Specialist: a 40-hour course that provides technical knowledge pertaining to tank cars including damage assessment, oversight for product removal, and movement of damaged tank and rail cars.
- HAZMAT Incident Commander: a 16-hour course designed to meet OSHA and NFPA standards to qualify incident commanders to manage HAZMAT incidents.

ASG interviewed the Albany Fire Department in Linn County and Corvallis Fire Department in Benton County and learned they have adopted and implemented the following Federal Emergency Management Agency (FEMA) online independent study courses offered by FEMA's Emergency Management Institute for all first responders and disaster workers:

- ICS-100: Introduction to the Incident Command System (ICS)
- ICS-200: ICS for Single Resources and Initial Action Incidents
- ICS-700: National Incident Management (NIMS) – An Introduction

Lieutenants (first line supervisors), and individuals fulfilling Command Staff roles also complete ICS-300 (Intermediate ICS for Expanding Incidents) and ICS-703.a (NIMS Resource Management). Furthermore, Battalion chiefs and above complete ICS-400 Advanced (ICS for Command and General Staff). All Corvallis Fire Department employees complete the AWR-160 (Weapons of Mass Destruction Awareness Training).

Based on the region's desired capability target for initial responders (conduct defensive operations until the RHMRT arrives), existing HAZMAT training is adequate. Analysts did not verify HAZMAT training requirements of other volunteer fire departments and districts serving the Mid-Valley LEPC Region. Attachment four provides training level details for primary County responders to include the RHMRTs serving Linn and Benton Counties.

8.2 Exercise and Evaluation Plan

To test plans and capabilities, the Homeland Security Exercise and Evaluation Program (HSEEP) recommends employing a multi-year exercise and evaluation program to enable organizations to participate in a series of increasingly complex exercises that build upon each other. County planners agree with this approach and as a result, the following exercise and evaluation plan detailed in Table 8-1 below has been recommended.

As Risk Management Plan (RMP) facilities implement the RMP Safer Communities by Chemical Accident

Prevention proposed rule, regulated facilities will be required to conduct exercises and enhance their planning and coordination with the public sector. This may be an opportunity to become more familiar with regulated facility hazards, personnel, processes, and resources. These exercises may enable responders to validate planning assumptions, capabilities, plans, procedures, communication, and incident command with private facilities.

Table 8-1: Recommended Exercise and Evaluation Plan

Time Period	Action/Exercise Type	Recommended Frequency	Recommended Objectives
Year 1	Seminar	Within 1 month	Orient response organizations to the Emergency Response Plan.
Year 1	Tabletop	Within 3-6 months	• Enhance Emergency Response Plan awareness and validate the plan. • Verify identification of roles and responsibilities among HAZMAT response stakeholders. • Verify that the plan provides decision makers with the information needed to support decision making during the pre-incident phase.
Year 1	Drill	Within 6-12 months and as necessary thereafter	• Validate notification procedures and response times. • Assess effectiveness of a specific function (e.g., establishment of a Unified Command, shelter-in-place procedures for vulnerable facilities, high-risk facility Emergency Action Plan procedures, technical decontamination set-up time and layout, etc.). • Conduct a scene size-up and set up a staging area within 15 minutes upon arrival at the scene. • Identify and quantify the hazards. • Establish technical decontamination operations to thoroughly clean HAZMAT team members exiting the scene.
Year 2	Functional Exercise	Within 12-18 months	• Provide and implement initial PPAs upon initial notification to protect downwind populations potentially affected by a HAZMAT release. • Complete a downwind hazard analysis to support implemented PPA procedures.

Time Period	Action/Exercise Type	Recommended Frequency	Recommended Objectives
			• Determine appropriate PPE levels for HAZMAT teams, make entry and stop the HAZMAT leak within one hour from arrival at the scene. • Establish a Unified Command and demonstrate effective command and control operations.
Year 2	Full-Scale Exercise	Within 18-24 months	Objectives listed in rows above may apply. Other recommended objectives include: • Assess patient triage, medical transport efficiency and medical surge capacity within the region. • Implement recovery and restoration operations to protect environmental resources.

9 SUPPORTING PLANS

Several plans support and align with this ERP. Planners should maintain interoperability with the plans identified below by reviewing these plans when this ERP is being revised to ensure consistency.

