

Clothianidin's, Imidacloprid's, and Thiamethoxam's Updated Occupational Exposure Assessments for Seed Treatment Uses: Guide to Commenters

Background

The Environmental Protection Agency (EPA) is opening a 60-day public comment period for clothianidin's, imidacloprid's, and thiamethoxam's updated occupational exposure assessments for seed treatment uses in support of the registration review for these nitroguanidine-substituted neonicotinoids (herein referred to as, "neonicotinoids"). These neonicotinoids have many registered use sites, and there are over 100 seed treatment registrations for clothianidin, imidacloprid, and thiamethoxam combined.

In February 2020, the Agency released the proposed interim decisions (PIDs) for the registration review of these neonicotinoids followed by a 60-day public comment period, which was extended for 30 days and then re-opened for an additional 30 days. Since the issuance of the 2020 PIDs, EPA has received more current and reliable data that were used to update EPA's policies 14 and 15.^{1,2} Primary revisions to these seed treatment policies include updates to the relevant exposure scenarios and how much exposure to the workers can occur when treating and handling treated seeds and cleaning seed treating equipment. Using the updated seed treatment policies, EPA revised the occupational exposure and risk assessments for all seed treatment uses, these revisions resulted in higher worker exposure and risk estimates than previously estimated. When all else is equivalent to previous assessments (*e.g.*, toxicity reference values are the same), there has been a large increase in the estimated dermal and/or inhalation risks of concern for workers conducting seed treatment activities. To further evaluate these estimates, the Agency has developed a list of questions to determine if chemical-specific use information aligns with the data and assumptions supporting the updates to policies 14 and 15. These questions are grouped by seed treatment risk scenarios and include topics such as cleaning, treating, loading/planting, and packaging in commercial seed treatment facilities. These questions also focus on evaluating treating/planting scenarios for on-farm seed treatments. Each scenario includes the description of the data used to assess the risk and is followed by a list of chemical-specific use questions.

Public Comment Period

The public is invited to comment on the Agency's occupational exposure assessments for seed treatment uses for these neonicotinoids. The public comment period will be 60 days from when the Federal Register Notice announces the availability of the document. The Agency will carefully consider all comments received during the public comment period, as well as any

¹ https://www.epa.gov/system/files/documents/2022-01/exposac-policy-14_seed-treatment-exposure-data.pdf

² https://www.epa.gov/system/files/documents/2022-01/exposac-policy-15_amount-seed-treated-planted.pdf

additional information or data provided in a timely manner. The neonicotinoids' registration review documents can be found at www.regulations.gov in the following dockets:

- Clothianidin: EPA-HQ-OPP-2011-0865
- Imidacloprid: EPA-HQ-OPP-2008-0844
- Thiamethoxam: EPA-HQ-OPP-2011-0581

Seed Treatment Questions

Soliciting seed treatment information – *for the cleaning scenario*

For clothianidin, imidacloprid, and thiamethoxam, potential risks of concern have been identified for those who clean seed treatment equipment. This worker subset has not been systematically evaluated for pesticide exposure and risk by EPA in the past because sufficient data were not available on which to base such evaluations. Recently, data on the pesticide exposures of cleaners of seed treatment equipment became available and have been reviewed by the Agency. Based on data from these studies, the potential exposures of these workers, who we will refer to as “cleaners” are far greater than any other *commercial* seed treatment activity (mixer/loaders, treaters, and packagers).

The studies of exposure to cleaners of seed treatment equipment were based on:

- Closed system for treating seed:
 - Single batch treaters
 - Continuous-batch treaters
- Equipment had been used to treat the following seed types before it was cleaned:
 - Cotton
 - Canola
 - Corn
 - Barley
 - Maize
 - Oats
 - Wheat

Risks of concern were identified for cleaners who clean equipment after the treatment of the following seed types:

Clothianidin:

