OPERATION PLAN

DOUGLAS-FIR TUSSOCK MOTH CONTROL PROJECT

POTLATCH UNIT

ST. JOE NATIONAL FOREST
1965

INTRODUCTION

The 1965 program for Douglas-fir tussock moth control will cover 116,300 acres of Douglas-fir and grand fir timber in Benewah and Latah counties on the west side of the St. Joe National Forest.

The control program will include the spraying of 29,300 acres with helicopters and 87,000 acres with fixed-wing planes. The insecticide, DDT, will be applied at the rate of 3/4 lbs. of DDT in one gallon of fuel oil per acre.

ADMINISTRATION

The Control project administration headquarters will be set up at the Moscow-Pullman airport. The project supervisor, assistant project supervisor, field operations officer, safety officer, formulation checker, and contracting officer will operate from this base.

Headquarters for the monitoring coordinator, unit entomologist, spray card checkers, development checkers, and technical assistant will be located at the Potlatch Work Center.

The headquarters for the helicopter spray units will also be located at the Potlatch work center. The helicopter spray supervisor, the spray crewmen, and helicopter pilots will be based at the work center.

FIXED WING SPRAY PROJECT

The fixed wing spray project will be based at the Moscow-Pullman airport. ~~At least~~ 4 spray planes and 2 observation planes will operate from this base.

HELICOPTER SPRAY PROJECT

Two helicopter units will be used to spray infested areas near fisheries, open fields, farm houses, dairies, etc. Three helicopters will be based with each unit. The units will be portable and will need to be moved during spray programs. Helispots will be located at Mineral Mountain, Sanders, McCumber Meadow, Howell Creek and Hatter Creek.

Each unit will have 2 landing pads, a 2,000-gallon mixing unit, one 1200-gallon tanker truck and radio communications.

The man-power necessary to operate each unit will consist of an operation manager, observer, mixer operator, loader, truck driver and night watchman.

Albert Turner will administer the helicopter spray operation.

TOUR OF DUTY

All employees will work 8 hours per day, 5 days per week during the pre-control phase of the program. During the control phase, employee will be authorized to work 6 days per week, 10 hours per day, when necessary.

During the post control phase employees will again work 8 hours per day, and 5 days per week. Night differential pay will be provided for those hours worked between 1800 and 0600.

PERSONNEL (FINAL ASSIGNMENTS ON TABLE -)

The personnel for carrying on the tussock moth control project will include people from the Regional Office, Missoula, Montana; St. Joe National Forest, St. Maries, Idaho; State of Idaho; Potlatch Timber Protective Association, Orofino, Idaho, ~~and~~ Potlatch Forests, Inc., Lewiston, Idaho, AND NORTHERN PACIFIC RY CO, MISSOULA, MONT.

The personnel and position assignment for the project are as follows:

	Position	Unit	Name
1.	Project Supervisor	State	Bill Scribner
2.	Assistant Project Super.	St. Joe Nat'l Forest	Clyde J. Miller
3.	Contracting Officer	Regional Office	W. C. Evans
4.	Information & Education Off.	State	R. Johnson
5.	Technical Assistant	Regional Office	David O. Scott
6.	Monitoring Coordinator	State	Charles Haynes
7.	Field Operation Officer	Palouse District	Charles Kern
8.	Safety Officer (Air)	Regional Office	Al Hammond
9.	Unit Entomologist	Regional Office	Dan Kucera
10.	Formulation Checker	Regional Office	(R.O. Employee)
11.	Weather Checker	State	Frank Schoeffler Dick Horn Ralph Matheson
12.	Helicopter Spray Super.	St. Joe N.F.	Albert Turner
13.	Helicopter Unit Manager	St. Joe N.F.	John Minor Jack Wengert
14.	Helicopter Spray Observer	Regional Office	(2 Smoke Jumpers)
15.	Helicopter Spray Mixers	St. Joe N.F.	George Thatcher Robert Sanders
16.	Helicopter Spray Loaders	St. Joe N.F. Regional Office	Edward Svancara (1 Smoke Jumper)
17.	Truck Driver	St. Joe N.F. Regional Office	Kenneth Lindsey (1 Smoke Jumper)
18.	Assist. Field Oper. Officer	St. Joe N.F.	Jerry Hamilton
19.	Clerk, Radio Operator, & Weather Recorder	St. Joe N.F.	Wendel Barbee
20.	Meter Reader (Fixed Wing)	State	(Forestry Aide)
21.	Aerial Observer (Fixed Wing)	Regional Office	(2 Smoke Jumpers)
22.	Spray Card Checkers	State, P.F.I., N.P.	Don McManamon (State) P.F.I. Forester N.P. Forester 3 Forestry Aide (Stat

Position	Unit	Name
23. Development Checkers	State, P.F.I.	Mike Reeb (State) 2 P.F.I. Foresters
24. Helicopter Unit Watchmen	State	2 State Employees
25. Administrative Assistant	St. Joe N.F.	Joe Collogan

TRANSPORTATION

Vehicles for transportation will be furnished by the Forest Service, State of Idaho, ~~and~~ Potlatch Timber Protective Association, NORTHERN PACIFIC RY, AND POTLATCH FORESTS INC
Each driver will be responsible for the maintenance of assigned vehicle.

SAFETY

The Air Safety Officer will be Al Hammond.

A safety plan for the project has been prepared and attached to this plan. All personnel will be given a copy of this plan.

SPRAY OPERATIONS

The elevation of the spray area ranges from 2600 to 5000 feet.

The size of the fixed wing spray blocks range from 800 to 5200 acres and the helicopter blocks from 300 to 1300 acres.

There are few fishing streams in the spray area. A one-quarter mile protective strip will be left unsprayed near the following fishing streams: Strychnine Creek, Palouse River, Meadow Creek ~~and Indian Creek~~.

A one-quarter mile strip will be left unsprayed around the deer enclosure on Moscow Mountain.

Sensitive areas including apiaries and dairies will be well marked on all spray maps and photos. A protective strip of a one-quarter mile unsprayed area will be left around each sensitive area.

The chief fixed wing pilot will be taken on an orientation flight prior to spray operation to acquaint him with the block boundaries. He will then acquaint the spray pilots with the boundaries of their respective assigned blocks.

The operation manager of each helicopter spray unit will orient each pilot on the boundaries of his assigned spray block prior to start of spraying.