- Oregon Emergency Operations Plan, April 2017
- Northwest Area Contingency Plan, 2020
- Hazardous Materials Transportation by Rail State Agency Response Coordination Plan Appendix within Emergency Support Function # 10 of the Oregon Emergency Operations Plan
- Linn County, Oregon Emergency Operations Plan, June 2022
- Benton Operational Emergency Operations Plan, September 2020
- Oregon State Fire Marshal Standards of Coverage for Regional Hazardous Material Emergency Response Teams, September 2014
- Union Pacific Railroad Company HAZMAT Emergency Response Plan, PB-20850, July 11, 2017
- Portland and Western Railroad Emergency Response Plan

ATTACHMENT 1: RISK ASSESSMENT METHODOLOGY

A1.1. Method and Process

Technological hazards are industrial chemicals or materials that may be toxic, biohazardous, explosive, or radioactive. The technological hazard assessment methodology mirrors the risk management process. This ensures a risk-based approach to planning, which assists decision-makers in prioritization and resource allocation for countering these threats. This assessment primarily focuses on EPCRA Section 302 facilities that store chemicals and hazardous substances in quantities greater than reportable quantities established by the EPA.

Potential sources of technological hazards include but are not limited to manufacturing plants, warehouses, hospitals, waste storage and disposal sites, water/wastewater treatment plants, service stations tanker trucks, pipelines, and railcars. The information in this attachment describes the methodology used to complete the risk assessment presented in section 5 above.

A1.2. Identify the Hazards

ASG analysts used the following sources to identify and develop a hazard inventory for Linn and Benton Counties:

- Facility Tier II reports maintained in the Oregon CR2K online database
- Toxic Release Inventory Form R Reports
- P&W, Albany & Eastern, and UP Railroad Commodity Flow Density Reports
- Hazardous material flow patterns
- U.S. Department of Transportation National Pipeline Mapping System
- Google Earth satellite/aerial photos
- Area maps
- Oregon Department of Transportation TransGIS website

The hazard inventory consisted of approximately 2,500 hazards stored at 97 EHS facilities across the region. Based on the findings, the top chemicals of concern included chlorine, hydrogen chloride, ammonia, and trichloroethylene. Analysts reviewed the CR2K database to obtain radioactive material (RAM) storage locations. ASG compiled an inventory of RAM hazards for the region from this data. The Albany Fire Department, Benton County Sheriff's Office and Linn County Sheriff's Office maintain electronic copies of the comprehensive hazard inventory.

A1.3 Prioritizing Hazards

To create a prioritized list of hazards from the initial inventory, planners adopted the chemical severity ratings from a 2011 report published by the Naval Research Laboratory titled, *Prioritization and Sensitivity Analysis of the Inhalation/Ocular Hazard of Industrial Chemicals*. This report provided a targeted list of 49 chemical hazards and assigned a Toxic Operational Hazard Score for each.

The Naval Research Laboratory used several factors when formulating the Toxic Operational Hazard Score (TOHS) to include toxicity, stability, and the physical state of each chemical hazard. For toxicity, the Naval Research Laboratory reviewed the Environmental Protection Agency's (EPA) assigned AEGL-3 or the Emergency Response Planning Guideline level three (ERPG -3) assigned by the American Industrial Hygiene Association. The

Naval Research Laboratory assigned the following values for toxicity based on these assigned AEGL-3/ERPG-3 values:

Table A1-1: Naval Research Laboratory Assigned Toxicity Rating Scores

Established AEGL-3/ERPG-3 Value	Assigned Toxicity Rating Score
< 1 part per million (ppm)	5
1.1 to 10 ppm	4
10.1 to 100 ppm	3
100.1 to 1,000 ppm	2
1,000.1 to 2,000 ppm	1
>2,000 ppm	0

To determine the stability portion of each chemical's TOHS, the Naval Research Laboratory used the average of both the chemical's flammability and reactivity as determined by the National Fire Protection Association (NFPA). The Naval Research Laboratory assigned the following values for both flammability and reactivity:

Table A1-2: Naval Research Laboratory Assigned Reactivity Rating Scores

NFPA Flammability and Reactivity Values	Score
0	5
1	4
2	3
3	2
4	1

The Naval Research Laboratory assigned these values with the assumption that the more flammable and reactive a chemical is, the less toxic it is from an inhalation standpoint. The team inserted these values into the following equation to determine the chemical's stability rating:

$$S = (F+R)/2$$

S = Stability
F = Flammability Score
R = Reactivity Score

For the physical state, the Naval Research Laboratory applied the following scoring system:

Table A1-3: Naval Research Laboratory Assigned Physical State Scores

Physical State of Chemical	Score
Gas	5
Liquid	2.5
Solid	1

To determine the final TOHS for each chemical, the Naval Research Laboratory used the following equation:

TOHS = (T + S + P)

TOHS = Total Operational Hazard Score
T = Toxicity
S = Stability
P = Physical State

Table A1-4 displays the Naval Research Laboratory's targeted chemical listing and associated TOHS for each.

