PESTICIDE REGISTRATION AND EVALUATION COMMITTEE (PREC)
Meeting Minutes – March 20, 2026

Committee Members/Alternates in Attendance:

Elizabeth Marder – California Department of Public Health (CDPH)
Fabiola Estrada – U.S. Environmental Protection Agency (EPA), Region 9
Fatemeh Ganjisaffar, and Kevi Mace (alternate) – California Department of Food and Agriculture (CDFA)
Garrett Keating – Department of Industrial Relations (DIR)
Kari Arnold (alternate) – University of California (UC), Davis, IR-4 Program and Environmental Toxicology
Kathleen Boyle (alternate) – Structural Pest Control Board (SPCB)
Katie Southerland-Ashley – Office of Environmental Health Hazard Assessment (OEHHA)
Kristen Pidcock – CalRecycle
Mai Ngo – Department of Toxic Substances Control (DTSC)
Nan Singhasemanon (PREC Chair) – Department of Pesticide Regulation (DPR)
Ryan Bourbour – Department of Fish and Wildlife (DFW)
Stan Armstrong – Air Resources Board (CARB)
Stephen Scheer – California Agricultural Commissioners and Sealers Association (CACASA)
Wendy Linck – State Water Resources Control Board (SWRCB)

Visitors in Attendance:

Note: Only attendees who identified themselves or could be identified by DPR are listed.

Ann Grottveit, Kahn, Soares & Conway, LLP
Anna Sanchez-Gowan, Gowan Co.
Anne Katten, CA Rural Legal Assistance Foundation (CRLAF)
Bob Schramm, Schramm, Williams & Associates, Inc.
Emily Saad, Exponent
Hanna Birdsong, Wonderful Co.
James Nakashima, Office of Environmental Health Hazard Assessment (OEHHA)
Jose Chang, County of Santa Barbara Agriculture
Karen DaSilva, Corteva
Kathleen Kilpatrick, Safe Agriculture, Safe Schools (SASS) / Californians for Pesticide Reform (CPR)
Margaret Reeves, Pesticide Action Network
Mia Lippy, CDFA
Michael Zeiss, CPR
Noah Beyeler, County of Santa Barbara Agriculture
Renee Pinel, Western Plant Health
Sarah Aird, CPR
Shelley Newman-DuTeaux

DPR Staff in Attendance:

Adam Moore – Environmental Monitoring Branch
Ajay Kumar – Pesticide Registration Branch
Alexander Gomez – Environmental Monitoring Branch
Amber Morris – Pesticide Programs Division
Amy MacPherson – Office of Outreach & Communications
Andrew Turcotte – Pesticide Registration Branch
Andy Rubin – Human Health Assessment Branch
Aniela Burant – Environmental Monitoring Branch
Anna Maddison – Pesticide Registration Branch
Atac Tuli – Environmental Monitoring Branch
Brandon Brown – Human Health Assessment Branch
Celia Pazos – Office of Environmental Justice and Equity
David Mauss – Pesticide Programs Division
Eric Kwok – Human Health Assessment Branch
James Gomez – Environmental Monitoring Branch
Jazmin Johnson – Environmental Monitoring Branch
Jeannie Martin – Enforcement Headquarters Branch
Jeff Nagle – Worker Health and Safety Branch
Jimmy Nguyen – Environmental Monitoring Branch
John Adragna – Human Health Assessment Branch
Kayla Jewell – Environmental Monitoring Branch
Kyle Sherbine – Environmental Monitoring Branch
Lauren Eby-McKenzie – Environmental Monitoring Branch
Laurie Brajkovich – Pesticide Programs Division
Madison Le – Pesticide Programs Division
Maziar Kandelous – Environmental Monitoring Branch
Nan-Hung Hsieh – Human Health Assessment Branch
Natalie Jarrell – Pesticide Registration Branch
Omid Zandvakili – Environmental Monitoring Branch
Peter Lohstroh – Human Health Assessment Branch
Raavi Arora – Environmental Monitoring Branch
Robert Scheffer – Pesticide Registration Branch
Rosemary Uyeda – Environmental Monitoring Branch
Samantha Jones – Human Health Assessment Branch
Sara Mohammadi – Environmental Monitoring Branch
Scott Tiscione – Human Health Assessment Branch
Svetlana Koshlukova – Human Health Assessment Branch
Taylor Whitehill – Pesticide Registration Branch
Vincent Aguirre – Environmental Monitoring Branch