PROPOSED

VEHICLE - RADIO ASSIGNMENTS

TUSSOCK MOTH CONTROL PROGRAM

St. Joe National Forest

1965

Personnel	Position	Vehicle	Radio	Base
Bill Scribner	Project Supervisor	State	Portable	Airport
C. J. Miller	Assist. Project Supervisor	F.S. P.U. 5411	Mobile	Potlatch
R. Johnson	I. E. Director	State	-	Moscow
W. C. Evans	Contracting Officer	F.S. (R.O.)	-	Airport
Dave Scott	Technical Assistant	F.S. (R.O.)	-	Potlatch
Charles Haynes	Monitoring Coordinator	State	-	Potlatch
Charles Kern	Field Operation Officer	F.S. P.U. 5416	Mobile	Airport
Al Hammond	Safety Officer	F.S. B-5 P.U.	Mobile	Airport
Al Turner	Helicopter Supervisor	F.S. P.U. 5110	Mobile	Potlatch
John Minor	Helicopter Unit Manager	F.S. 6-Passenger Vehicle	Portable	Potlatch
Jack Wengert	Helicopter Unit Manager	F.S. 6-Passenger Vehicle	Portable	Potlatch
Jerry Hamilton	Assistant Field Operation Off.	Private Vehicle	-	Airport
Joe Collogan	Administrative Assistant	Private Vehicle	-	Potlatch
Smoke Jumper	Observer - Helicopter Unit 1	-	Portable-Back Pack	Potlatch
Smoke Jumper	Observer - Helicopter Unit 2	-	Portable-Back Pack	Potlatch

Personnel	Position	Vehicle	Radio	Base
Frank Schoeffler	Weather Checker	State	Portable	Potlatch
Dick Horn	Weather Checker	State	Portable	Potlatch
Ralph Mathison	Weather Checker	State	Portable	Potlatch
Regional Office (Evans will Select)	Formulation Checker	F.S. (R.O.)	-	Airport
Dan Kucera	Unit Entomologist	F.S. BRC P.U.	Mobile	Potlatch
Don McManamon	Spray Card Checker	State	-	Potlatch
5 State, P.F.I. and N.P. Employees	Spray Card Checkers	State & Private	-	Potlatch
Mike Reeb	Development Checker	State	-	Potlatch
2 P.F.I. Employees	Development Checkers	Private	-	Potlatch
Helicopter Unit 1	Standby Vehicle (Crash)	F.S. Jeep	Portable	Helicopter1
Helicopter Unit 2	Standby Vehicle (Crash)	F.S. Jeep	Portable	Helicopter 2
Airfield	Standby Vehicle (Crash)	D-5 450 gallon tanker	Portable	Airport

Other Radio Needs

3 Aerial Observers Fixed Wing ----------Forest Net Radios

Basement of Potlatch Work Center ----------Remote Control

Airport----------Base Station

2 Helicopter Units----------2 Portables

Repeat Station on Palouse Baldy----------Repeat Station

4 Radios for helicopter units on Regional net.

PLAN FOR TECHNICAL DIRECTION
DOUGLAS-FIR TUSSOCK MOTH CONTROL
ST. JOE NATIONAL FOREST
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Unit Entomologist

The unit entomologist is a part of the regular project organization and, as such, is administratively responsible to the project supervisor. With guidance of the assistant project director, the unit entomologist will train and supervise the insect development checkers, the spray deposit checkers, and the pre- and postspray mortality checkers. Using data collected from established development plots, the unit entomologist will determine the proper time to apply insecticide to spray blocks and report this information to the project supervisor. He will work in close collaboration with the project supervisor as technical and entomological advisor.

a. In preparing for the arrival of the development checkers, the following jobs should be accomplished by the unit entomologist:
   (1) Become familiar with the boundaries of the unit and the spray blocks.
   (2) Select a number of accessible locations scattered throughout the unit to be used as larval development plots. These plots should be selected so as to sample:
      (a) A wide range of elevations (within 500-foot elevational zones).
      (b) Typical infested Douglas-fir timber types.
      (c) North and south exposures.
      (d) Ridges and drainage bottoms.
      (e) Foliage that can be reached from the ground.
   (3) Tag the center of all selected plots with a "Douglas-fir tussock moth development plot" tag. Indicate plot number on tag.
   (4) Fill in all the information requested on the tag, including the elevation as determined with an altimeter or from a contour map.
   (5) Fill out form R1-5240-3, Douglas-fir Tussock Moth Development Plot Data, in triplicate for each plot. Two copies will be kept by the unit entomologist; the other copy will be given to the checker. (Exhibit 11)
   (6) Arrange the plots into twice as many groups of four to six plots each as there are tussock moth development checkers assigned to the unit, keeping in mind:
      (a) Time required to travel to plots from unit headquarters.
      (b) Ease with which larvae may be collected.
      (c) Distance between plots.
      (d) Capability of checker assigned to plot.
   (7) Locate and number each plot accurately on a unit map.
b. After the collections of egg masses and larvae have begun, the unit entomologist will supervise the collections and instar determinations of the larvae. From the larval development records, the unit entomologist will make decisions as to when spraying will start by using the following guides.
   (1) Upon receipt of form R1-5240-2, Larval Development Record, he will enter the data from all plots on the development chart. (Exhibit 12)
   (2) When 75 percent of the eggs begin to hatch on two or more spray blocks in the unit, the project supervisor will be notified so he can advise the Regional Office (contract officer) that spraying

operations can start in the unit in approximately 10 days.

(3) When the tussock moth larvae reach the second instar, the unit entomologist will notify the project supervisor that the spray block is released for spraying. (Exhibit 13)

(4) As the larvae reach the second instar in additional spray blocks, the unit entomologist will notify the project supervisor.

(5) When larval collections in any block show that 5 percent or more of the population has entered the pupal stage before spraying, the project supervisor should be immediately notified so spraying on that block can be stopped.

c. The unit entomologist will keep the progress chart up to date, form R1-5240-4. (Exhibit 9)

d. A graphic development chart will be kept current.

Development Checkers

Douglas-fir tussock moth development checkers will be trained by the unit entomologist on the spray units to which they are assigned. Each checker will be given:

a. A definite assigned number of collection plots.

b. Directions for reaching these plots (form R1-5240-3).

c. Guidelines for taking samples and recording data are:

(1) Mark the location and number of each plot on his personal unit map.

(2) Become familiar with the location of each plot.