Table A1-4: Toxic Operational Hazard Score Listing

Chemical	CAS Number	Toxic Operational Hazard Score
Phosgene	75-44-5	14.4
Chlorine	7782-50-5	13
Sulfur Dioxide	7446-09-5	13
Nitric Oxide	10102-43-9	13
Nitrogen Dioxide	10102-44-0	13
Sulfur Tetrafluoride	7783-60-0	12.8
OMPA	152-16-9	12.5
Hydrogen Chloride	7647-01-0	12.4
Hydrogen Fluoride	7664-39-3	12.4
Boron Trifluoride	7637-07-2	12.4
Chlorine Trifluoride	7790-91-2	12.1
Hydrogen Bromide	10035-10-6	12
Formaldehyde (Formalin solution – 37% methanol)	50-00-0	11.8
Tungsten Hexafluoride	7783-82-6	11.8
Hexafluoroacetone	684-16-2	11.8
Silicon Tetrafluoride	7783-61-1	11.8
Germanium Tetrafluoride	7783-58-6	11.8
Mercury	7439-97-6	11.5
Bromine	7726-95-6	11.5
Chlorine Dioxide	10049-04-4	11.5
Oleum-E3	8014-95-7	11.5
Methyl Bromide	74-83-9	11.4
Phosphoryl Trichloride	10025-87-3	11.3
Arsine	7784-42-1	11.3
Fluorotrichloromethane	75-69-4	11
Pentachlorophenol	87-86-5	11
Acetylene Tetrabromide	79-27-6	10.9
O-Anisidine	90-04-0	10.9
Sulfur Trioxide	7446-11-9	10.8
Hydrogen Iodide	10034-85-2	10.8
Toluene-2, 4-Diisocyanate	584-84-9	10.6
Parathion	56-38-2	10.6
Nitric Acid	7697-37-2	10.5
Hydrogen Sulfide	7783-06-4	10.5
Molybdophosphoric Acid	51429-74-4	10.5

Chemical	CAS Number	Toxic Operational Hazard Score
Fluorine	7782-41-4	10.5
Malathion	121-75-5	10.5
Ethylene Dibromide	106-93-4	10.5
1, 1, 2, 2-Tetrachloroethane	79-34-5	10.5
Ammonia	7664-41-7	10.4
Azinphosmethyl	86-50-0	10.4
Sulfuric Acid	7664-93-9	10.3
Phosphorus Trichloride	7719-12-2	10.3
Boron Trichloride	10294-34-5	10.3
Phosphine	7803-51-2	10.3
Chlorosulfonic Acid	7790-94-5	10.3
Boron Tribromide	10294-33-4	10.3
Thionyl Chloride	7719-09-715	10..3
Methlyphenyldichlorosilane	149-74-6	10.3
Phosphorus trichloride	7719-12-2	10.3
Boron trichloride	10294-34-5	10.3
Phosphine	7803-51-2	10.3
Chlorosulfonic acid	7790-94-5	10.3
Boron tribromide	10294-33-4	10.3
Thionyl chloride	7719-09-715	10.3
Benzene	71-43-2	8.8

Analysts identified chemicals from the table above from within the Mid-Valley LEPC hazard inventory. ASG analysts multiplied the assigned Toxic Operational Hazard Score for each chemical by the quantity on site code listed on the hazard inventory to determine a risk rating. When a facility used and/or stored more than one chemical from the list of 49 chemicals in the table above, analysts added the results together to formulate a cumulative risk rating for each facility. Planners used this methodology to formulate a high-risk facility listing based upon the cumulative risk. ASG used the following quantity scores as part of the final risk rating calculation.

Table A1-5: Assigned Quantity Scores

On-Site Quantity (Pounds or Gallons)	Quantity Code Assigned
0-99	1
100-999	2
1,000-9,999	3
10,000-24,999	4
25,000-49,999	5
50,000-99,999	6
100,000-249,999	7
250,000-499,999	8

A1.4. Assessing the Risk

Risk is a function of probability and severity. Analyzing historical and statistical data and applying probability models enabled ASG to estimate the probability of a hazard release incident occurring within the county. ASG determined severity for each release by plume modeling hazards at the 97 assessed facilities that reported airborne hazards contained in the ALOHA Program's library. We also assessed hazards likely transported along county highways to determine the impact on the community in terms of casualty estimates. Analysts calculated the overall risk for each incident by multiplying the probability and severity factors.

