

Project Instructions - Hemlock Treatment

Project planning

The sites and priorities for USFS and DNR treatment projects are set by those agencies, usually at the beginning of the year so we can plan our schedule. There are normally 4 to 6 projects each for the USFS Blue Ridge and Chattooga River Ranger Districts and 1 or 2 for DNR State Parks or Wildlife Resources per year, and sometimes other projects with neighborhoods and other nonprofits. As our time and resources permit, we also undertake projects with POAs and other nonprofits.

If we will be working in a fee area of public lands, we try to arrange with the property manager for participants to have fee-free access.

1. Based on the number and size of trees to be treated or retreated, use the *SGH Chemical Calculator* to determine the amount of chemical needed.
 - If the project is on public land, ensure that the land manager will provide the necessary amount of Imidacloprid 2F / 2L.
 - If the project is on other property, ensure that the property owner / manager will cover the cost of the chemical (Imidacloprid 2F / 2L and/or Safari 20 SG), and SGH will order it for timely delivery.
2. Decide how many teams of 2-3 people are needed. Each team should include at least one experienced Facilitator. An experienced team should be able to treat 120 trees in 4 hours. A less experienced team should be able to treat 60 trees in 4 hours.
3. Solicit experienced Facilitators to serve as team leaders, 1 per team. All team leaders should be identified and confirmed 2-3 weeks before project date. Solicit additional volunteers to work in teams; confirm volunteers as they sign up until roster is full and send a copy of the *Project Details* to each volunteer.
4. Arrange to have an adequate number of application devices 2-3 weeks before project date.
 - If the project is on USFS or DNR land, those agencies allow us to use their injectors, supplemented by our own if necessary.
 - If the project is on other property, we normally rely on our own injectors.

Project preparation

1. Prepare copies of the *Release / Waiver of Liability* sign-in form and other required USFS/DNR forms as appropriate.
2. Test application devices for proper functioning at least 1 week before project date to allow repair time if needed. If any soil injector dispenses less than the standard amount and cannot be brought up to the standard amount, print an adjusted mixing/dosing card for that injector only (see *Testing & Adjusting Calibration* on Resources page of web site) and attach it to the injector.
3. Assemble project materials, equipment, and supplies 1 or 2 days before project date. Work bags should contain only the items needed for the specific project.

Tailgate briefing for team leaders

Ask team leaders to arrive 1/2 hour before other volunteers are scheduled to report, and welcome them as they arrive.

1. **Ask team leaders to sign** the Release / Waiver of Liability form (and other DNR/USFS forms if applicable) and to fill out and wear name tags so volunteers can get to know each other.
2. Make sure each team leader is **properly attired with PPE**:
 - Dressed for the weather and terrain
 - Long pants and long sleeved shirt, sturdy shoes/boots with socks, work gloves
 - Head covering is recommended. USFS supplies the required hard hats for their projects.
3. When all team leaders are present, **describe nature of project**:
 - Treating or retreating ___ hemlocks for the woolly adelgid
 - Chemical to be applied and mixing ratio.
 - Application method to be used.



4. **Give each team leader a clipboard:**
 - A map of the project area with their assigned work site marked; mention stream crossings or other hazards.
 - A set of data sheets for the trees at their work site with instructions on how to mark the data sheets
 - The names of their team members (if known in advance) and any special information about abilities/disabilities if known