- | | |
|--------------------------------|--|
| • Beet, sugar | • Lettuce, head; film-coated |
| • Broccoli, film-coated | • Lettuce, head; encrusted/pelleted |
| • Broccoli, encrusted/pelleted | • Lettuce, leaf; film-coated |
| • Carrot, film-coated | • Lettuce, leaf; encrusted/pelleted |
| • Carrot, encrusted/pelleted | • Onion, bulb, dry; film-coated |
| • Corn, pop | • Onion, bulb, dry; encrusted/pelleted |

- Endive, film-coated
- Endive, encrusted/pelleted
- Leek, film-coated
- Leek, encrusted/pelleted

- Onion, green; film-coated
- Onion, green; encrusted/pelleted
- Parsley, film-coated
- Parsley, encrusted/pelleted

Imidacloprid:

- Canola
- Carrot, film-coated
- Carrot, encrusted/pelleted
- Corn, field
- Corn, pop
- Corn, sweet
- Cotton
- Crambe, film-coated
- Crambe, encrusted/pelleted
- Flax

- Millet, Japanese
- Millet, pearl
- Millet, proso
- Mustard seed, film-coated
- Mustard seed, encrusted/pelleted
- Mustard seed
- Safflower
- Sorghum, grain
- Sunflower

Thiamethoxam:

- Alfalfa
- Amaranth, Chinese (Spinach, Chinese); film-coated
- Amaranth, Chinese (Spinach, Chinese); encrusted/pelleted
- Balsam pear (Bittermelon)
- Barley
- Bean, broad (Faba)
- Bean, dry
- Bean, lima
- Bean, navy
- Bean, snap
- Bean, Yardlong
- Beet, sugar
- Broccoli, film-coated
- Broccoli, encrusted/pelleted
- Broccoli, Chinese; film-coated
- Broccoli, Chinese; encrusted/pelleted
- Brussels sprout, film-coated
- Brussels sprout, encrusted/pelleted
- Buckwheat
- Cabbage, film-coated
- Cabbage, encrusted/pelleted
- Cabbage, Chinese; film-coated

- Millet, pearl
- Millet, proso
- Muskmelon, film-coated
- Muskmelon, encrusted/pelleted
- Mustard greens, film-coated
- Mustard greens, encrusted/pelleted
- Mustard seed, film-coated
- Mustard seed, encrusted/pelleted
- Mustard seed
- Mustard, Chinese; film-coated
- Mustard, Chinese; encrusted/pelleted
- Oat
- Onion, dry, bulb; film-coated
- Onion, dry, bulb; encrusted/pelleted
- Onion, green; film-coated
- Onion, green; encrusted/pelleted
- Other Brassica (5A), film-coated
- Other Brassica (5A), encrusted/pelleted
- Other Brassica (5B), film-coated
- Other Brassica (5B), encrusted/pelleted
- Other, Cereal grains (15)
- Other, Cucurbits (9A); film-coated
- Other, Cucurbits (9A); encrusted/pelleted
- Other, Cucurbits (9B)

- Cabbage, Chinese; encrusted/pelleted
- Canola
- Cantaloupe, film-coated
- Cantaloupe, encrusted/pelleted
- Carrot, film-coated
- Carrot, encrusted/pelleted
- Cauliflower, film-coated
- Cauliflower, encrusted/pelleted
- Celery, film-coated
- Celery, encrusted/pelleted
- Chayote
- Collards, film-coated
- Collards, encrusted/pelleted
- Corn, field
- Corn, pop
- Corn, sweet
- Cotton
- Cowpea
- Cucumber, film-coated
- Cucumber, encrusted/pelleted
- Endive, film-coated
- Endive, encrusted/pelleted
- Fennel, film-coated
- Fennel, encrusted/pelleted
- Flax
- Guar
- Honeydew, film-coated
- Honeydew, encrusted/pelleted
- Kale, film-coated
- Kale, encrusted/pelleted
- Kohlrabi, film-coated
- Kohlrabi, encrusted/pelleted
- Lentil, film-coated
- Lentil, encrusted/pelleted
- Lettuce, head; film-coated
- Lettuce, head; encrusted/pelleted
- Lettuce, leaf; film-coated
- Lettuce, leaf; encrusted/pelleted
- Lupin, white
- Other, Leafy (4A); film-coated
- Other, Leafy (4A); encrusted/pelleted
- Other, Leafy (4B); film-coated
- Other, Leafy (4B); encrusted/pelleted
- Other, Legume (6A)
- Other, Legume (6B)
- Other, Legume (6C)
- Other, Oil seed (20A)
- Other, Oil seed (20B)
- Parsley, film-coated
- Parsley, encrusted/pelleted
- Pea, edible-podded
- Pea, field
- Pea, garden
- Pea, pigeon
- Pea, southern
- Peanut
- Potato
- Pumpkin
- Rape greens, film-coated
- Rape greens, encrusted/pelleted
- Rhubarb, film-coated
- Rhubarb, encrusted/pelleted
- Rice
- Rye
- Safflower
- Sorghum, grain
- Soybean
- Spinach, film-coated
- Spinach, encrusted/pelleted
- Squash, Chinese
- Squash, summer
- Squash, winter
- Sunflower
- Swiss chard, film-coated
- Swiss chard, encrusted/pelleted
- Triticale
- Watermelon
- Wheat