A1.4.1. Probability

A1.4.1.1 Natural Threats

The overall probability of a release is a function of the individual probability of an accident occurring that could lead to a release. For the initial risk assessment, planners used a probability constant of zero for each release scenario since historical data revealed no differences between Linn and Benton Counties except for floods and wildfires. We assigned a probability factor of one percent (0.01) for each facility located within a designated high-risk flood zone and one half of one percent (0.005) for facilities located outside a designated flood zone as determined from FEMA flood maps. For wildfires, analysts reviewed data maintained in the National Oceanic and Atmospheric Administration (NOAA) online historical weather events database and determined that in Linn County, approximately 250,000 acres burned from 2017 through 2021. We calculated the annual probability of a wildfire in the county by dividing the total acres burned in the county (250,000) by five to obtain an annual average of 50,000 acres. Analysts divided this result by the total county acres (1,477,760) to obtain an annual wildfire probability of 0.034 for Linn County. ASG applied this same calculation to Benton County. Approximately 2,550 acres burned over a 5-year period in Benton County resulting in an annual average of 510 acres. Analysts divided the result by the total county acres (432,640) to obtain an annual wildfire probability of 0.001. ASG applied a common probability of zero for tornados and earthquakes since probability of exposure is the same for all facilities.

A1.4.1.2 Stationary Source Accidents and Incidents

ASG calculated the probability of a hazard release from a stationary source within a 5-year period (2017-2021) by dividing the annual average of releases (7,841) by the total manufacturing, industrial, and chemical plants in the United States (420,983). We obtained this data from the National Response Center and Bureau of Labor Statistics. The probability of a hazard release from a stationary source is 0.0186. For the explosive probability, ASG divided the average number of explosions from 2017-2021 (71.2) by the total chemical plants (420,983) to obtain a total probability of 0.00017. We obtained this data from the Bureau of Labor Statistics and the National Response Center.

A1.4.1.3 Mobile Source Accidents and Incidents

Analysts based the probability of a hazard release from a tanker truck on the proportion of annual releases from this mode of transportation apportioned to the mileage of interstate and arterial roads within each county. ASG calculated this apportionment factor for Linn County by estimating from maps the total miles of road likely used by tanker trucks (167 miles) divided by the total miles of interstate and arterial roads in the United States (436,602 miles). We analyzed data from the past five years and calculated the probability by multiplying the annual serious HAZMAT incident release rate (757) by the mileage apportionment factor (0.00038). The calculated annual probability of a hazard release from a tanker truck in Linn County is 0.29 meaning planners should anticipate 29 hazard releases per hundred years within Linn County. For Benton County, analysts estimated from maps 70 miles of interstate and arterial roads divided by the total miles of interstate and arterial roads in the United States (436,602 miles). We calculated the probability by multiplying the annual

serious HAZMAT incident release rate (757) by the mileage apportionment factor (0.00016). The calculated annual probability of a hazard release from a tanker truck in Benton County is 0.12.

ASG applied this same methodology towards determining the explosion probability for tanker trucks. We multiplied the annual average of explosions over the past seven years (2) by the apportionment factor (0.00016) to obtain an explosion probability of 0.00032 in Benton County. For Linn County, we multiplied the annual average of explosions over the past seven years (2) by the apportionment factor (0.00038) to obtain an explosion probability of 0.00076. This method assumes that hazard releases are distributed evenly along these roads throughout the United States and may vary from localized incidence rates. ASG obtained hazardous material release statistics from the Department of Transportation, Bureau of Transportation Statistics' 2012 commodity flow study for commercial vehicles. We derived the frequency for each specific chemical listed and applied it to the tanker truck probability of release. This resulted in a specific probability for each chemical based on the frequency of transport.