5. **Give each team leader a work bag**, a supply of chemical, and the necessary equipment/supplies for their team (see *Checklist*). Team leaders should already be familiar with the work kit contents, but mention that it contains only the items they'll be using today.
 - Safety vest for team leader.
 - Clipboard, treatment log sheets, and pen – Use to record tree diameters and any special notes.
 - Apron – Someone other than person with injector or sprayer should wear this.
 - Diameter tape – Keep in apron and use to measure trees.
 - Laminated dosing card – Keep in apron and use to determine number of pumps based on tree diameter and wet/dry mixture. If any injectors have nonstandard output, point out the attached mixing/dosing card with adjusted mixing instructions.
 - Laminated infestation photos card – Use to determine/confirm level of infestation.
 - Permanent marker – use to make check-mark on metal tags of treated trees if trees already have tags
 - Nitrile gloves – Use when mixing, pouring, or cleaning up chemical.
 - Hand sanitizer and towels – Use to clean skin if contacted by chemical and clean up before lunch.
 - Mask & goggles – Use when mixing or spraying Safari.
 - Small measuring cup w/bottle cap – Use to check calibration of injector if this hasn't already been done.
 - Special measuring cup – Use to measure amount of Safari product.
 - Funnel and paper paint filters – Use for filling injector tank or sprayer tank.
 - Gallon baggie – Put used funnel, gloves, and filters in it to keep work kit clean.
 - Strap with carabiner clip – Use as shoulder strap to carry injector if desired.
 - Cloth tote bag – Use to carry extra chemical jugs to work site. Be sure pour spouts are firmly closed and jugs are upright.
 - Spike – Use to make holes in soil if ground is too hard for injector probe to penetrate.
 - Spray paint – Use to mark treated trees on non-government land.
 - Small hammer, nail puller, pre-numbered metal tags & aluminum nails – Use to tag or re-tag treated trees on government land.
 - Flagging tape – Use to mark start/finish points or to mark treated trees if tags aren't available.
 - Pack of tissue, insect repellent, and sun screen.
 - Trash bag – Use for woods clean-up and end-of-day clean-up.
 - Small rake if needed to clear needle duff or ground cover from base of trees.
 - Walkie talkies – If using these, provide instructions and do radio check.

6. **Point out location** of general / replenishment materials that are on hand if needed (see *Checklist*).

7. **Indicate specific procedures** for today:
 - Chemical mixing instructions – may be done by each team or done at a central mixing station.
 - Identify mixing jugs with orange tape marked for ounces and clean jugs with green tape. If must dip from stream, use clean jug only.
 - Indicate wet or dry soil ratio (Imid only).
 - Make 96 oz of mixture at a time if using Kioritz soil injector (75 oz water + 21 oz chemical for dry soil or 55 oz water + 41 oz chemical for wet soil).
 - Make 1-gallon master batch if using EZ-Ject soil injector.
 - Make custom batch if doing soil drench or trunk spray.
 - Use WARM water for powdered Imid product or for Safari.
 - Always put water in first, then add chemical.
 - Finding trees – Indicate whether trees to be treated are already tagged/marked and how to identify trees with missing tags; whether permitted to add new trees or replacements for trees that can't be found or have died.
 - *Note for government land:* Tagged trees (or trees that should have tags) should be treated or retreated first.
 - Then if there is enough time and chemical and if a site doesn't have the full complement of tagged trees, teams can select and treat additional viable ones up to limit per site. Explain parameters and priorities for choosing additional trees.

Tailgate briefing for all volunteers

1. **Welcome other volunteers** as they arrive. Introduce self, other project leaders, and team leaders.
2. After everyone has signed the Participant Release & Waiver of Liability form and any USFS / DNR forms and made a name tag, **explain the significance of the treatment project** to the natural and human communities (*adjust depending on audience*):
 - **Aesthetically**, these beautiful trees contribute greatly to the enjoyment of those who live, work, and play among them, as well as the many people who come to north Georgia for tourism and recreation.
 - **Ecologically**, hemlocks help maintain the health and biodiversity of our forests and provide food and habitat for a diverse population of birds and other animals, shade for native plants, and cool temperatures for trout streams.
 - **Environmentally**, hemlocks are vital for protecting the quality of our waterways and watersheds, preventing soil erosion on mountain slopes and around waterways, and maintaining our air quality.
 - **Economically**, healthy mature trees such as hemlocks support jobs and local tax revenues associated with tourism and recreation and supporting the value of private properties and the community as a whole.
 - **And on a personal note**, hemlocks are the favorite tree of so many people who grew up visiting the woods, taking their children and grandchildren to the woods for memorable family outings, and teaching lessons of respect and personal responsibility, wise use of resources, and environmental stewardship.
 - **Add any information** that is specific to this project or site, such as protecting endangered species.
 - **But the hemlocks are under attack** by an invasive insect, Hemlock Woolly Adelgid (HWA), and most will die unless action is taken to prevent it – which is where we come in. By treating the trees chemically, as we will do today, we will be protecting them for another 5-6 years.
3. **Describe the nature of the project:**
 - We'll be **treating or retreating _____ hemlocks** for the woolly adelgid.
 - We'll be using a **chemical containing the active ingredient Imidacloprid**, a synthetic nicotine derivative that's also in flea collars. It kills the insects, provides residual protection for an average of 5-6 years after treatment, and isn't toxic to humans. However, just for safety, anyone who is handling the chemicals or application equipment will wear nitrile gloves.