1. **Introductions and Committee Business – Nan Singhasemanon, Chair, DPR**

a. DPR's Rulemaking Calendar for 2026 is now available. This document identifies potential proposed regulations and upcoming rulemaking actions that may be noticed this year. Additional details such as status, contact information and projected timelines for key dates are also provided.

b. DPR released its first annual status update for SprayDays California (or SprayDays), our statewide notification system for planned agricultural pesticide applications. The report describes how the system works, looks at how the system was used by the public and summarizes related public outreach efforts, feedback received, and upgrades completed since launch in March of last year. DPR also opened a comment period to collect feedback on the system. That comment period closes on May 1st.

c. DPR has released a proposal to expand its Air Monitoring Network, including adding up to four new monitoring stations. A news release and related documents were posted last week. We're inviting public input on proposed locations and inviting communities to participate in a virtual public workshop on April 14.

Note that the PREC meeting presentations were summarized using artificial intelligence and have been reviewed for accuracy.

2. **DPR's Air Monitoring Network (AMN) Expansion: A Prioritization Framework – Aniela Burant, Environmental Monitoring Branch**

The presentation started with remarks from the DPR Deputy Director for Monitoring and Mitigation, Madison Le, who emphasized that ambient air monitoring is both a technical undertaking and a matter of significant public concern. Le noted that the expansion of DPR's Air Monitoring Network (AMN) is intended to strengthen public health protections, improve transparency, and support long-standing community requests for additional pesticide air monitoring. She highlighted that the expansion is supported by permanent funding through the state budget, which will allow DPR to more than double the number of long-term monitoring stations statewide. Le reiterated that although pesticide air monitoring is a scientifically complex activity, it directly intersects with concerns around public health, environmental justice, and community trust.

The AMN Program Supervisor, Dr. Aniela Burant, provided an overview of the current Air Monitoring Network. The AMN generates long-term data on pesticides in ambient air in agricultural communities with elevated pesticide use. The network currently monitors 35 pesticides and 5 breakdown products, including fumigants such as 1,3-dichloropropene and chloropicrin, organophosphates, carbamates, organochlorines, herbicides, fungicides, and several insecticides. Some monitored chemicals are no longer registered in California but remain part of the analytical screen used at AMN stations. Weekly sampling at each station supports multi-year

datasets that allow DPR to evaluate seasonal, annual, and long-term concentration trends. These data are compared with screening levels for acute, subchronic, chronic, and lifetime exposures to identify conditions requiring further evaluation. The network also supports assessment of cumulative exposures to pesticides with shared modes of action, such as cholinesterase-inhibiting organophosphates.

Dr. Burant described the existing AMN stations located in Oxnard (Ventura County), Santa Maria (Santa Barbara County), Shafter (Kern County), and Pajaro (Monterey County). The Pajaro station was recently relocated from Royal Oaks to Pajaro Middle School based on updated siting criteria and community preference. The Delhi station in Merced County was converted from a 1,3-D-only location to a full AMN site in January 2026, and DPR is planning to convert the Fresno County 1,3-D site into a full station once an appropriate school site is secured. Many of these stations have generated more than a decade of continuous pesticide air monitoring data, a dataset noted as rare both nationally and internationally.

The presentation next went over the proposed expansion of the AMN. DPR received additional funding in the 2024 Budget Act to permanently expand ambient air monitoring, and the expansion includes three components. The first component is the conversion of existing 1,3-D-only stations to full AMN stations. The second component is the introduction of a mobile monitoring platform that can be deployed anywhere in California for shorter-term monitoring periods ranging from weeks to a full year. The mobile unit will contain standard sampling instrumentation and a weather tower, allowing it to collect data comparable to stationary AMN stations. The third component is the addition of four new long-term monitoring stations. The locations for the monitoring stations will be selected through a structured community prioritization framework process. DPR intends to implement all expansion components by the end of 2027.

Dr. Burant described the multi-step community prioritization framework used to identify candidate locations for the four new stations. First, DPR compiled a list of 1,611 communities statewide using 2020 Census boundaries. Second, DPR extracted pesticide use data from 2020 through 2024 for two pesticide groups: fumigants and organophosphates. These groups were prioritized because fumigants readily enter the gas phase and several are designated as toxic air contaminants, while organophosphates share a common physiological mechanism that can result in cumulative toxicity. For fumigants, DPR applied Emission Fractions (EFs), which estimate the proportion of applied product that volatilizes based on application method. EF adjustments allowed fumigant use to more closely reflect potential air emissions. Organophosphate use was not adjusted due to insufficient data.