(3) Decide on the order of sampling the plots in each daily group and follow this order each collecting day.

(4) Sample each group of plots on alternate days.

(5) Upon arrival at the plot, label the collecting vial.

(6) Observe egg masses and collect larvae from infested trees as follows:

(a) Observe egg masses within a radius of 100 yards of the plot center.

(b) Observe no more than 25 egg masses per tree.

(c) Observe a total of 100 egg masses and record the percentage that have hatched.

(d) If most of the egg masses have hatched, cut a 15-inch twig from an infested tree.

(e) Collect all larvae and pupae (later collections) from this 15-inch twig.

(f) Place all larvae and pupae collected in the vial and float them in collection solution.

(g) When all larvae on the 15-inch twig have been collected, move to another tree and cut another twig.

(h) Repeat this procedure until the required number of larvae are obtained.

(i) Collect all larvae on each twig cut; do not stop collecting in the middle of a twig.

(7) Twenty-five larvae will be collected from each plot each collection date from the time collections are started until 10 days prior to the beginning of spraying.

(8) Fifty larvae will be collected from each plot during the 10 day period preceding spraying and during spraying operations. If the Douglas-fir tussock moth population is low, collect only 25 larvae.

(9) Between 4 p.m. and 5 p.m. on the day larval collections are made, the checker will examine the larvae collected at unit headquarters. This will be done under the supervision of the unit entomologist as follows:
   (a) Place the larvae, from one plot at a time, in a Petri dish and then separate them in watch glasses according to their instar classification.
   (b) Determine the proper instar by comparing the collected larvae with a set of sample larvae classified as to instars.
   (c) Count the larvae and determine the percentage in each instar. (Use the Rowland Percentage Chart.)

(10) Record these counts and percentages on form R1-5240-2, Douglas-fir Tussock Moth Development Checker's Daily Report, and give this report to the unit entomologist before 6 p.m. each day.

(11) Return all tussock moth larvae to the original collecting vials after counting and store these vials at unit headquarters.

(12) Place other defoliating larvae in a separate vial.

Spray Deposit Checkers

Some spray deposit checkers may be recruited from the tussock moth development checkers; as blocks are sprayed, development plots are eliminated. After a spray block has been released for spraying, and within 1 to 2 days before spraying commences on the block, the unit entomologist will designate on the progress chart the date and checker for putting out the spray deposit cards.

a. The spray deposit checker will then locate the start of the line on the map and will receive directions from the unit entomologist on how to reach the starting point.

b. On the date stated on the Unit Progress Chart (R1-5240-4), the checker will travel to the start of the line, where spray deposit cards will be distributed in the following manner:
   (1) Attach location string to the starting tag.
   (2) While trailing the string, pace along the line on the bearing designated.
   (3) Place a spray deposit card on the ground at each 4-chain interval along the line.
   (4) Select card locations in forest openings. If possible, place card 50 feet from nearest tree. If an opening cannot be found and card is placed under overhead foliage, indicate as such on back of card.
   (5) Secure card to ground or stump with large paper clip and nail.
   (6) Place serial numbered side of card face up.
   (7) Adjust paper clip to prevent curling of card.
   (8) Secure location string to the nail in each card so they can be located easily by the pickup checker.
   (9) Keep a record of the serial numbers on the cards and their order on the line.

c. Upon returning to headquarters, date the "Spray deposit cards put out" (column 10) on the Unit Progress Chart and indicate the serial numbers of the cards used in the block.

d. After the spraying of the block has been completed and the project supervisor has so indicated by dating and signing the "Spraying in

block completed" (column 12) on the Unit Progress Chart, the spray deposit line will be rerun in the following manner:

(1) In the "Spray deposit cards to be picked up" (column 14) of the Unit Progress Chart, the unit entomologist will indicate which checker will rerun the line and the date on which it will be done.

(2) The checker will proceed to the line location tag and follow the string, retrieving the cards in order.

(3) As each card is collected, it will be given a brief examination for spray deposit spots.

(4) If there are no oil deposit spots, or only a few, the checker will re-lay that portion of the card line that shows no oil deposits, and make a further and immediate examination within a 50-foot radius of the card as follows:
   (a) Make a check of foliage for evidence of oil burning.
   (b) Check for death webs on infested fir trees.
   (c) Look for dead and dying larvae on trees or ground.
   (d) Make notes of the above checks on the back of the spray card.
   (e) Indicate amount of screening by foliage (distance of spray card from tree).
   (f) In large blocks, two or more spray card lines will be desirable. This decision will be left to the project supervisor.

(5) After the spray deposit cards have been collected, they should be returned to unit headquarters and given to the unit entomologist.

(6) In the "Spray deposit cards picked up" (column 15) of the Unit Progress Chart, place the date the cards were collected on the appropriate line.

(7) Post-mortality checking will fall into two categories:
   (a) Immediate effect on the aerial spray job, expressed in percent of kill.
   (b) September residual population counts of egg masses from sample trees.

(8) Percentage of kill 10 days after spraying. To determine the effectiveness of the aerial spraying, it will be necessary to take a sampling of the larval population in control units immediately prior to and 10 days after the spraying of selected blocks. Comparison of the living larval population before and after spraying will provide a fairly accurate estimate of the percentage of mortality occurring in an area. All larvae will be collected from 15-inch branches.

Mortality Checkers (recruited from development checkers and spray card checkers)

Control project personnel will determine the tussock moth mortality as accurately as possible by following this procedure:

a. One to two days before a block is to be sprayed, a mortality line will be established perpendicular to the swath width for at least every third spray block.

b. Mortality lines will be run in conjuction with spray card lines where practible to do so.

c. A mortality line will consist of 10 sampling stations or less as directed by the unit entomologist. Each station will be 4 chains (264 feet) apart. Each station will be marked by tagging the trees from which the samples will be taken. The first collection at each sampling station will require the counting of all the egg masses on one branch from each of two trees (two branches). Select a branch that has at least five new egg masses. Egg mass counts must be made before larvae hatch.

d. Ten days after the stands around the mortality line have been sprayed, these lines will be rerun and collections made from the two trees at each station. However, at each sampling station, collect all the larvae on two branches from each of two trees and place in vials if they do not exceed more than 20 larvae. In that case, count the larvae on the spot.

e. All unit supervisors will be notified of the resultant mortality as soon as it can be calculated by the formula:

$$\left(\frac{\text{Prespray sample} \times 2 - \text{postspray sample}}{\text{Prespray sample} \times 2}\right) 100 = \text{Percent mortality}$$

The residual population will be obtained by resampling trees from which the egg masses were collected the preceding year.