Note: If using Safari, indicate that it's a nicotine-based fast-acting treatment that gains control over HWA within 3 to 8 weeks. It lasts only about 2 years but is very effective in saving heavily infested hemlocks or very large infested hemlocks. It's also very expensive and must be mixed and dosed accurately so avoid using more than is needed. Anyone spraying Safari will also wear mask and goggles.
 - The application method will be **soil injection using a Kioritz or EZ-Ject soil injector** to place the treatment material directly into the feeder root zone. The tree takes up this systemic material and disperses it throughout the entire plant. The treatment material binds quickly to the organic matter in the soil and migrates less than a foot from each injection point.

Note: If using Safari, indicate how and where it will be applied – soil injector, soil drench, or basal trunk spray.
4. **If using Kioritz injector, explain and demonstrate special features:**
 - The Kioritz injectors are no longer made and parts are not available, so PLEASE take good care of them. If you notice one is not working properly or if something happens while you're using it, please let your team leader or the project leader know.
 - Make sure the calibration ring is all the way down, the white plastic collar just above the tank is tight, and the baffle and all probe parts are tight.
 - The tip has 4 emitter holes. Make sure they're open before using injector. If a hole is clogged, clear it using a metal paper clip or large safety pin affixed to work bag. It should go all the way through and out the other side.

CAUTIONS FOR KIORITZ

- Carry the injector upright. Otherwise, it will leak.
- Do not use the depth gauge for foot pressure. It's there to prevent the injector from going too deep in the soil but will break under hard use. Use shoulder power to push the injector probe into the soil.
- Be careful to pull it back out at the same angle.
- The tip is not a jack hammer. If you hit rocks or roots, move the injector over a few inches
- Do not let the injector sit still for more than 10 minutes while there's mixture in the tank. Shake / agitate unit periodically to keep mixture from settling out.
- Should you have a problem with the injector, deliver it to the project coordinator immediately.

5. **If using an EZ-Ject injector, explain and demonstrate special features.**

- The EZ-Ject injector is a very sturdy tool, but if you notice one is not working properly or if something happens while you're using it, please let your team leader or the project leader know.
- Make sure the piston and all probe parts are tight.
- The tip has 4 emitter holes. Make sure they're open before using injector. If a hole is clogged, clear it using a metal paper clip or large safety pin affixed to work bag. It should go all the way through and out the other side.
- Add a few drops of lubricant (e.g., 3 in 1 oil) to the lubrication hole on the piston before each use.

CAUTIONS FOR EZ-JECT

- Carry the injector upright. Otherwise, it will leak.
- Use the foot plate to push the injector probe into the soil.
- Be careful to pull it back out at the same angle.
- The tip is not a jack hammer. If you hit rocks or roots, move the injector over a few inches
- Do not let the injector sit still for more than 10 minutes while there's mixture in the tank. Shake / agitate unit periodically to keep mixture from settling out.
- Should you have a problem with the injector, deliver it to the project coordinator immediately.

6. **Explain and demonstrate chemical mixing procedure.**

- Show volunteers that chemical mixing jugs are marked with orange tape and must never be dipped into any water source, even if they look clean. Jugs marked with green tape are for clean water only and can be dipped into water sources.
- When using Imidacloprid, soil condition – “dry to normal” or “moderate to wet” – determines how chemical is to be mixed. TODAY we will use the _____ mixing ratio.