Next, DPR used geospatial analysis to allocate pesticide use to concentric zones surrounding each community: within community boundaries, 0–1 mile outside the community boundary, 1–5 miles outside the boundary, and 5–10 miles outside the boundary for fumigants only. Pesticide use density was calculated as pounds applied per square foot and then divided by average wind speed to account for atmospheric dispersion conditions. This produced adjusted use densities for each community that more accurately represent potential airborne movement of pesticides.

The framework then removed communities located in counties with existing AMN stations—including Ventura, Santa Barbara, Monterey, Merced, Fresno, and Kern—to maintain geographic diversity and ensure that no county hosts more than one long-term AMN station. DPR identified 823 communities with fumigant use within 10 miles and 1,041 communities with organophosphate use within 5 miles, from which the top 50 communities in each pesticide category were selected. The resulting lists had partial overlaps. Using CalEnviroScreen 4.0 population characteristics percentiles, DPR re-ranked these communities to account for environmental justice considerations. Communities with higher PC percentiles, reflecting greater sensitivity to pollution based on demographic and socioeconomic indicators, received higher priority.

The analysis also incorporated school proximity because AMN stations are preferentially located on school properties. Communities without a school within one mile were removed. DPR further prioritized communities that were geographically clustered with other high-ranking communities, reasoning that locating a station within such clusters would maximize representation of multiple high-priority areas. This process yielded 21 fumigant-priority communities and 23 organophosphate-priority communities eligible for consideration as final monitoring sites.

Based on the refined list, DPR identified five counties with the highest number of high-priority communities: Tulare County (27), Stanislaus County (13), Imperial County (5), Siskiyou County (6), and San Joaquin County (2). These counties were proposed as candidates for the four new AMN stations, with Tulare identified as the highest priority. Dr. Burant explained that Santa Cruz and San Luis Obispo counties, although containing high-use communities, were excluded because neighboring Monterey and Santa Barbara Counties already host AMN stations located close to Santa Cruz County's and Santa Luis Obispo County's borders, respectively.

Feedback was requested from the public on both the proposed ranking of the five counties and the selection of specific communities within each county. Stakeholders were asked to consider factors such as accessibility for sample collection, availability of electrical power, site security, and the willingness of school partners. An example table for Imperial County was discussed, illustrating how community-specific factors such as CalEnviroScreen PC percentiles and fumigant and organophosphate use rankings may influence siting decisions. The public comment period for the AMN expansion proposal is open from March 12th through May 11th, 2026, and stakeholders were encouraged to submit comments through SmartComment.

Committee Comments

Garrett Keating (DIR): I have two questions. First, how do you account for population density in your site-selection process? I may have missed something, but I want to understand whether you consider how many people could be exposed. Second, with the new mobile monitoring unit, are you going to use that to validate air-modeling used in your risk assessments and evaluations? I'm wondering if that could be used to check some of your model predictions?

Aniela Burant (DPR): DPR does not currently account for population density in the site-selection procedure but welcomes comments suggesting its inclusion in future updates. Regarding the mobile monitoring station, DPR is still determining how it will be deployed and may consider model-validation uses depending on public feedback and other needs that may arise.

Wendy Linck (SWRCB): How does DPR decide which pesticides to monitor at these stations? I am also interested in whether emerging contaminants like Per- and Polyfluoroalkyl substances (PFAS) might be included in the future.

Aniela Burant: Each AMN station, including the mobile station, monitors for all 40 pesticides that I shared in the presentation. Pesticides are selected based on their likelihood of entering the air, toxicity, and the availability of analytical methods. Some chemicals cannot yet be included because validated analytical methods do not exist. I suspect increasing interest in PFAS and similar compounds going forward and will take that into consideration.

Stan Armstrong (CARB): I want to clarify the timeline. When you say the stations will be deployed by 2027, does that mean all new stations will be installed and operating by then?

Aniela Burant (DPR): Yes. By the end of 2027, all new AMN stations are expected to be fully deployed, and we will be collecting data by 2028 at all stations.

Stan Armstrong (CARB): You apply emission-fraction adjustments for fumigants but not for organophosphates. How does that affect prioritization, and could it bias which communities are selected?