Biological Evaluation

Prespray and Postspray Egg Mass Collection

Final mortality will be determined by comparing new egg masses against old egg masses. Egg mass collection plots will be established in areas of visible crown defoliation. All tussock moth cocoons will be counted on any branch cut. Branches will be at such a height that they can be reached from the ground.

Prespray egg mass counts will be taken preferably in early September, preceding the year an area is to be sprayed. If this is not possible, they will be taken in the spring prior to spray day.

All field personnel will be trained before taking any egg mass samples.

Sample trees will be marked on a ½-inch map. A description of how to get to the tree will be written up and one copy sent to the Regional Office along with the map. Each tree will be tagged and/or painted for future reference.

DOUGLAS-FIR TUSSOCK MOTH CONTROL

St. Joe National Forest

1965

Duties and Responsibility

Fixed-wing Spray Operation

I. Regional Responsibility:

The Regional Office will be responsible for the assignment of the project contracting officer, formulation checker, technical assistant, and regional air officer.

A. Contracting Officer

The regional contracting officer will be responsible for all bid solicitations and awarding of contracts for spray plane services, insecticide, all qualifications, specifications and heavy construction and/or equipment. He will designate the unit supervisor as his representative in obtaining contractual compliance. Interpretation of contracts and controversial disputes with contractor's representatives that cannot be resolved at the local project officer's level will be referred to the regional contracting officer.

B. Formulation Checker

A formulation checker will be assigned to the project by the regional contracting officer. He will check all insecticide testing and gallonage measurements for contract compliance for payment purposes. He is responsible to the contracting officer.

C. Air Officer

The regional air officer will be responsible for developing specific guidelines and for exerting leadership in aerial safety practices. More specifically, his duties will be:

a. To contact the Federal Aviation Agency and determine adequacy of airfields to be used.

(1) Length and width required for type airplane to be used.

(2) Amount of maintenance and surfacing needed.

(3) Altitude and spray load capacity allowed.

(4) Check present flight pattern, or develop one.

b. Advise project director on the type aircraft that will do the best and safest spray job.

(1) Help write specifications to exclude unsafe airplanes.

(2) Prevent four-engine planes from spraying in mountainous country.

c. Inspect contractor's aircraft for compliance with contractural requirements prior to and after contract is awarded.

(1) A special trip to the contractor's hangar will be necessary t obtain needed personnel and aircraft information (Form 22-5730-1, Exhibit 4-A). Spray systems will be checked and proposed changes discussed on the same visit.

(2) Final inspection is made when plane arrives at Missoula Airport for calibration tests. All aerial safety requirements as included in the contract specifications, State, and Federal Aviation Agency regulations will be checked. State spray licenses must be valid for the current season.

d. Calibrates spray apparatus to determine flow rate (gallons per minute), atomization (mean median diameter), and effective swath width (Form 22-5700-8, Exhibit 4-B).

e. Determine that spray systems are clean, sound, and free of leaks.

f. Following the initial calibration at the beginning of the project, makes subsequent checks when aerial observers report improper rate of discharge or when spray deposit checkers report improper deposit and atomization.

g. Train aerial observers in maintaining proper height above spray planes.

II. Forest Responsibility

This section of the plan is a brief description of the various individual duties and responsibilities of important positions in the fixed-wing phase of the Tussock Moth Control operation.

A. Project Supervisor

Responsible for the general administration of the entire Tussock Moth control operation. Acts as coordinator between all agencies, units, cooperators and contractors involved in the operation. Also responsible for safety, training, and personnel welfare.

B. Assistant Project Supervisor

Will be responsible for sharing the work load of the project supervisor. Acts for the project supervisor when the latter is not available. Acts as CODR on flying and insecticide contracts.

C. Field Operations Officer

Authorized to make all important decisions, subject to assistant project project supervisor approval, important to the success of the fixed-wing phase of the project. Responsible to the assistant project supervisor for covering all general administration of the fixed-wing unit. He is also an authorized representative of the contracting officer and carries the responsibility to obtain full contract compliance. He must maintain a constant communication with the assistant project supervisor during the actual spray job. The field operations officer has full responsibility for the aerial inspection of the fixed-wing blocks.

D. Assistant Field Operations Officer

Responsible for all administrative duties delegated to him by the field operations officer. Also responsible for the aerial orientation of the chief pilot. Maintains necessary reports, progress maps, and records necessary to the control operation. Informs administrative assistant daily of acres sprayed, crew hours worked, vehicle use, and other necessary administrative activities of each day.

E. Administrative Assistant

Maintains all essential records, reports, progress maps assigned to this position. Primarily concerned with fiscal control. Serves as office manager to the total control operation.

F. Clerk

Responsible for maintaining current records and reports at Pullman-Moscow airport during flying hours. Will act as part time radio operator, load checker, flight checker, messenger, and weather recorder. Keeps full account of all happenings in daily log book and diary.

G. Aerial Observer

Aerial observations are usually made by the assistant project supervisor and aerial observers. They are directly responsible to the project supervisor. They will stay aloft while spray planes are in the air and report on each spray load observed. A 12- by 12-inch lap board (having the spray block mosaic on one side and a one inch map on the other) should be used to sketch in spray coverage. More specifically, his duties include:

a. Keeping spray plane in assigned spray block.

b. Reporting leaking spray nozzles. These are best seen during the turns of the plane at the end of each swath or on ferry trips to and from the spray area.

c. Check on application of spray. The spray ribbon should settle into the trees without appreciable side drift within 5 minutes after passage of the spray plane. Excessive side drift or vertical boiling of the spray will require determination of the spraying.

d. Take air temperatire at spray plane altitude after spray plane has left area. These readings should start at about 8 a.m. The observation plane should remain above and behind the spray plane and cross the spray swath frequently for effective observation.

e. Determine the height of spray plane above the trees. Accurate determinations are difficult. A rough estimate can be made by using multiples of tree heights as a basic measurement. The observation plane should never fly at the same altitude as the spray plane to estimate the height of the spray plane.

f. Observe for potential flight hazards (power lines, etc.) and safe flying practices. Immediately report forced landings.

g. Will observe compliance of flying instructions issued by the fiel operations officer and other overhead. Report all unsatisfactory performances when they occur.