Questions for stakeholders:

- Does your seed treatment equipment require cleaning? If so, describe in detail the process by which your machine to treat seeds is cleaned.
- How representative are the types of equipment discussed in the exposure studies of the equipment used to treat seeds in your area?
 - What other types of equipment are in use?
 - How do these other types of equipment differ in how they are cleaned from single and continuous batch treaters?
 - Schematics, photos, and videos of the equipment are appreciated.
- Describe how seed treatment equipment differs, particularly with respect to how they are cleaned, that treat small seeds (e.g., many vegetables) and large seeds (e.g., cotton or corn).
- Describe the clothing and/or PPE that the cleaner wears when cleaning equipment and name/describe the type of seed treater.
- How many hours in one workday does a person spend cleaning equipment?
- How many days per year does a person spend cleaning equipment?
- Do you use the maximum label application rate on the [type/use] seeds?
- What is the maximum rate used to treat [type/use] seeds?
- What is the average (“typical”) rate used to treat [type/use] seeds?
- What is the median rate (some XXth percentile) used to treat [type/use] seeds?

Soliciting seed treatment information – *for the treating scenario*

For clothianidin, imidacloprid, thiamethoxam, potential risks of concern have been identified for those individuals who treat seeds. Individuals who treat seeds with pesticides will be referred to as “treaters.” The treating scenario represents any possible commercial seed treatment (CST) workday during which CST worker exposure is the result of performing any combination of packaging, treating, or cleanout tasks, but not exclusively packaging or exclusively cleanout. This “treater” scenario includes several tasks that are critical to the CST process and generally involve just a few specially trained workers at each facility, including mixing and loading chemical, calibrating the treater, treating/coating the seed and sampling “wet” treated seed. This worker subset has not been specifically evaluated for pesticide exposure and risk by EPA in the past because sufficient data were not available on which to base such evaluations. Recently, data on the pesticide exposures of treaters became available, have been reviewed by the Agency, and are now incorporated in the updated Policy 14.

The studies of exposure to treaters were based on the following assumptions:

- Closed systems used for treating seed:
 - Continuous flow treaters
 - Single batch treaters
 - Continuous-batch treaters
- Treaters working with the following seed types (range of pounds of seed treated):
 - Barley (163,803 – 289,908)
 - Canola (29,829 – 142,378)

- Corn (33,656 – 349,383)
- Cotton (12,250 – 121,455)
- Maize (58,422 – 96,562)
- Oats (72,312)
- Oilseed rape (19,511 – 62,082)
- Wheat (61,895 – 189,597)
- Exposure to liquid formulations of fungicides and insecticides

Risks of concern were identified for treaters who had treated the following seed types:

Clothianidin:

- Corn, pop

Imidacloprid:

- Safflower

Thiamethoxam:

- | | |
|---|---|
| • Alfalfa | • Mustard seed |
| • Amaranth, Chinese; film-coated | • Mustard, Chinese; film-coated |
| • Amaranth, Chinese; encrusted/pelleted | • Oat |
| • Balsam pear (Bittermelon) | • Onion, dry, bulb; film-coated |
| • Barley | • Onion, green; film-coated |
| • Bean, broad (Faba) | • Other, Brassica (5A); film-coated |
| • Bean, dry | • Other, Brassica (5B); film-coated |
| • Bean, lima | • Other, Cereal grains (15) |
| • Bean, navy | • Other, Cucurbits (9A); film-coated |
| • Bean, snap | • Other, Cucurbits (9B) |
| • Bean, Yardlong | • Other, Leafy (4A); film-coated |
| • Broccoli, film-coated | • Other, Leafy (4A); encrusted/pelleted |
| • Broccoli, Chinese; film-coated | • Other, Leafy (4B); film-coated |
| • Brussels sprout, film-coated | • Other, Leafy (4B); encrusted/pelleted |
| • Buckwheat | • Other, Legume (6A) |
| • Cabbage, film-coated | • Other, Legume (6B) |
| • Cabbage, Chinese; film-coated | • Other, Legume (6C) |
| • Canola | • Other, Oil seed (20A) |
| • Cantaloupe, film-coated | • Other, Oil seed (20B) |
| • Carrot, film-coated | • Parsley, film-coated |
| • Cauliflower, film-coated | • Pea, edible-podded |
| • Celery, film-coated | • Pea, field |
| • Celery, encrusted/pelleted | • Pea, garden |
| • Chayote | • Pea, pigeon |

- Corn, field
- Corn, pop
- Corn, sweet
- Cotton
- Cowpea
- Cucumber
- Fennel, film-coated
- Fennel, encrusted/pelleted
- Flax
- Guar
- Honeydew, film-coated
- Kale, film-coated
- Kohlrabi, film-coated
- Lettuce, head; film-coated
- Lettuce, leaf; film-coated
- Lupin, white
- Millet, pearl
- Millet, proso
- Muskmelon, film-coated
- Mustard greens, film-coated
- Pea, southern
- Peanut
- Potato
- Pumpkin
- Rape greens, film-coated
- Rhubarb, film-coated
- Rhubarb, encrusted/pelleted
- Rice
- Rye
- Safflower
- Sorghum, grain
- Soybean
- Squash, Chinese
- Squash, summer
- Squash, winter
- Sunflower
- Triticale
- Watermelon
- Wheat

Questions for stakeholders:

- How common is the use of liquid versus solid (dust) formulations on each type of seed that you treat?
- Is one formulation type (*e.g.*, liquid, dust) preferred over the other? If so, why? Please list the type of seed when providing a preference for a formulation.
- Given that “treaters” who were monitored in exposure studies performed multiple activities that included some equipment cleaning and seed packaging as well as mixing and loading chemicals, calibrating the treater, treating/coating the seed, and sampling “wet” treated seed, please describe in detail all the activities performed by a worker who is a designated seed treater in your treatment facility. (Please do not include details for workers who exclusively clean equipment or package seeds.)
- Please describe the PPE worn by the worker who is the designated treater in your operation when they treat seed.
- Do you use the maximum label application rate for [type/use] seeds?
- What is the maximum rate used to treat [type/use] seeds?
- What is the average (“typical”) rate used to treat [type/use] seeds?
- What is the median rate (some XXth percentile) used to treat [type/use] seeds?
- For **small-seeded vegetables**, the Agency assumes that 3,000 pounds of seed are treated per day by one worker. For the types of small-seeded vegetables that are treated in your facility, how many pounds of small-seeded vegetable seeds are treated by each worker in an

eight-hour day? Please state the type of small-vegetable seed when providing an estimate of weight.

- For **large-seeded vegetables** (e.g., beans, squash, watermelon, pea, cowpea, and pumpkins), the Agency assumes that 339,500 pounds of seed are treated by each worker in one eight-hour day. For large-seeded vegetables treated in your facility, how many pounds of large-seeded vegetable seeds are treated by each worker in an eight-hour day? Please state the type of large-vegetable seed when providing an estimate of weight.
- For other non-vegetable seeds treated in your facility, please provide an estimate of weight treated by a worker in an eight-hour day. Please state the type of seed treated when providing your estimate.