Aniela Burant (DPR): Fumigants and organophosphates are ranked separately, so differences in methodology do not interfere with each other. For fumigants, emission-fraction adjustments help distinguish between application methods with higher or lower expected emissions and help us better select what communities to target. Organophosphates have no equivalent data, so all uses are treated uniformly. This does not distort the final prioritization because the lists are developed independently. Since the processes are done separately, one list will not impact the other and would not impact finding the best communities to select for this process.

Maziar Kandelous (DPR): We have the rankings for both lists for each community. So it's not an apples-to-oranges comparison. It's just one list for OPs, and one list for fumigants. Both lists are there independently, and they don't interfere with each other. For the emission fraction for the

fumigants, we will adjust the ranking based on which fumigant can go to the air based on the application method and which fumigant will stay in the soil longer. But for the OPs, you could assume that the adjustment is 1 for all of the OPs because we don't have those emissions to adjust for.

Elizabeth Marder (CDPH): I am really excited about this proposal. I was curious about the relocation of the Pajaro Ohlone monitoring site to Pajaro Middle School. That is a change where you have had a decade of data. Did you conduct any crossover monitoring between the old and new locations during the same seasons to compare concentrations and evaluate potential differences? And will there be an adjustment for the older data?

Aniela Burant (DPR): DPR did not perform crossover field monitoring. However, modeling was conducted, and results suggested that the new Pajaro Middle School site may experience slightly higher concentrations than the previous location. Because both sites are in the same township, the long-term dataset remains relevant. No adjustments will be applied to historical measurements because there is no reliable way to mathematically adjust past values.

Public Comments

Mike Zeiss (CPR): I believe you should add a new AMN objective: investigating the likely causes of high concentration spikes when detected and reporting findings. Do you agree that should be an objective?

Aniela Burant (DPR): That is a bit out of scope of this presentation. I will note that already inherent in the existing AMN objectives. When concentrations exceed screening levels or regulatory targets, DPR investigates those findings as part of routine procedures.

Mike Zeiss (CPR): In prioritization step five, you used CalEnviroScreen demographic metrics. Will you also consider metrics related to airborne toxicants other than pesticides?

Aniela Burant (DPR): No. The AMN prioritization process focuses solely on pesticide exposure metrics.

Mike Zeiss (CPR): In step two, you adjust use density by average wind speed. But wind varies significantly day to day and even hour to hour. Is average wind speed sufficient to justify that adjustment?

Aniela Burant (DPR): Yes, DPR used daily average wind-speed data from 145 statewide monitoring stations covering 2020–2024. These data are publicly available and considered appropriate for this screening-level analysis.

Mike Zeiss (CPR): In prioritization step six, when you select one community to represent nearby high-priority communities, did you consider prevailing wind direction during peak pesticide-use seasons?

Aniela Burant (DPR): No, DPR only considered average wind speed over those five years but did not incorporate wind direction into the analysis.

Mike Zeiss (CPR): Is there any actual data showing that low-emission fumigant application methods—such as TIF tarping—actually result in lower air concentrations? My concern is about uncommon but important events like tarp failures that could lead to unexpected concentration spikes.

Aniela Burant (DPR): Yes, DPR has application studies data demonstrating reduced emissions from low-emission application methods such as TIF tarps, and this informs the emission-fraction values used in prioritization. If tarp failures or similar events occur, they are treated as enforcement issues rather than monitoring issues.

Madison Le (DPR): Thanks for all the thoughts and opinions we have received so far, just wanted to remind everyone to please remember to submit written comments related to these questions through the formal public comment process. We will take all of it into consideration. If there are any suggestions that make sense for us to adopt during this process or in the future we will definitely take them into consideration.

Anne Katten (California Rural Legal Assistance Foundation): Would DPR consider using a mix of school and non-school sites for air monitoring? School buffers reduce pesticide use near schools, so school-based monitors may not represent exposures in residential areas where children live too. I also wonder whether the Parlier site could be retained.

Madison Le (DPR): Sensitive sites such as schools have been preferred monitoring locations because of their sensitive populations, but you make a good technical point and the department will consider the suggestion and assess whether alternative non-school sites may be appropriate.