H. Weathermen

Directly responsible to the field operations officer. A portable weather station will be used. It will be the duty of the weatherman to take and report weather observations every halfhour, beginning at 3:30 a.m., until the spray operation ceases for the day. He will take these readings in t block assigned. Observations will include wind velocity and direction, a temperature, and humidity.

a. Will proceed, in a safe manner, to assigned location for weather observations as outlined above.

b. Keep a complete record observation on the forms furnished.

c. If rain has occurred during the night, check the amount of water on the needles. (Shake branches; if free water, do not spray.)

d. Report immediately whenever wind conditions change materially or approach 5 m.p.h.

e. When in an area where spray planes can be observed, report immediately any plane down or in trouble.

f. Instrument location

(1) Set up anemoneter in a small opening within the block to be sprayed.

(2) Place thermometer in the open, but do not have bulb in the s

(3) Keep compass away from vehicle and other metal objects when giving wind direction.

(4) Give wind direction when facing into the wind. For example, "Wind at 4 miles per hour from Southwest".

I. Communications Technician

Responsible to the assistant project supervisor. Will maintain all communications systems for the total operation on an on-call basis.

J. Repeater Operator

Responsible for operation of radio repeater on Palouse-Baldy lookout for the overall control operation. Must be available on an on-call basis at early hours of the morning as well as normal work day hours.

SAFETY PLAN

DOUGLAS-FIR TUSSOCK MOTH CONTROL

AERIAL TREATMENT PROJECT

HELICOPTER PHASE

St. Joe National Forest

1965

POLICY

No Forest Service air job is so important or so urgent that it cannot be done safely. Safety will be integrated into all phases of air work to minimize or eliminate risks and hazards. (FSM 5702.42)

PROTECTIVE AND SAFETY EQUIPMENT

1. All pilots should wear protective helmets while piloting helicopters on Forest Service operations. The standard military-type crash helmet will be accepted as meeting the specification requirements.
2. Forest Service personnel making frequent helicopter flights shall wear the standard military-type crash helmet.
3. Others who make occasional flights in helicopters should wear the standard safety hat with chin strap. Hard hats will be carried while entering and leaving the helicopter bubble to avoid possible contact with rotors.
4. Safety glasses will be worn by servicing crew when operations manager deems it advisable.
5. Head gear of ground personnel should be soft and incapable of blowing off and fouling the rotor blades.
6. High-visibility vests will be worn by Forest Service personnel involved in loading the helicopters.

LOADING HELICOPTER WITH SPRAY SOLUTION

1. Only authorized and necessary personnel will approach the helicopters and carry out the loading operations.
2. Personnel will approach the helicopter only after a definite landing has been made.
3. Approach and leave the helicopter only from the front or sides that are visible to the pilot. Never approach from the uphill side or from the rear.
4. The loader shall not load the helicopter until the pilot signals to do so.
5. The loader shall follow the pilot's instructions for the gallonage per load.
6. The loader should give the pilot the "all-clear" signal before take-off.
7. The loader should visually check the spray equipment as the helicopters approach and depart.
8. Care should be taken in removing the filler hose nozzle from the spray tanks to prevent spillage of chemical on the helicopter.
9. Always be cognizant of the rotor blade and the tail rotor.
10. A chalk line will be placed on the ground designating the outer limits of the prop when in rotation.
11. Refrain from bodily contact with bubble and make sure doors are closed before take-off.

FLYING IN HELICOPTER

1. Before taking off, fasten and adjust safety belt. Keep safety belt fastened until the helicopter has landed.
2. Keep person, maps, clothing, and equipment clear of helicopter controls.
3. Talking to the pilot during take-off or landing is prohibited.
4. Keep alert for hazards such as snags, high lead cables, telephone lines, etc.
5. Use only mechanical lighters and safety matches while riding in helicopter. Smoking in helicopters should be discouraged at all times.

REFUELING HELICOPTERS

1. Forest Service employees will not participate in refueling helicopters unless adequate contractor personnel are not available, and the helicopter motor is shut off.
2. Helicopters should be refueled from one pad. Service truck should be 50 feet from the helicopter.
3. Helicopter and gasoline containers will be grounded.
4. No smoking will be permitted within 50 feet of the helicopters or fuel drums.
5. "No Smoking" signs will be posted at helicopter landing and fuel storage area.
6. Fifteen-pound fire extinguishers will be on hand at pads and fuel storage area.
7. Drums containing helicopter gas must be well labeled and separated from other drums.

SAFETY PRECAUTIONS

1. Only spray personnel may be carried in any helicopter outfitted with spray equipment and then only when the tanks are empty.
2. A large first aid kit and stretcher will be available at the heliport.
3. Radio contact will be maintained between the heliport and the observer, and the heliport and BRC Headquarters or the nearest Ranger District.
4. Pilots shall be briefed on hazards in the spray area.
5. Helicopter pilots are subject to flight duty limitations as follows:

A. Eight Hours on First Day. An 8-hour day is permissible whenever 4 hours or less were flown the preceding day.

B. Six Hours Per 24-Hour Period Thereafter. This is the maximum hours of flight time permitted, if the preceding day's flight time exceed 4 hours.

C. Not To Exceed 38 Hours in Any 6-Day Period. This is the maximum flight hours permitted for any 6 consecutive days involving flight time.

D. Full Day's Rest. Pilots flying 26 hours or more during 6 consecutive days involving flight time will have the seventh day for rest.

When a day of rest is due, it will be the pilot's responsibility to advise the contractor and arrange for an accepted relief pilot, if needed.

E. One-Hour Rest Period. No pilot can fly over 6 hours without a 1-hour rest period. It is preferable that a 2-hour rest period be arranged, when possible.

The period required should be devoted to rest. Time spent gassing up or checking weather, loading or unloading the aircraft, or other such work will not be considered part of a rest period.

Flight is not entirely reliable as a gage of accumulative pilot fatigue. Sound judgement is essential in administering air operations to provide maximum safety.