Soliciting seed treatment information – *for the loading/planting scenario*

For clothianidin, imidacloprid, and thiamethoxam, potential risks of concern have been identified for those individuals who load and plant treated seeds. Individuals who load and plant seeds with pesticides will be referred to hereafter as “loader/planters.” Workers in relevant exposure studies were monitored while both loading treated seed and planting the treated seed. Separate samples were not taken during each activity. Therefore, it is not possible to differentiate exposure from the loading versus the planting activities. Workers typically performed other tasks in addition to driving the tractor through the field while planting, such as making sure that the seed is properly planted (e.g., by checking seed depth and making adjustments or repairs as needed) or leveling the seed in the hopper as needed. It would also include any ‘background’ exposure such as contact with contaminated surfaces or equipment in the workday environment. This worker subset has not been specifically evaluated for pesticide exposure and risk by EPA in the past because sufficient data were not available on which to base such evaluations. However, recently data on the pesticide exposures of loader/planters became available, have been reviewed by the Agency, and are now incorporated in its updated Policy 14.

The studies of exposure to loader/planters were based on:

- Treated seed loading techniques:
 - forklift
 - manual pour
 - container lift
- Planting equipment:
 - pneumatic
 - conventional
- Workers loaded and planted the following seed types (acres planted by seed type).
 - Corn 13.6 – 101.6 acres
 - Wheat 12.4 – 46.9 acres

Risks of concern were identified for loader/planters who had loaded/planted the following seed types:

Clothianidin:

- Beet, sugar
- Onion, green; film-coated
- Onion, green; encrusted/pelleted)
- Parsley, film-coated
- Parsley, encrusted/pelleted

Imidacloprid:

- Beans, navy

Thiamethoxam:

- | | |
|--|---|
| • Amaranth, Chinese (Spinach, Chinese); film-coated | • Other, Brassica (5B); encrusted/pelleted |
| • Amaranth, Chinese (Spinach, Chinese); encrusted/pelleted | • Other, Cucurbits (9A); film-coated |
| • Barley | • Other, Cucurbits (9A); encrusted/pelleted |
| • Bean, dry | • Other, Cucurbits (9B); film-coated |
| • Bean, lima | • Other, Cucurbits (9B); encrusted/pelleted |
| • Bean, navy | • Other, Leafy (4A); film-coated |
| • Bean, snap | • Other, Leafy (4A); encrusted/pelleted |
| • Bean, Yardlong | • Other, Leafy (4B); film-coated |
| • Buckwheat | • Other, Leafy (4B); encrusted/pelleted |
| • Canola | • Other, Legume (6A) |
| • Carrot, film-coated | • Other, Legume (6B) |
| • Corn, field | • Other, Legume (6C) |
| • Corn, pop | • Other, Oil seed (20A) |
| • Corn, sweet | • Other, Oil seed (20B) |
| • Cotton | • Parsley, film-coated |
| • Cucumber, film-coated | • Parsley, encrusted/pelleted |
| • Cucumber, encrusted/pelleted | • Pea, edible-podded |
| • Fennel, film-coated | • Pea, field |
| • Fennel, encrusted/pelleted | • Pea, garden |
| • Flax | • Peanut |
| • Kale, film-coated | • Potato |
| • Kale, encrusted/pelleted | • Pumpkin |
| • Lettuce, head, film-coated | • Rape greens, film-coated |
| • Lettuce, head, encrusted/pelleted | • Rape greens, encrusted/pelleted |
| • Lupin, white | |

- Muskmelon, film-coated
- Muskmelon, encrusted/pelleted
- Mustard, Chinese; film-coated
- Mustard, Chinese; encrusted/pelleted
- Oat
- Onion, dry, bulb; film-coated
- Onion, dry, bulb; encrusted/pelleted
- Onion, green; film-coated
- Onion, green; encrusted/pelleted
- Other, Brassica (5A); film-coated
- Other, Brassica (5A); encrusted/pelleted
- Other, Brassica (5B); film-coated
- Rice
- Rice (Planting restrictions/high-end)
- Rice (Planting restrictions/low-end)
- Rye
- Safflower
- Soybean
- Spinach, film-coated
- Spinach, encrusted/pelleted
- Swiss chard, film-coated
- Swiss chard, encrusted/pelleted
- Triticale
- Watermelon
- Wheat