Kathleen Kilpatrick (Safe Ag / Safe Schools Campaign for Organic and Regenerative Agriculture): I want to point out that the Pajaro-valley area air monitor has been renamed twice first it was called the Watsonville monitor, then Ohlone monitor, now it's the Pajaro monitor and its current location may not reflect pesticide emissions in the Salinas Valley much more reflective of emissions in the Pajaro Valley. When I examine school-district-level data using PAN data, I see extremely high pesticide use (2017-2022) that does not appear reflected in your maps. Why are high-use communities such as those in Kings County or Kettleman City absent? It seems like your method focuses too narrowly on small communities and misses the broader regional exposure picture. I highly recommend you also look at the county numbers and the school district numbers as those are the overall exposure to those in these areas including the children. Also, just to remind everyone of the history of the monitoring sites, the long term monitoring sites were not just selected by DPR decision making but were selected at schools because of a lawsuit on the part of parents of school children worried about exposures to methyl bromide.

Aniela Burant (DPR): We encourage submission of these concerns through the formal public comment process. Suggestions such as incorporating county-level or school-district-level metrics—or adding additional counties—will be reviewed as part of the broader evaluation.

3. **Linuron Draft Risk Characterization Document – Brandon Brown and Andy Rubin, Human Health Assessment Branch**

Dr. Brandon Brown and Dr. Andrew Rubin, Staff Toxicologists in the Toxicology Evaluation and Risk Assessment Section of DPR's Human Health Assessment (HHA) Branch jointly presented on the Draft Human Health Risk Characterization Document for Linuron. Dr. Brown presented first and noted that the findings being presented were detailed in both the draft risk characterization document and the exposure assessment document distributed for external review in November. He explained that the scope of the assessment encompassed all registered uses of linuron in California that are approved only for specific agricultural crops and weed-control applications. Potential exposures could occur for pesticide handlers during mixing, loading, and application; agricultural workers reentering treated fields; residential bystanders via primary or secondary (revolatilization) spray drift, contaminated indoor air or house dust; and swimmers who may be exposed through swimming in water bodies contaminated with linuron following runoff. Acute and chronic dietary exposures from food and drinking water were also evaluated as part of the analysis.

Linuron is a phenylurea herbicide used to control grasses and broadleaf weeds. In California, crops most commonly treated between 2018 and 2022 included carrot, cilantro, celery, parsley, and asparagus. Additional registered uses include potato, cotton, corn, applications to roadside rights-of-way, and nursery or greenhouse sites. Dr. Brown emphasized that linuron acts by inhibiting photosynthesis, specifically by blocking electron transport, and that differential

metabolism explains its selectivity—crop plants can metabolize linuron more effectively than weeds. Pesticide use reporting data show a steady decline in linuron use since 2012.

Dr. Brown summarized available human health information, noting that between 1992 and 2024 only three linuron-related illnesses were reported to DPR's Pesticide Illness Surveillance Program (PISP), with no registrant-submitted adverse effect reports or SENSOR cases. Reported symptoms included nausea, vomiting, headaches, blurred vision, swelling, and hives. Four epidemiology studies were identified—two from California, one from Brazil, and one from the Netherlands—evaluating endpoints such as acute lymphoblastic leukemia, medulloblastoma, antinuclear antibodies, and increased birth weight. None provided dose–response data, and most involved co-exposures to multiple pesticides, leading to insufficient evidence for establishing causal relationships.

Dr. Brown explained that the toxicological database used in the assessment came from open-literature studies, registrant-submitted studies required under FIFRA and California's Birth Defect Prevention Act, and data evaluated through a process of systematic review. He introduced key risk assessment terminology, including data acceptance criteria, points of departure (PODs), PECO (Population, Exposure, Comparator, Outcome) criteria for literature screening, mode of action, and the margin of exposure (MOE) framework used by DPR. He described the systematic review process, noting that over 500 references were screened, with 31 meeting PECO criteria; however, none met DPR's data acceptance requirements for establishing PODs. Supplemental mechanistic and toxicokinetic studies were used to characterize modes of toxicity. He summarized several mechanistic pathways, explaining that linuron or its metabolites can oxidize heme iron to produce methemoglobin, leading to potential hemolytic anemia, that linuron promotes neuroinflammation by activating pro-inflammatory astrocyte responses, and that linuron disrupts androgen signaling by competing with dihydrotestosterone for androgen-receptor binding sites, thereby disrupting the hypothalamus–pituitary–testes axis, increasing luteinizing hormone, and contributing to testicular tumors seen in rat studies. Developmental and reproductive toxicity is believed to result from linuron-induced alterations in androgen-dependent tissue development.