To determine the probability of a railcar release, analysts based the probability of a technological hazard release from a railcar on the proportion of annual releases from this mode of transportation apportioned to the mileage of freight railroad track within each county. ASG calculated this apportionment factor by estimating from maps the total miles of railroad likely used by railcars within Linn County (139 miles) divided by the total miles of railroads in Oregon (2,639 miles obtained from the Oregon State Rail Plan). We researched the number of incidents within Linn County from 2013-2022 (40) and multiplied the annual serious HAZMAT incident release rate (4) by the mileage apportionment factor (0.052). The calculated annual probability of a technological hazard release from railcars in Linn County is 0.21. We employed the same approach for Benton County by estimating from maps the total miles of railroad in the county (70.5) divided by the total miles of railroads in Oregon (2,639). There were 7 incidents in Benton County from 2013-2022 and we multiplied the annual serious HAZMAT incident release rate (0.7) by the mileage apportionment factor (0.026). The calculated annual probability of a technological hazard release from railcars in Benton County is 0.018.

ASG applied this same methodology towards determining the explosion probability for railcars. We multiplied the annual average of railcar explosions/overpressure incidents over the past 17 years (2005-2021) in the U.S. (2.4) by the Linn County apportionment factor (0.052) to obtain an explosion probability of 0.125. For Benton County, analysts multiplied the apportionment factor (0.026) by the annual average of railcar explosions/overpressure incidents over the past 17 years (2005-2021) in the U.S. (2.4) to obtain an explosion probability of 0.062 in Benton County. This method assumes that technological hazard releases are distributed evenly along these railroads throughout the U.S. We derived the frequency for each specific chemical listed on the obtained commodity flow density report and applied it to the railroad probability of release. This resulted in a specific probability for each chemical based on the frequency of transport.

A1.4.2. Meteorological Data

Meteorological data includes wind speed and direction. For each scenario, analysts modeled a release based on the average overall wind speed in the month of June (77^0F), humidity level of 10% and a wind of 5.2 miles per hour. We applied this temperature and wind speed for each ALOHA plume model. Wind direction had a less significant impact since analysts created a 360^0-hazard area based on plume modeling results. ASG obtained these averages for the city of Corvallis from the following link: https://weatherspark.com/y/400/Average-Weather-in-Corvallis-Oregon-United-States-Year-Round - Sections-Temperature.

A1.4.3. Severity

ASG calculated the severity of each incident by determining the population impacted for each scenario. We used the ALOHA Program to model hazard release impacts within the region. One limitation of the ALOHA software is that it does not model beyond six miles from a hazard release point. For each modeled scenario, ASG reviewed submitted Tier II reports to identify the quantity and entered this into the ALOHA plume modeling program. For tanker trucks and rail cars, planners research typical tanker volume capacity for each modeled hazard and entered this quantity into the plume model. The ALOHA model output displays the estimated airborne concentration expressed as an AEGL. We used the demographic layers within the MARPLOT Program to estimate the number of casualties within the AEGL-2 concentration areas (based on plume modeling estimates) around each facility release scenario. For tanker truck and railroad models, ASG measured the distance from the model's point of release to the AEGL-2 downwind edge and determined the severity by totaling populations within these hazard areas on each side of the roadway or track. For example, if analysts measured 500 meters from the point of the release to the downwind edge of the AEGL-2 contour, we totaled the populations within 1,000 meters of the highway (500 meters on each side) along its entirety within the county and used this total as the severity factor for that scenario. Analysts conducted one plume model for tanker truck and rail car hazards to determine the estimated AEGL-2 downwind hazard distances and scenario for each hazard and applied the model to all transportations routes since the model parameters remained the same. ASG selected Interstate-5, and highways 20, 22, 34, 99E, 99W and 180 as likely HAZMAT transportation routes.

A1.4.4. Chemical Explosions and Detonations

ASG considered the potential for large quantity flammable chemicals stored at facilities or transported in tanker trailers to explode because of fire, detonation, accident, or other means. ASG used a model that is based on a vapor cloud explosion and uses a commonly accepted formula, known as the TNT-equivalency formula, for determining overpressure distances of explosions resulting from vapor clouds (USEPA, 1999). The method used to calculate the overpressure severity and distance is shown below.

- Determine quantity of substance released, expressed in kilograms
- Estimate hazard zones

Hazard zones for explosives are represented by three concentric circles from the point of explosion. These zones are defined by the approximate overpressure, expressed in psi, at the limit of the zone. ASG used the equation below to calculate the distance from an explosion source to an overpressure limit of one psi.