7. **Explain and demonstrate chemical loading procedure.**

- Push injector into ground at 45° angle or have a volunteer hold it so fill cap faces straight up. Remove fill cap (and plastic filter if present) and either hold it or place it on ground face up so no dirt can get into it.
- Slowly pour mixture through funnel and paper paint filter into injector tank. **Use a funnel and paper paint filter EVERY TIME when filling or refilling soil injector.** Emphasize importance of using filter to keep any small debris – needles, pollen, insects, etc. – from getting into the injector as this could cause it to leak.
- Replace fill cap before standing injector upright. Use towel to wipe off spillage from hands and applicator.

8. **Present brief demonstration** of treatment process and any new or project-specific procedures:

- **Finding trees** – Trees in your assigned area to be treated are generally located within approximately 100 to 150 feet of a camp site, picnic area, trail, stream or road. Indicate whether trees to be treated are already tagged/marked.
- **Treat or retreat** all the healthy hemlocks in each treatment area, including trees that have tags and are still viable and trees that do not have tags but are still viable and are at least _____ inches dbh.
- **Clearing ground cover** at base of tree if necessary, using your feet, not your hands – just 1 foot from trunk, replacing after treatment. For trees growing on steep slope, clear ground cover from upper side and apply majority of the chemical on the upper side so the chemical can and flow downward into feeder root zone.
- **Measuring diameter** at breast height (DBH) – For anyone unfamiliar, demonstrate use of diameter tape; reading tape at zero mark, not metal tip; measuring each stem of multi-trunk trees and adding for total, measuring trees on slope from the up-side, rounding up to next inch if ½ or greater. *Suggestion:* Have each person determine where 4.5 feet comes to on their own body.
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- **Applying treatment** – Indicate number of holes for soil application should equal diameter but minimum of 4 holes; within 1 foot of trunk, 4 to 5 inches deep. Demonstrate pushing injector into soil using shoulder power for Kioritz or foot plate for EZ-Ject.
 - The Imidacloprid label specifies no setback for proximity to water; however, if a tree is growing with no space between it and the water, apply the full dosage on the side away from the water.
 - Trees growing from rock cannot be treated via soil injection NOR can trees on stream edge if soil is saturated or sandy. Record the DBH on your treatment log and indicating not treated (N/T) and the reason.
- **Using Quick Reference Card** -- On the Imidacloprid side of the Quick Reference Card, refer to the Dosing section for number of pumps per hole. Locate the soil moisture column for the mixing ratio specified for today. Note that there are four size ranges, each with its own application rate. Give several examples, especially how to do 1.5 pumps for the 12-18” range.