6. Landing pads shall be kept in sound shape with no loose boards and nails.
7. Keep the helispot free of loose debris and articles which may be blown around by the helicopter. (Loose paper, tarps, ropes, empty cans, etc.)
8. Remove hazards in landing area such as trees, brush, and rocks.
9. Use extreme caution around helicopters during high wind or starting up or shutting down. The rotor blades may pass dangerously low to the ground.
10. A vehicle supplied with a radio, sledge hammer, blankets, crowbar, pulaski, suitable 15 lb. CO_2 fire extinguisher and first aid supplies shall be available at the heliport at all times during the actual spray operation.
11. Do not watch landing, takeoff, or hovering closer than 100 feet without eye protection.

12. Unauthorized personnel will remain at a minimum of 100 feet from the helicopter.

13. All spray personnel except the loader should remain 50 to 75 feet from the helicopter when it is landing or taking off.

14. Warning signs shall be placed at the heliport, and, if necessary, a rope fence should be placed around three sides of the landing area. The fence should be about two feet high and marked with high-visibility tape.

15. Never approach or leave a helicopter in an area not visible to the pilot or from the higher side.

16. Always be conscious of the main rotor and tail rotor.

17. A ribbon-type wind indicator will be provided for flying safety.

18. During dusty conditions, the heliports should be sprinkled with water.

19. The following articles will be carried in each helicopter:

    A. Sheath knife

    B. First aid kit

    C. Fire extinguisher

    D. Air-ground signal code

    E. Maps of operating area

20. Keep long-handled tools horizontal when around helicopters to avoid being struck by rotors.

21. Insecticide Precautions

    Observe the following precautions and observations when handling D.D.T. insecticide and fuel oil carriers.

    A. Fuel oil carriers are dangerous as skin burners. Avoid direct contact and wash after handling.

B. D.D.T. is rated as moderately toxic and should be considered poisonous. Symptons of D.D.T. poisoning are muscular tremors, diarrhea, labored breathing and convulsions.

C. Avoid chemical concentrates on the skin and keep them out of eyes, nose and mouth. In event of eye contact, rinse eyes for 15 minutes and see a doctor.

D. Wash with soap and warm water after handling DDT spray mix. Always wash hands and face before smoking or eating.

E. Each employee will have clean clothes to change into in case of spillage.

F. Washing facilities will be available at all helispots and airports.

SAFETY PLAN

FOR

DOUGLAS-FIR TUSSOCK MOTH CONTROL

FIXED WING OPERATION

St. Joe National Forest

1965

I. Introduction

Safety has the highest priority of any activity on this project. No effort will be spared to see that all job accomplishment is obtained in a safe manner.

II. Objective

No accidents or injuries.

III. Policy

The safety objective established for this project is the highest obtainable. This objective will be achieved by all personnel analyzing each job assigned -- discussing it with the supervisor, and reading the Safety Code Handbook -- and carrying out all assignments with the proper attitude.

IV. Responsibility

The Project Supervisor will be responsible for the overall safety and welfare of all personnel, including the contractor's people. He will be assisted by the Unit Supervisors whose prime responsibility will be to check with each sub-unit officer-in-charge to make certain that he understands the safety plan and has explained it to the people in his unit. The Safety Officer for air operations will be Al Hammond. The Project Supervisor or his assistants will coordinate rescue operations.

V. Hazard Analysis

Hazards are grouped into two major areas. Those encountered during aerial operations and those encountered on the ground.

A. Aerial hazards

1. Aircraft failure - take-off, flying, landing.
2. Weather conditions - turbulent air, etc.
3. Terrain, as it effects local wind conditions.
4. The many power lines leading to farm houses within the spray area.

B. Ground hazards

1. Those encountered by the field crew:

   a. Poor driving conditions (narrow, steep roads).
   b. Hazardous terrain.
   c. Hazardous ground cover (understory and overstory).
   d. Hand tools.
   e. Wind in area with hazardous overstory.

C. Hazards encountered at the airfield

1. Handling aviation gas.
   a. Storage.
   b. Refilling aircraft.
2. Aircraft traffic.
3. Vehicle traffic.
4. Handling insecticide and other spray ingredients.
5. Tools and other equipment.

VI.. Action Plan

A. Aerial operations:

All contract and Forest Service personnel connected with the use of airplanes will acquaint themselves with the instructions on pages 52 - 65 of the Health and Safety Code. The Health and Safety Code will be available at all ground stations for review by all personnel.

1. All aircraft will be equipped with shoulder harnesses and safety belts of a type approved by the F.A.A. and the contracting officer, and installed in accordance with their requirements.

2. Crash helmets of hard material approved by the contracting officer will be worn by spray pilots in the performance of the spray operations.

3. All planes shall be clean inside and out with special attention given to clean windshields. This item will be checked each trip.

4. No plane may be used for spraying or observation which has not been approved by the regional air safety officer or his designated representative.

5. The maximum allowable insecticide spray load for each airplane will be based on the C.A.A. certificated gross weight for the airplane concerned as modified by the regional air safety officer and the project supervisor to meet local airport runway and flying conditions of the control unit concerned.

6. Gasoline and insecticide tanks shall be clearly marked or designated as to avoid all danger of confusion when loading gasoline and insecticide.

7. The spray system shall have positive action; leakproof, shut-off valves capable of eliminating drool or clusters on the nozzles.

8. All aircraft and refueling equipment will be electrically grounded properly while refueling.

9. A minimum of thirty (30) minutes reserve supply of gasoline over the estimated amount needed for the round trip will be required for each flight. This will be determined by actual measurement if felt necessary by the contracting officer or his representative.

10. Radio communications will be maintained between the observation plane and the spray plane, except during actual spray operations.

11. Each observer will check in with the radio clerk at Moscow-Pullman Airport every fifteen (15) minutes while airborne.

12. The observation plane will be airborne whenever the spray plane is over the area. The observer shall check (1) spray coverage in the blocks, and (2) the spray plane's compliance with safety instructions. If any discrepancies occur, they will be reported to the project supervisor or his assistant immediately.

13. Spray plane pilots will not be permitted to fly aircraft for more than six (6) hours in any twenty-four (24) hour period. Nor will they be allowed to fly more than six (6) days in succession.

14. A line inspection will be performed by a properly certified and rated mechanic each day and reported on form NFA-SBW #4. These forms will be filed with the administrative assistant to the project, and checked by the air operations inspector.

15. Wearing of parachutes by Forest Service personnel is optional. The Safety Code specifies conditions requiring use of parachutes.

16. The airplane contractor will furnish 15 pound carbon dioxide fire extinguishers, or the acceptable equivalent type at each of the following locations.

    a. One at each gasoline loading station.
    b. One in the area where daily maintenance work is carried on when in operation.
    c. One for each three planes or fraction thereof where the planes are parked.