Equation: $D = 1.60 * (m*hc)^{0.33}$

D = distance to 1-psi overpressure (feet)

1.60 = constant for 1-psi overpressure, maximum yield, and

metric conversion factor m = mass of substance (kg)

hc = heat of combustion (kJ/kg)

This model assumes that 10% of the substance participates in the explosion. This is a conservative assumption applied by the EPA in worst-case analyses of chemical explosions (USEPA, 1999). Based on the distance, D, determined above, three hazard zones are defined: Zone 1, radius equal to 1/5 times D; Zone 2, radius equal to 1/2 times D; and Zone 3, radius equal to D. These distances are based on the approximation that overpressure is proportional to 1/distance cubed ($1/D^3$). Zones 1, 2, and 3 correspond to the 100 psi, 8 psi, and 1 psi overpressure distances.

Structural building failures begin to occur at 1 to 3 psi. At approximately 8 psi, most buildings would collapse, and eardrums may rupture. Finally, complete building collapse can be expected at 100 psi. For explosion scenarios, ASG used the MARPLOT Program to determine the total population within the 8 and 100 psi impacted areas around facilities and along highway transportation routes. This served as the severity factor for the risk assessment.

A1.4.5. Risk Estimate

ASG calculated the risk estimate by multiplying the probability by the impacted population for each scenario. We then rank ordered the incidents from highest relative risk to the lowest relative risk. This risk rating represents the number of individuals at risk from each scenario within a year. While some of the assumptions are conservative, the standardized approach ensures that the output from the process results in a relative risk rating from each threat. The electronic tool used to calculate the risk contains the final risk assessment results and has been provided to the Albany Fire Department, Benton County Sheriff's Office, and Linn County Sheriff's Office.

A1.5. Analyzing Risk Controls

ASG reviewed the spectrum of response and controls that can be employed to control risks from hazard releases. We used the POETE framework for the analysis. The review included reviews of maps, existence of mutual aid agreements, equipment inventories, interviews, and local response capabilities. ASG conducted interviews with key response agencies to gain a better understanding of response roles, responsibilities, and capabilities. Considering the community's response capability, we conducted an impact analysis based on the top risks. The POETE framework served as a tool to identify shortfalls and limiting factors within the county. For each shortfall and limiting factor, ASG identified potential solutions and ranked each based on their respective level of capability enhancement so that a prioritized list could be developed.

Throughout the report, we detailed assumptions and approaches used to evaluate the risks of potential hazard releases. It was not intended to precisely predict consequences from actual chemical releases or explosions. This assessment details hazard release scenarios at the 97 reporting EHS facilities; it does not represent all possible scenarios that may affect the community. Furthermore, this methodology does not address terrorist use of chemical, biological, radiological, nuclear, and explosive materials, or by-products from physical/chemical processes after a substance is released such as fire, thermal effects, or reactions.

ATTACHMENT 2: FIRST RESPONDER INITIAL HAZMAT RESPONSE CHECKLIST

ASG developed an initial response actions checklist to assist county responders during the initial phases of a HAZMAT release at a facility or transportation incident. This checklist assumes that first responders will only conduct defensive operations until specialized teams arrive on-scene to execute offensive operations (i.e., contain/stop the leak, firefighting, spill cleanup, etc.). The procedures listed in the checklist below align with those identified in each County's EOP.

Linn and Benton County Initial HAZMAT Response Checklist

PURPOSE

This checklist addresses incident management and response actions to take in the event of a HAZMAT release incident within Linn and Benton Counties following the initial incident notification. This checklist incorporates defensive measures to consider until the RHMRT or other specialized teams arrive to conduct offensive operations at the incident.

	INCIDENT MANAGEMENT	YES	NO	N/A	NOTES
1	9-1-1 call center (CRCC in Benton County or Linn County Sheriff's Office in Linn County) notifies responsible fire department based upon incident location. For major incidents, 9-1-1 dispatch also notifies the city and/or county Emergency Manager (incident location/jurisdiction dependent).				
2	Emergency Manager in coordination with the IC, determines level of support required for the incident and notifies EOC staff using the active 911 app (Linn County) or Everbridge (Benton County). The notification is typically sent by the Emergency Manager but may be sent by 9-1-1 dispatch.				
3	Emergency Manager or designee activates the EOC as appropriate/if deemed necessary. A Mobile Emergency Operations Center (MEOC) will be purchased soon by Linn County. Setup location is determined by the incident location. Benton County maintains limited mobile EOC functions.				
4	Emergency Management and/or local public safety agencies inform the Oregon Emergency Response System of EOC activation and requests support as directed by IC (i.e., Regional HAZMAT Support Team) at 800-452-0311.				
5	Facility, trucking, or railroad representative (dependent on type of incident) contacts the National Response Center to report HAZMAT spill at 800-424-8802.				
6	Communications link established between EOC and the				