Dr. Rubin then took over to discuss the critical toxicity studies selected for establishing PODs. He explained that DPR reviews studies to identify the most sensitive adverse effects and chooses the lowest toxicity thresholds as critical PODs. For linuron, the acute POD of 2 mg/kg/day was based on decreased total motor activity in rats from an acute oral neurotoxicity study, while the POD of 0.3 mg/kg/day for subchronic and chronic exposure was based on increased methemoglobin and sulfhemoglobin levels in a chronic oral study in dogs. He described the clinical significance of methemoglobin formation as an oxidized hemoglobin species with reduced oxygen-carrying and oxygen-off-loading capacity, which contributes not only to direct adverse effects but also to downstream hematologic toxicity including methemoglobinemia, hemosiderin deposition, and hemolytic anemia. Regarding carcinogenicity, he noted that linuron induces testicular interstitial adenomas in rats via an androgen-disruption mode of action and causes liver tumors in mice only at high doses associated with excessive systemic toxicity. DPR did not perform a quantitative cancer risk assessment for either tumor type because probable biological modes of action were identified and the evidence for mutagenicity was practically nil. Furthermore, the U.S. EPA classifies linuron as a Group C (possible human) carcinogen that

does not require quantitative risk estimation. The chronic POD is 17-fold lower than tumor-inducing doses, providing sufficient protection.

Dr. Rubin reviewed the dietary exposure assessment performed using commodity consumption data from NHANES and residue data from USDA's Pesticide Data Program (PDP). Detected residues were used where available (63 food forms), while default tolerance levels were used when data were insufficient (21 food forms). Drinking-water exposure was also incorporated. Deterministic acute and chronic dietary exposure estimates indicated that children aged 1–2 years had the highest potential exposure by this route, with infants and women of childbearing age also among the more highly exposed subpopulations. Carrots were identified as the greatest single-commodity contributor to exposure. He emphasized that the dietary assessment was health conservative, assuming maximum detected residue levels or federal tolerance levels.

Dr. Rubin went on to describe the non-dietary exposure assessments, which evaluated five groups of scenarios. These included pesticide handlers, agricultural reentry workers, residential bystanders exposed to primary or secondary spray drift, residential bystanders exposed to indoor house dust, and swimmers in contaminated waters. These assessments incorporated dermal, inhalation, and incidental oral routes, depending on the scenario. He explained the exposure-duration metrics used: the short-term absorbed daily dosage (STADD), representing exposures up to one week; the seasonal average daily dosage (SADD), representing exposures greater than a week and up to a year; the annual average daily dosage (AADD); and the lifetime average daily dosage (LADD). Different exposure and modeling tools were used depending on the scenario. These included the Pesticide Handler Exposure Database (PHED) for handlers, DPR/U.S. EPA methodologies for reentry workers, AgDRIFT® for primary spray drift, air-dispersion modeling for secondary drift, and the SWIMODEL for swimmer exposures. Indoor-dust exposures were assessed using the method developed by Weschler & Nazaroff (2010).

He then explained how margins of error (MOEs) were calculated and interpreted. The margin of exposure is the ratio of a critical POD to an exposure estimate; values below the target MOE of 100 indicate potential health risk. The target MOE was calculated as the product of two default assumptions: an animal-to-human uncertainty factor of 10 and an intra-human uncertainty factor of 10. Combined exposure refers to simultaneous dermal and inhalation exposure, while aggregate exposure includes all dietary and non-dietary exposures occurring over the same duration. He presented the risk characterization findings, noting that handler scenarios showed MOEs ranging from 1 to 77 across acute, subchronic, and chronic durations for combined dermal and inhalation exposures. All were below the target MOE of 100 and therefore indicative of risk. As for reentry workers exposed only dermally, approximately half of the scenarios exhibited MOEs less than 100. The latter risk-laden reentry scenarios showed acute, subchronic, and chronic MOEs ranging from 3 to 84. Four additional reentry scenarios fell below 100 when aggregate values were calculated (i.e., when dietary/drinking water exposures were added). Residential bystander exposures via drift, indoor dust, volatilization, and swimming did not result in MOEs below 100 when evaluated separately; however, one aggregate scenario indicated potential risk for children exposed to spray drift and deposition 25 feet from a field edge following a high-ground-boom application. Dietary/drinking water exposures for all

subpopulations produced MOEs greater than 1,000, indicating no dietary risk when considered independently of potential exposures by other routes.