17. A Forest Service crash vehicle (light truck, panel, or station wagon) will be held on standby at the airport. This vehicle will be equipped as follows:

Number	Item
2	15 lb. CO_2 fire extinguishers
1	10-25 man first aid kits
1	stretcher
2	blankets
1	set crash equipment, including bolt cutter, hacksaw, pry bar, and other miscellaneous hand tools
1	set wire splints

18. The pilot is in command and shall be responsible for the safety of the aircraft, occupants, and cargo. He has complete authority to postpone, change, or cancel his flight when he believes existing or impending conditions make it unsafe.

B. Ground Operations

Air Base

1. No smoking will be allowed within 100 feet of the storage tanks (gasoline and insecticide) or filling hoses. An adequate number of "No Smoking" signs will be posted around the area.

2. Adequate fire extinguishers will be available at the airfield office and near the filling hoses.

   (a) One 15-pound carbon dioxide extinguisher or equivalent at each installed pumping unit will be supplied by the insecticide contractor.

   (b) One 15-pound carbon dioxide extinguisher or equivalent at each nozzle outlet of each airplane insecticide loading station.

   (c) All other fire extinguishers not listed above will be furnished by the Forest Service.

3. All Forest Service vehicles and rented vehicles will be inspected by the drivers of each vehicle before operations begin. Form 6430-8 will be filled out and any deficiencies will be corrected before use.

4. All drivers of Forest Service vehicles and rented vehicles must have a valid Forest Service permit as well as a State driver's license.

5. All personnel not directly involved with the loading, servicing, operations, or maintenance of aircraft will stand clear of taxi strips and loading booms.

6. No visitors or unauthorized persons will be allowed beyond the "OFF LIMITS" signs.

7. "Off Limits" and "No Smoking" signs will be posted throughout the loading area of the airport.

8. Jeeps will not be driven over 35 miles per hour.

9. Hardhats, boots, and appropriate field clothing will be worn as applicable. Pants will be stagged.

10. A standard 10-25 man R-1 first aid kit will be available in the office, at the airport, and in the lab.

11. All men in the field will carry a 1-man first aid kit.

12. Applicable sections from the new "Health and Safety Code" should be reviewed, depending upon job duties.

13. Inspect vehicles each day and keep them in good repair. They should be greased every 2000 miles. Repairs should be made immediately. Do not drive a vehicle that is not in safe working order.

14. Fresh hot coffee will be provided at the air field to help keep everyone alert. Unit supervisors to see that this is done.

15. In the event of a plane accident away from a road, the unit supervisor will immediately call for the services of the regional air rescue squad from the aerial fire depot. The call should be placed with the regional fire dispatcher. Also, notify project director, Forest Supervisor, and regional serious accident committee at once. This action should not defer any local effort to reach the accident scene in the shortest possible time and with the best available medical facilities and other appropriate equipment. The district fire dispatcher, whose district the accident is on, should be notified in case of fire. (See Emergency Plan Section).

16. Very early morning spraying operations make it desirable that men off duty during daylight hours get rest or sleep in late afternoon or early evening.

17. Adequate safe lighting should be provided for landing, maintenance and headquarters area.

18. Protective clothing, gloves, and goggles should be worn by personnel handling or working with insecticides. This also applies to the contractor's employees.

19. Washing facilities will be made available near the area.

    a. Personnel use.
    b. Equipment cleaning, etc.

20. All insecticide containers which are to be destroyed will be done according to Forest Service regulations. This also applies to contractor's employees.

Field

1. Hard hats, boots, and appropriate field clothing will be worn. Pants will be stagged.

2. All men will carry a 1-man first aid kit.

3. Vehicles will be properly inspected for safe operations prior to being used on field assignments.

4. Driving will be done over hazardous mountain roads. Safety belts will be worn at all times while vehicle is under way. Speed of vehicle will be commensurate with road conditions.

5. Personnel will review Safety Code before going into field.

6. Work will not be done in timber when high winds are blowing and blowdown is likely to occur.

EMERGENCY PLAN SECTION

I. Downed Aircraft Personnel Rescue Procedure in Spray Area

1. Have available phone numbers of doctors available to fly into crash location, also central answering service number.

2. List of rescue squad on standby at the jump center.

3. Helicopter and fixed wing aircraft on standby.

4. Aerial observer to report location of downed aircraft, and whether rescue personnel can land at location in helicopter or nearby, whether jump personnel can land at crash location or nearby, or whether best to send in rescue squad on foot, and nearest location to land rescue squad from which they can walk to crash scene.

5. Report to regional fire dispatcher, forest dispatcher, and district dispatcher the above information. If aircraft is burning report intensity, rate of spread, fuel, etc.

6. Contact Project Supervisor. Will coordinate rescue operations.

7. Only authorized personnel to engage in rescue operations.

8. Notify hospital that patient will be arriving.

II. Pilot Rescue Procedure at Air Base

1. Same as 1 and 2 for Downed Aircraft Rescue.

2. A crash truck will stand by during all fueling operations, take-off and landings.

3. Report accident to regional fire dispatcher and Project Supervisor.

4. Notify hospital or central answering service and have doctor standing by.

DOUGLAS-FIR TUSSOCK MOTH CONTROL

Emergency - Search and Rescue Planning
- Fixed Wing - Helicopter -

I. Priority of action before crash is located.
   1. Alert all ground and aerial personnel.
   2. Have all spray pilots return to base.
   3. Obtain following information from aerial observers:
      a. Crash location
      b. Accessibility - whether best to send rescue squad by vehicle, helicopter, on foot, jumpers, etc. Also, nearest point from which ground rescue can walk to crash site.
      c. Description of crash - evidence of survivor, fire, etc.
      Note: Contractor's chief pilot may elect to scout general crash area.
   4. Ground rescue squad starts in radio-equipped crash truck toward general crash area.
   5. Notify nearest CAA office. Alert Assistant Project Supervisor and Forest Air and Safety Officer.
   6. Arrange for smokejumpers and/or helicopters.
   7. Notify hospital or central answering service. Make arrangements for medical and ambulance service.
   8. Complete, constant communications are necessary with all units concerned.