	on-scene IC.				
7	Incident resource needs identified, in coordination with the on-scene IC.				
8	Protective measures for the public determined and implemented (evacuation and Shelter-in-place).				
9	Shelter and housing needs addressed for displaced populations. Directions/instructions provided to displaced populations.				
10	Adjacent county EM Office notified if a HAZMAT release in Linn or Benton County may potentially impact that county.				
	RESPONSE ACTIONS	**YES**	**NO**	**N/A**	
1	Staging area location for the incident determined (upwind, uphill, and safe distance from the site).				
2	First responders provided a safe route to the scene (based upon wind conditions and to include fire, police, ambulance).				
3	Arriving first responders conduct a scene size-up of the incident site from a safe location, upwind from the incident and report findings to IC upon arrival.				
4	IC conducts a risk assessment and directs actions based on the assessment findings (i.e., contain leak, rescue casualties, and provide medical treatment, etc.).				
5	IC Collaborates with facility leaders and responders to integrate response operations (Unified Command).				
6	Protective measures for the public determined and implemented (evacuation and shelter-in-place).				
7	Traffic control actions implemented to ensure that persons do not travel into contaminated areas/plumes.				
8	Staging area team constantly assesses incident site visually from a safe distance and reports any changes to the IC until the arrival of the regional HAZMAT team.				
9	Gross decontamination is established initially for potentially exposed victims. If requested, technical decontamination is set-up as directed by the IC.				

ATTACHMENT 3: TECHNOLOGICAL HAZARD INVENTORY

Analysts did not include the Linn-Benton County technological hazard inventory in this attachment due to the sensitive nature of the material. ASG provided inventory data to the Albany Fire Department, Benton County Sheriff's Office, and Linn County Sheriff's Office for future reference.

ATTACHMENT 4: RESPONSE CAPABILITIES AND EQUIPMENT

Analysts compiled the inventory below to identify capabilities of county and regional responders. The inventory below is not all-inclusive and only accounts for the primary responding agencies (who replied to requests for information) to a HAZMAT incident or for which ASG recently obtained this information in support for another related project.

Table A4-1: Linn-Benton County HAZMAT Response Capabilities

Organization	Manpower/Training	Personal Protective Equipment	HAZMAT Equipment	Decontamination Capabilities	Estimated Response Time
102nd CST (Salem, OR)	22 HAZTMAT Technicians	• Multiple level A, B and C suits available • Drager SCBAs and PAPR respirators with a variety of cartridges available • 12 SCBA tanks (60-minute tanks) • Multiple types of gloves available	• Multiple five-gas meters (PID, LEL, O2, CO, H2S) • Several AreaRAEs and • MultiRAEs available • HAZMAT ID • Portable gas chromatograph/mass spectroscopy unit (HAPSITE) • Ahura Defender HAZMAT identifier • Alpha, beta, and gamma radiation detection meters • Radiation isotope identifier • Radiation personal dosimeters • Satellite communication truck with secure communication system • Talon robot (provides unmanned HAZMAT detection) • Mobile laboratory (chemical identification) • One ambulance	Technical decontamination (intended for responders only)	Depart within 90 minutes upon notification Within 45 to 90 minutes travel time (traffic/location dependent)

Organization	Manpower/Training	Personal Protective Equipment	HAZMAT Equipment	Decontamination Capabilities	Estimated Response Time
Albany Fire Department	86 trained employees with typically 4-6 HAZMAT Technicians and 17-19 HAZMAT Operations trained responders	• MSA G1 full-face SCBAs (10) with 20 bottles available • 8 Level A suits • 16 Level B suits • Various glove types	• Gemini FTIR/Ramen Spectrometer • Benzene meter • PID • 4-gas monitor (CO, LEL, H_2S, and O_2) • Ludlam radiation meters • Drager colorimetric tubes (chlorine, phosgene, CO, carbon dioxide, benzene, sulfur dioxide, and hydrogen sulfide) • pH paper • Chlorine hand-held monitors • PEAK plume modeling software	Technical decontamination	Initial arrival within 4-6 minutes; follow-on HAZMAT response is 10-45 minutes
Corvallis Fire and Rescue Emergency Medical Services (Serve about 90% of Benton County-Polk County serves far northwestern corner of Benton County while Albany assists in areas across the river from Albany)	45 paramedics total with 15 available per shift All paramedics receive HAZMAT Awareness and Operations Level Training	• Nitrile gloves • Fitted eye protection • N95 masks	• Six ambulances	N/A	Urban areas within 8 minutes for urban areas and up to 2 hours for rural/isolated areas