The presentation concluded with an overall summary showing that (1) all combined and aggregate handler MOEs indicated the presence of human health risk for all exposure durations (acute, subchronic, and chronic); (2) approximately half of reentry scenarios showed risk under dermal exposure alone with four additional reentry scenarios showing risk when dietary exposure was incorporated; and (3) only one residential bystander scenario showed risk, and only under aggregate exposure conditions. Dr. Brown and Dr. Rubin acknowledged the contributions of the full HHA linuron team and invited questions from committee members and the public.

Committee Comments

Garrett Keating (DIR): I have two quick toxicology questions. First, regarding the tumor data for rats: were there any tumor sites other than the testicular adenomas that formed the basis for the positive cancer finding? Were all other sites negative?

Andy Rubin (DPR): Yes, all other sites were negative. The testicular tumors were observed in rats, while the hepatic tumors occurred in mice. These studies were thorough; virtually every tissue in the animals was evaluated. No other tumors were detected, and certainly none that could be correlated with linuron exposure.

Garrett Keating (DIR): My second question is about the methemoglobin data — the subchronic and chronic endpoints. Did both come from the same study? I'm wondering whether the chronic study was used to "backfill" the subchronic value. Was the POD derived from a NOEL or a LOEL? And was this modeled or taken directly from the study?

Brandon Brown (DPR): The subchronic and chronic PODs both came from the same chronic oral dog study. That study included measurement timepoints at 3, 6, and 9 months of exposure, which are considered subchronic timeframes, in addition to the full chronic duration which was 1 year. We observed that the increase in blood methemoglobin levels had stabilized by 3 months and showed no further increases even after 12 months of exposure. The POD was derived using benchmark dose modeling which, when the data were sufficient (as was the case in this study), is a more reliable method of POD determination than the NOEL/LOEL approach.

Garrett Keating (DIR): The exposure graph in the presentation was extremely dense — every point representing a different scenario. Some appear to use PHED, others dermal models, others

inhalation. Are all those individual points representing unique scenarios, and can this help guide targeted mitigation for specific occupational activities?

Andy Rubin (DPR): Correct. Each point represents a distinct scenario. Because both dermal and inhalation routes are represented for handlers, the number of data points is double the number of scenarios. Squares correspond to inhalation-based estimates, and triangles correspond to dermal. This level of granularity can indeed help guide mitigation or intervention strategies for specific occupational tasks.

Public Questions

Mike Zeiss (CPR): Many agricultural handlers and re-entry workers live in communities near agricultural fields. When you calculated aggregate exposure, did you include potential exposure at home?

Andy Rubin (DPR): No, except when dietary and drinking water exposures were added to produce aggregate values, which applied to all the scenarios analyzed in the assessment. However, when we evaluated specific occupational tasks, we first assessed that task alone (i.e., dermal + inhalation routes) to produce combined risk values, then added dietary/drinking water exposure to produce aggregate risk values.

Mike Zeiss (CPR): Can you mention a few of the highest risk scenarios for re-entry workers—which crops or which work tasks?

Andy Rubin (DPR): Re-entry workers are exposed by the dermal route alone. The RCD documents each of these exposure scenarios separately. The highest risk scenarios are typically hand harvesting activities. We would have to look back to see what other tasks are in the risk levels, but it's easily identified in the RCD. We can follow up with the exposure assessors to identify crops and tasks in more detail.

Andy Rubin (DPR) (*this is additional follow-up provided after the meeting*)**:** Exposure scenarios with the highest risk for reentry workers (that is, exhibited the lowest MOEs below the target of 100) were associated with irrigation and hand harvesting for many crops, as well as with sod transplanting and maintenance, although many other scenarios fall under this rubric.

Anne Katten (CRLAF): What mitigations are being considered to reduce handler and re-entry worker exposures and risk?

Andy Rubin (DPR): DPR's Human Health Assessment Branch identifies risk values based on the best available science. Mitigation decisions fall outside HHA's purview and are addressed at later stages by other programs within DPR.

Samantha Jones (DPR): Hello everyone, I am the Branch Chief for HHA. This presentation is specifically on the draft risk characterization document. Mitigation will be evaluated at a later time after the document is finalized, incorporating peer review and departmental considerations.

Anne Katten (CRLAF): How do the low acute-to-chronic MOEs for handlers and re-entry workers impact the cancer risk?

Andy Rubin (DPR): In our estimation, the very low chronic POD would protect from the development of cancer, as it is lower than the doses that produced tumors or putative precursor lesions in animal studies.

Anonymous: Have you considered using California-specific consumption data for dietary exposure assessment?