Questions for stakeholders:

- Given that “loaders/planters” who were monitored in exposure studies performed multiple activities that included some short periods of equipment cleaning and repairing, checking seed planting depth, and leveling seed in the hopper, please list and describe in detail all the activities performed by a worker who is designated to load/plant in your operation.
- Describe how treated seeds are loaded into the planter in your operation. Please state the type of seed that is loaded with this method.
- Describe the planting equipment used to sow seeds. Please state the type of seed that is sown with this method.
- To the best of your knowledge, please describe how loading/planting treated corn and wheat seeds is **different** than loading/planting treated seeds in use in your operation. Please state the type of seed in your response.
- Do you use the maximum label application rate to treat [type/use] seeds?
- What is the maximum rate used to treat [type/use] seeds?
- What is the average (“typical”) rate used to treat [type/use] seeds?
- What is the median rate (some XXth percentile) used to treat [type/use] seeds?
- The Agency assumes that 61, 80, and 200 acres are planted by a loader/planter in one eight-hour day for potatoes, vegetables and other specialty annual crops, and large acreage field crops (i.e., alfalfa, some beans, sugar beets, canola, field and pop corn, cereal grains, cotton, mint, rice, and soybean), respectively. How many acres are planted by a loader/planter in your operation? Please state the type of seed planted.
- The Agency assumes a high-end seeding density (or number of seeds/acre) for each type of seed in its models of dermal and inhalation exposure to loader/planters. The current assumptions for seeding density are found in Table 3.1 (pages 16-18) in Policy 15: https://www.epa.gov/system/files/documents/2022-01/exposac-policy-15_amount-seed-treated-planted.pdf

- There are more types of seeds with their associated seeding density listed in the worksheet named “Amount Seed Planted variables” in the seed treatment calculator (Microsoft Excel file). Look at values in Column ‘D’.
https://www.epa.gov/system/files/documents/2022-02/seed-treatment-and-planting-exposure_mar2022.xlsx
- What is the highest seeding density used in your operation? Please state the type of seed planted at this density.

Soliciting seed treatment information – *for the packaging scenario*

For clothianidin, imidacloprid, and thiamethoxam, potential risks of concern have been identified for those individuals who package treated seeds. Individuals who packaged treated seeds with pesticides will be referred to as “packagers.” The packaging scenario represents any possible commercial seed treatment (CST) workday during which CST worker exposure is the result of performing one or more packaging tasks, but none of the treating or cleanout tasks. The packaging-related tasks identified include bagging, closing/sewing, tagging, stacking, and moving packaged seed via forklift. Worker-day exposure associated with these scenario-specific tasks is expressed relative to the amount of active ingredient handled. Recently, data on the pesticide exposures of packers became available and have been reviewed by the Agency and are now incorporated in the updated Policy 14.

The studies of exposure to packagers were based on:

- Types of packaging that contained treated seeds handled by workers:
 - small bags
 - mini-bulk containers
 - loose bulk containers
- Types of bagging/stacking systems
 - automated
 - semi-automated
 - manual
- Packagers working with the following seed types (range of pounds of seed treated):
 - Barley (163,803 – 289,908)
 - Canola (29,829 – 142,378)
 - Corn (33,656 – 349,383)
 - Cotton (12,250 – 121,455)
 - Maize (58,422 – 96,562)
 - Oats (72,312)
 - Oilseed rape (19,511 – 62,082)
 - Wheat (61,895 – 189,597)

Risks of concern were identified packagers who packaged the following seed types:

Clothianidin:

- Corn, field
- Corn, pop
- Lettuce, head; film-coated
- Lettuce, leaf; film-coated

Imidacloprid:

- Safflower

Thiamethoxam:

- | | |
|--|---|
| • Amaranth, Chinese (Spinach, Chinese); film-coated | • Other, Cucurbits (9B) |
| • Amaranth, Chinese (Spinach, Chinese); encrusted/pelleted | • Other, Leafy (4A); film-coated |
| • Balsam pear (Bittermelon) | • Other, Leafy (4A); encrusted/pelleted |
| • Canola | • Other, Leafy (4B); film-coated |
| • Celery, film-coated | • Other, Leafy (4B); encrusted/pelleted |
| • Chayote | • Other, Oil seed (20A) |
| • Corn, field | • Other, Oil seed (20B) |
| • Corn, pop | • Parsley, film-coated |
| • Corn, sweet | • Pumpkin |
| • Cotton | • Rhubarb, film-coated |
| • Fennel, film-coated | • Rhubarb, encrusted/pelleted |
| • Fennel, encrusted/pelleted | • Rice |
| • Flax | • Safflower |
| • Lettuce, head; film-coated | • Sorghum, grain |
| • Lettuce, leaf; film-coated | • Squash, Chinese |
| • Mustard greens, film-coated | • Squash, summer |
| • Mustard seed | • Squash, winter |
| • Other, Brassica (5B); film-coated | • Sunflower |
| | • Watermelon |

Questions for stakeholders:

- How prevalent is the use of liquid versus solid (dust) formulations on each type of seed that you treat?
- Is one formulation preferred over the other? If so, why? Please list the type of seed when providing a preference for a formulation.
- Given that “packagers” who were monitored in exposure studies performed multiple activities that included bagging, closing/sewing, tagging, stacking, and moving packaged seed via forklift, please describe in detail all the activities performed by a worker who is a

designated packager in your treatment facility. (Please do not include details for workers who exclusively clean equipment or treat seeds.)

- Please describe the PPE worn by the worker who is the designated packager in your operation when they package seed.
- Please describe the type of packaging that contain treated seeds handled by the designated packager and state the type of seed in that packaging.
- Please describe the bagging/stacking (e.g., automated, semi-automated, manual) system in your operation and state the type of seed that uses this system.
- Do you use the maximum label application rate for [type/use] seeds?
- What is the maximum rate used to treat [type/use] seeds?
- What is the average (“typical”) rate used to treat [type/use] seeds?
- What is the median rate (some XXth percentile) used to treat [type/use] seeds?
- For **small-seeded vegetables**, the Agency assumes that 3,000 pounds of seed are packaged per day by one worker. For the types of small-seeded vegetables that are packaged in your facility, how many pounds of small-seeded vegetable seeds are packaged by each worker in an eight-hour day? Please state the type of small-vegetable seed when providing an estimate of weight.
- For **large-seeded vegetables** (e.g., beans, squash, watermelon, pea, cowpea, and pumpkins), the Agency assumes that 339,500 pounds of seed are packaged by each worker in one eight-hour day. For large-seeded vegetables packaged in your facility, how many pounds of large-seeded vegetable seeds are packaged by each worker in an eight-hour day? Please state the type of large-vegetable seed when providing an estimate of weight.
- For other non-vegetable seeds treated in your facility, please provide an estimate of weight packaged by a worker in an eight-hour day. Please state the type of seed when providing your estimate.

Soliciting seed treatment information – *for the on-farm treating/planting scenario*

For clothianidin, imidacloprid, and thiamethoxam, potential risks of concern have been identified for those individuals who are on farm to treat, load, and plant seeds. Seeds in this scenario are treated with a liquid or solid formulation of clothianidin, imidacloprid, or thiamethoxam and are labeled as OFST-P/L or OFST-P/S, on-farm seed treatment and planting for products formulated as liquids (OFST/P-L) or for products formulated as solids (OFST/P-S). In the exposure studies, workers were monitored for pesticide exposure while treating, loading, and planting seeds. However, separate samples were not taken during each activity. Therefore, it is not possible to differentiate exposure from the treating, loading, and the planting activities. Workers often performed other tasks that may have included maintenance, cleaning of nozzles, checking seed depth at planting, among others. Recently, data on the pesticide exposures of OFST-P/L and OFST-P/S became available, have been reviewed by the Agency and are now incorporated in the updated Policy 14.