- **Marking treated trees** – On private land place small dot of spray paint low on side away from view. On public land mark existing metal tag with permanent marker checkmark; if there is no tag or bark has grown around old one, apply new tag leaving the nail protruding 1 inch and tapped downward to tag hangs away from trunk.
 - **Replacing ground cover** after treatment.
 - **Updating data sheets** – Indicate info to record; how to mark if unable to locate tree, if tree is dead, or if new tag is applied; any other info that would help identify tree in the future.
 - **Getting refills** – Send a runner or call the project leader via the radio to request a refill if you believe it will be needed. If contact cannot be established via radio, send a team member to the mixing station to pick up a refill jug of chemical
 - **Rotating jobs** throughout the day to give team members a variety of experience
 - **Reporting other hemlock pests** or problems observed.
9. Ask volunteers to **assemble with team leaders to form teams** of 2 to 4 people. Indicate that team leaders will provide OJT as needed for new or less experienced volunteers and instruction for any unusual circumstances.
10. Remind everyone of **environmental safety**:
- Don't allow chemicals to spill into waterways or go down drains.
 - Don't wash equipment in waterways or down drains.
 - Trees that are right on waterway and don't have at least a ring of basketballs of space around the trunk should be treated on side away from stream.
 - Don't use more or less chemical than is called for.
11. Remind everyone of **personal safety**:
- Ask if anyone has serious allergies and whether they've brought what they need with them.
 - Wear PPE, face masks during Covid, nitrile gloves if handling chemical, hard hats.
 - Look out for holes, snakes, bees, poison ivy, briars / tangling vines, eye-level branches, steep / slippery terrain.
 - Tuck pants into boots if possible and use insect repellent for ticks and mosquitos.
 - Be careful crossing streams; avoid slippery rocks and logs; don't get wet if weather is cold.
 - Be mindful of heat and adequate hydration, cold and hypothermia, changing weather conditions.
 - Keep eyes open for hazards and ears open for falling branches or trees.
 - Stay within sight/speaking distance of other team members.
 - Seek project leaders immediately in case of spill, accident, or other emergency.
12. Go over **schedule for the day** and indicate how teams will get to their work site. Indicate whether everyone will get together for lunch (time and place) or each team will eat at their work site whenever they choose.
- If your treatment area has not been completed before lunch, use the flagging ribbon in your work kit to mark your stopping point so you'll know where to resume after lunch.
 - When we pause for lunch and at the end of the day, we'll pour off any unused mixture and clean the injectors by triple rinsing and pumping them with clean water away from any waterway or drain, and set them upside down to drain.
 - If your treatment area has not been completed at the end of the day, use the flagging ribbon in your work kit to mark your stopping point and write the date on it. Note location of stopping point on treatment log sheet.
 - If anyone needs to leave early, you must check out with project leader and turn in work kit, log sheets, and all equipment and supplies.
5. **Ask if there are any questions** and let teams know the project leader(s) will be traveling from team to team throughout the day to replenish supplies, handle communications, or address any issues that may arise. Provide project leader cell numbers or other way to get in touch if needed.

GET TO WORK, BE SAFE, AND HAVE FUN!

Care of injectors at lunch break

If any treatment mixture remains in injectors, pour it into a chemical container and cover it to prevent exposure to sunlight. Clean injectors by triple rinsing and pumping them with clean water away from any waterway or drain, preferably under a hemlock.

Care of injectors at end of project

1. **Pour any unused mixture** that was made with a powdered product around the base of hemlocks as the treatment material tends to fall out of suspension and doesn't keep well. Unused mixture that was made with a liquid or granular product may be poured into a chemical storage container with a screw top, marked with chemical name and mixing ratio used, and stored in a place that is away from sunlight and not subject to freezing.
2. **Check condition of application equipment** as it is turned in. Retrieve any missing parts.
3. **Clean injectors** by triple rinsing and pumping with clean water away from any waterway or drain, preferably under a hemlock. Remove any debris from tip area, and rinse outside of injector to remove chemical residue and dirt. Use towel to clean and dry the entire injector. When injector is placed in storage, stand it upside down on the pommel handle to allow remaining moisture to drain out. Do not keep it where temperature may drop below freezing
Note: If using Safari in a sprayer, clean it thoroughly by rinsing, shaking, and spraying clean water through device until fluid comes out clear.
4. **Clean mixing jugs** and lids as above by triple rinsing and drying.

At end of project

1. **Collect work bags**, tools, and other supplies back from volunteers and make sure all original contents are accounted for. Clean tools. Make note of items that may need replacing, such as treatment log sheets, pen, spray paint, nitrile gloves, paper paint filters, gallon Ziploc baggie, hand sanitizer, towels, or trash bag.
2. **Collect treatment logs** from each team:
 - Original signed *Release / Waiver of Liability* forms to Donna, copy retained by project leader.
 - Original signed *USFS Job Hazard Analysis* form to Donna, copy retained by project leader.
 - Original *treatment logs/data sheets* to Donna, copy retained by project leader.
 - Original *USFS Pesticide Application Data* form and original *chemical tracking document* retained by project leader.

THANK EVERYONE FOR THEIR GOOD WORK AND WISH THEM SAFE TRAVEL HOME.