Organization	Manpower/Training	Personal Protective Equipment	HAZMAT Equipment	Decontamination Capabilities	Estimated Response Time
Corvallis Fire Department	70 total career firefighters on staff; 18 typically available per shift	• Turnout gear • MSA G1 SCBA packs (60) and 120 bottles	• 4-gas monitors on each engine truck • Command vehicles as well	Gross	4-12 minutes
NWFF Environmental (Regional response contractor based in Albany, OR)	At least 16 personnel available to respond All responders trained to the HAZMAT Technician Level and each receive ICS training	• Level A, B, C suits • 8 Scott SCBAs with 60-minute bottles • A variety of APRs and PAPRs with an assortment of cartridges available	• 4 gas meters • 5 gas meters with PID • AreaRAE • Qualitative field identification kits	Gross and Technical decontamination (mobile shower plumbed to field tankers available if necessary)	Within 45 minutes during business hours; within 2 hours after normal business hours
Philomath Fire and Rescue	7 career staff and 30 volunteers Five firefighters trained to HAZMAT Awareness Level and 30 to HAZMAT Operations Level	• Turnout gear only • Scott SCBAs with 30 bottles available	• 4-gas monitors on each engine truck • Pads, booms, absorbent material for spill containment	Gross	2-7 minutes in urban areas; 7-15 minutes for rural areas
P & W Response Team	Contracts in place with the NRC and CTH to conduct response/cleanup activities Contractor operations/capabilities determined based upon incident size and complexity	Unknown	Unknown	Unknown	Within 4-5 hours of notification

Organization	Manpower/Training	Personal Protective Equipment	HAZMAT Equipment	Decontamination Capabilities	Estimated Response Time
RHMRT 5 Linn-Benton Co (Corvallis, Albany, and Lebanon FDs)	22 trained HAZMAT Specialists and 5 trained to the HAZMAT Technician Level	• MSA G1 full-face SCBAs (10) with 20 bottles available • 8 Level A suits • 16 Level B suits • Various glove types	• 6 Electronic personal dosimeters (Dositec) • 12 Canberra Ultra-Radiac Dose Rate Meter • 1 TIFF Combustibles detector • 3 MultiRAE Lite 4-gas meters with PIDs • 2-ToxRAE Pro meters • Standalone Chlorine, ammonia, hydrogen cyanide available • 1-Drager X=ACT 5000 with HCl, HF acid, sulfur dioxide, and ammonia detection Drager CDS kit • 6-Ludlam radiation detectors • 1 UltraRAE 3000 (PID/benzene) • 1-MiniRAE PID with 10.6 eV lamp • 1 Gemini Analyzer (FTIR and Raman technology) • pH paper • Thermal imaging camera (thermal and infrared)	Gross and technical	Within 45 minutes

Organization	Manpower/Training	Personal Protective Equipment	HAZMAT Equipment	Decontamination Capabilities	Estimated Response Time
Lebanon Fire District	Two full-time staffed locations (Stations 31 and 34) and three volunteer staffed (Stations 32, 33, 35) All personnel receive HAZMAT Operations Level Training and some trained to the HAZMAT Technician Level	• Turnout gear only • MSA G1 full-face SCBAs with 45-minute bottles	• 4-gas monitors	Gross	4 to 20 minutes
Lebanon Fire District (EMS)	32 full time EMTs (fire department personnel)	• Nitrile rubber gloves • Eye protection	• Staff 2 medic units during day (nnon-10) • 3 during noon to 10 • 5 ambulances total	N/A	4 to 20 minutes
UP HAZMAT Response Team	HAZMAT Technician: 150-300 (Primary: Graymar Environmental response contractor) HAZMAT Specialists: 50-100	• Scott SCBAs, Scott air purifying respirators equipped with organic vapor/acid gas cartridges and P100 filters • Level A, B, and C suits available	• RAE systems air monitor • Drager colorimetric tubes (wide range available) • CtEH offsite consulting services available 365 days a year • Six foam trailers spread throughout the state	N/A	UP Rep onsite within 1 hour to serve as informational resource/liaison; HAZMAT contract team within 5 hours