II. Priority of action after crash is located.
   1. Decide rapidly as possible whether to use ground or airborne rescue. Initiate action.
   2. Maintain communication.
   3. Start medical aid and ambulance service to crash.
   4. Report pilots condition, as determined by rescue squad, to medical units and to Forest headquarters.
   5. Take any action necessary to save life.
   6. Notify hospital or central answering service that patient will be arriving.

DOUGLAS-FIR TUSSOCK MOTH CONTROL

St. Joe National Forest

1965

DUTIES AND RESPONSIBILITY

Helicopter Spray Operation

Helicopter Unit Operation Manager

1. Responsible to the supervisor in charge of the helicopter spray phase of the Douglas-fir tussock moth control program. (Albert E. Turner)

2. Directs the activities of personnel assigned to his unit and carries out all phases of the master operating plan. A unit usually consists of two or three helicopters with full service equipment and crew.

3. Prepares a daily operating plan in advance, and arranges to have all necessary spray materials and equipment ready for use at the beginning of each day's operation.

4. Furnishes the pilots with a map, photos, briefing of daily spray operation, and warning of special flight hazards. During the spraying operation, is responsible for periodically checking with the pilots on progress of spraying, keeping them oriented in the spray block, and giving them their instructions for correcting flight patterns as needed, for better spray coverage. Knowing the solution gallonage required for each block, checks on pilot's progress when one-half and again when three-fourths of the required gallonage has been applied.

5. Is responsible for keeping crew time reports. At the end of each day, verifies the flight hours with pilots. The Daily Flight Report--Invoice, form 6500-122, must be signed for each day by the pilot.

6. Makes the decision to begin and close the spray operation each day, based on weather factors and conditions affecting flying safety.

7. Responsible for safety in all phases of the operation. Take immediate action and notifies his supervisor in case of accident or injury to personnel.

8. Sees that communication with the Potlatch Work Center is maintained.

9. Keeps a daily log of spraying operations.

10. Maintains a 2-inch-to-the-mile map with data recorded separately by spray blocks.

11. Responsible for reading the helicopter meter in the morning and evening and whenever spraying time is interrupted.

12. Prior to treatment, the operation manager will make the necessary reconnaissance with the pilots to point out the spray block boundary, and if necessary, mark the boundaries.

13. Checks with the Administrative Assistant at the end of each spray day giving him a summary of the acres sprayed by blocks, gallons of solution sprayed, helicopter flight hours, hours worked by each employee at the heliport, and equipment use hours.

14. Performs other duties as assigned.

Helicopter Unit Mixer Operator

1. Directly responsible to the Helicopter Unit Operation Manager.

2. Operates a 2000-gallon mixer-tanker unit.

3. Service the mixing unit as required in accordance with posted instructions.

4. Makes minor equipment repairs and adjustments when necessary.

5. Maintains mixer log book and other records as required.

6. Responsible for safety around the mixing unit.

7. Keeps the spray solution agitated during the spray operation.

8. Responsible for logging helicopter flight time (clock time), gallons of spray solution used, weather data, and number of spray trips made during the day for each helicopter.

9. Record the outlet meter reading on the mixer unit before spraying begins each morning, and after spraying ends each day. Determines the amount of solution remaining in the unit and reports the amount dispensed that day to the operation manager.

10. Performs other duties as assigned.

Helicopter Unit Observer

1. Directly responsible to the Helicopter Unit Operation Manager.

2. Is responsible for observing the helicopter actually spraying. Sometimes this can be done from the helispot. By using binoculars, determines if the pilots are getting proper spray coverage. If the spray area is not visible from the helispot, he will travel to a point where the operations can be observed.

3. The observer should have radio contact with operation manager at all times during the spray period. He should frequently report the field conditions such as (a) air temperature, (b) wind velocity as indicated by spray drift, (c) presence of heavy moisture on tree foliage, and (d) spray pattern.

4. He should keep track of helicopters when on or near spray blocks, so that he can report and give aid in case of a forced landing.

5. He should observe all flight procedures and report any unsprayed gaps between spray swaths.

6. The observer makes frequent checks, at least once daily, for accuracy of spray system calibration. A stop watch is used in accordance with calibration procedures and the operation manager is informed of the results.

7. The observer will need the following equipment when in the field: Radio, map of spray area, weather station, binoculars, ruler, and pencil for keeping a record of spray progress.

8. Perform other duties as assigned.

Helicopter Unit Spray Loader

1. Directly responsible to the Helicopter Unit Operation Manager.

2. Responsible for loading the insecticide into the helicopter spray tanks.

3. Responsible for maintaining clean loading hose nozzle, keep from spilling solution on the helicopter engine, electrical system and bubble. Check the hose nozzle for rocks or debris after laying it on the ground or pad after filling operation.

4. Follow signals from the operator indicating when the correct quantity of spray solution has been dispensed into the spray tanks.

5. Responsible for maintaining the cleared helispot of all loose debris that may be picked up by the helicopter rotor blades.

6. Responsible for checking to make certain that the helicopter is free of all personnel prior to take-off and gives the pilot the "all-clear" signal.

7. Responsible for checking the helicopter spraying system for leaks, breaks, and drooling nozzles. This should be done as the helicopter approaches the helispot, while loading, and as the helicopter leaves the helispot.

8. Check and record the weather data at the helispot every 20 minutes during spray operation. Data will include wind velocity, temperature, and humidity.

9. May be required to record spray data occasionally. Will include logging of helicopter flight time (clock time), gallons of spray solution used, weather data from observers, and number of spray trips made during the day for each helicopter.

10. Performs other duties as assigned.

Helicopter Unit Truck Driver

1. Directly responsible to the Helicopter Unit Operation Manager.

2. Responsible for the transportation of the insecticide DDT from the storage tank at Potlatch Work Center to the helispot. The spray solution will be hauled in a 1200-gallon tanker truck.

3. Responsible for the maintenance of assigned motor vehicle.

4. May be required to assist in loading helicopters at times.

5. Wash vehicles as needed.

6. Responsible for adhering to established safety standards while driving and when working around the helispot.

7. Performs other duties as assigned.

Helicopter Unit Watchman

1. Directly responsible to the Helicopter Unit Operation Manager.

2. Responsible for remaining at the helicopter landing spots during the times when the base is not in operation. This will include weekend duty when necessary.

3. May be required to give information about the tussock moth spray program to visitors occasionally.

4. Required to remain at the landing site during tour of duty to prevent vandalism and theft of valuable helicopter and mixing equipment.

5. Performs other duties as assigned.