Andy Rubin (DPR): We can use California specific data, but our dietary exposure assessment relied primarily on USDA's PDP dataset, which includes samples from multiple labs nationwide including California. Of course, we can check how much California data contributed to the final estimates, but because our dietary MOEs were extremely high using the national dataset, they would likely remain so using only California data.

Andy Rubin (DPR) (*this is additional follow-up provided after the meeting*): If the question referred to commodity consumption rates for Californians, then we explained in the presentation that the Dietary Exposure Evaluation Model (DEEM v4.02), that is built on WWEIA-NHANES data (What We Eat In America-National Health And Nutrition Examination Survey), does not differentiate consumers based on their state of residence. In other words, California-specific consumption rates for any commodity in DEEM were/are not available. This is because the geographic locations of WWEIA-NHANES participants were/are not publicly accessible and were not incorporated into DEEM. Therefore, all consumption rates used to estimate exposure by the model provided a nationally representative sample rather than one that was California specific.

On the other hand, if the question concerned the presence of linuron residues in produce grown or sold in California, it is important to emphasize that California-specific samples in PDP residue data do not necessarily include only California-grown foods but also may include foods imported into California and subsequently analyzed by the PDP program. For linuron, DPR conducted a Tier 2 dietary exposure analysis which partially refined the exposure estimate by using the maximum detected PDP residue concentration for each commodity, when available, rather than the tolerance limit. Restricting the PDP data used in this assessment to California-grown samples residues would have:

a) reduced the level of refinement because there may not be sufficient residue data for each commodity evaluated, resulting in more commodity residues defaulting to the tolerance
b) excluded PDP data from samples collected outside of California that contained high residue concentrations.

DPR's approach is to use all the available national PDP data in its dietary assessments, including California-specific samples grown and sold in the state as well as samples from other states. However, for drinking water exposure estimation, the relevant residues were measured only in California waters and not in waters elsewhere in the country.

Anne Katten (CRLAF): If indoor dust exposure is considered, why isn't dust inhalation included for re-entry workers?

Andy Rubin (DPR): Indoor house dust exposure is most relevant for indoor residents. Reentry worker exposure is predominantly dermal. Due to reentry intervals and linuron's vapor pressure, inhalation of linuron in the gas phase during reentry is considered to be a minimal possibility. We can follow up specifically regarding dust.

Andy Rubin (DPR) (*this is additional follow-up provided after the meeting*): Currently, no validated methodologies exist to quantify post-application inhalation exposure to pesticide-contaminated dust among reentry workers. However, ongoing HHA efforts are focused on characterizing exposure pathways associated with dust generated by physical disturbance of treated foliage (e.g., during harvesting), which may be applicable in the future for assessing post-application dust inhalation exposure in this population.

DPR recognizes the possibility that reentry worker exposures could be underestimated in the linuron RCD because an inhaled dust component was not assessed. While the contribution to combined exposure may be slight relative to dermal exposure, a statement to this point will be added to the Risk Appraisal section in the revised RCD.

Anonymous: Why not use DPR food residue data rather than USDA PDP data?

Andy Rubin (DPR): DPR's food residue program samples whole commodities, including inedible portions, and is used mainly for enforcement of tolerances. PDP data enable a better (i.e., more accurate) representation of actual human dietary exposures.

Kathleen Kilpatrick (SASS / CPR): I appreciate the thorough risk characterization and I think you did a great thorough job and I hope to see these for all the other toxic chemicals on PREC's to do list. It does help to understand who (and how) might be impacted by these pesticides. My concern is the missing piece: risk communication. What guidance will handlers, and re-entry workers, receive about these risks and how to protect themselves? I'm concerned about the hematological effects and how you are also communicating to healthcare providers and first responders that may respond to a chronic or acute health incident. It's really important to be able to communicate to everyone who uses or comes in contact with these pesticides.

Andy Rubin (DPR): You're absolutely right — risk communication is critical. HHA develops the scientific risk estimates. Once the document is finalized, DPR will undertake both mitigation and risk communication strategies. What you heard today, i.e., the description and outcome of the risk assessment process, is only a first step. Risk communication will come during later steps.

5. Agenda Items for Next Meeting

None suggested from the committee.

The next PREC meeting is scheduled for May 15, 2026, at 10:00 am. This meeting will be held virtually on the Zoom platform and broadcast live on the CalEPA webcast page <video.calepa.ca.gov/>

6. Adjourn