Because the workers in the exposure study used open loading systems to treat seeds, the OFST/P-L and OFST/P-S dataset are used to represent **open loading systems** only.

The following seed types and amounts were used in the studies to measure on-farm worker exposure:

- Treating and planting **cotton** seeds (with solid formulation pesticide): 640 – 1,480 pounds of seed treated and 64 – 213 acres planted
- Treating and planting **wheat** seeds (with liquid formulation pesticide): 3,901 – 59,380 pounds of seed treated and 16 – 186 acres planted
- Treating activity only for **potato** seed pieces (with liquid formulation pesticide) (Amount of potato seed pieces treated was not documented in the study - no planting monitored in this study)

Risks of concern were identified for the OFST/P-S (solid formulations) for the following seed types:

Clothianidin:

- Barley
- Oat
- Potato
- Rye
- Triticale
- Wheat

Risks of concern were identified for the OFST/P-L (liquid formulations) for the following seed types:

Thiamethoxam:

- Bean, dry
- Bean, navy
- Bean, snap
- Flax
- Cucumber
- Other, Legume (6A)
- Other, Legume (6C)
- Pea, edible-podded
- Pea, field
- Pea, garden
- Potato
- Other, Cucurbits (9B)
- Rice

- Rice (Planting Restrictions/High-end)
- Rice (Planting Restrictions/Low-end)
- Soybean
- Wheat

Questions for stakeholders:

- Please list and describe in detail all the activities performed by a worker who is designated to treat on farm and then plant seeds in your operation. Please state the seed type in your response. Is a liquid or solid formulation of clothianidin, imidacloprid, or thiamethoxam in use for that seed type?
- Describe the pesticide loading system in your operation on farm to treat seed. Is this an open or closed loading system? Please state the type of seed in your response. Is a liquid or solid formulation of clothianidin, imidacloprid, or thiamethoxam in use for that seed type?
- Describe the treating equipment used to treat seeds on farm. Please state the type of seed treated with this equipment. Is a liquid or solid formulation of clothianidin, imidacloprid, or thiamethoxam in use for that seed type?
- Describe the planting equipment used to sow seeds after they have been treated on farm. Please state the type of seed that is sown with this equipment.
- To the best of your knowledge, please describe how treating potato seeds and treating and planting cotton and wheat seeds on farm is **different** than treating and plantings seeds in your operation. Please state the type of seed in your response.
- Do you use the maximum label application rate to treat [type/use] seeds?
- What is the maximum rate used to treat [type/use] seeds?
- What is the average (“typical”) rate used to treat [type/use] seeds?
- What is the median rate (some XXth percentile) used to treat [type/use] seeds?
- The Agency assumes that 61, 80, and 200 acres are planted by a loader/planter in one eight-hour day for potatoes, vegetables and other specialty annual crops, and large acreage field crops (i.e., alfalfa, some beans, sugar beets, canola, field and pop corn, cereal grains, cotton, mint, rice, and soybean), respectively. How many acres are planted in one eight-hour day in your operation after you treat seeds on farm? Please state the type of seed planted.
- The Agency assumes a high-end seeding density (or number of seeds/acre) for each type of seed in its models of dermal and inhalation exposure to those workers who treat seeds on farm and then plant. The current assumptions for seeding density are found in Table 3.1 (pages 16-18) in Policy 15: https://www.epa.gov/system/files/documents/2022-01/exposac-policy-15_amount-seed-treated-planted.pdf
 - There are more types of seeds with their associated seeding density listed in the worksheet named “Amount Seed Planted variables” in the seed treatment calculator (Microsoft Excel file). Look at values in Column ‘D’.
https://www.epa.gov/system/files/documents/2022-02/seed-treatment-and-planting-exposure_mar2022.xlsx
 - What is the highest seeding density used in your operation? Please state the type of seed planted at this density.

Next Steps

The EPA will review comments received on the updated occupational exposure assessments for seed treatment uses prior to issuing the amended proposed interim decision for the neonics, which are currently expected in 2025.