NOAA FORM 17-4 (4-81) — U.S. DEPARTMENT OF COMMERCE — NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Form Approved OMB Control No. 0648-0025
Expires 05/31/2021

INITIAL REPORT ON WEATHER MODIFICATION ACTIVITIES

This report is required by Public Law 92-205; 85 Stat. 735; 145 U.S.C. 330b. Knowing and willful violation of any rule adopted under the authority of Section 2 of Public Law 92-205 shall subject the person violating such rule to a fine of not more than $10,000, upon conviction thereof.

Complete in accordance with instructions on reverse and forward one copy to:
National Oceanic and Atmospheric Administration
Office of Oceanic and Atmospheric Research
1315 East-West Highway, WWMC-3, Rm 11216
Silver Spring, MD 20910

1. PROJECT OR ACTIVITY DESIGNATION, IF ANY
Idaho Power's Central Mountain Project

2. DATES OF PROJECT
a. DATE FIRST ACTUAL WEATHER MODIFICATION ACTIVITY IS TO BE UNDERTAKEN: 11/15/2023
b. EXPECTED TERMINATION DATE OF WEATHER MODIFICATION ACTIVITIES: 04/30/2024

3. PURPOSE OF PROJECT OR ACTIVITY
ecipitation Enhancement/Snow Augmentation

4. (a) SPONSOR

NAME	AFFILIATION	PHONE NUMBER
Idaho Power Company	Self	(208)388-2200

STREET ADDRESS	CITY	STATE	ZIP CODE
1221 W Idaho St	Boise	ID	83702

4. (b) OPERATOR

NAME	AFFILIATION	PHONE NUMBER
Same		

STREET ADDRESS	CITY	STATE	ZIP CODE

5. TARGET AND CONTROL AREAS (See Instructions)

TARGET AREA		CONTROL AREA	
LOCATION	SIZE OF AREA	LOCATION	SIZE OF AREA
Payette, Boise, and Wood Ba	4560 SQ. MI	SNOTEL sites NW and N	Point SQ. MI

6. DESCRIPTION OF WEATHER MODIFICATION APPARATUS, MODIFICATION AGENTS AND THEIR DISPERSAL RATES, THE TECHNIQUES EMPLOYED, ETC. (See Instructions)

1. Ground-based generators: 33 units operating from locations indicated on project maps.
   a. Agent for 32 generators: Silver iodide (AgI) at 20 g/hr via acetone carrier and propane flame.
   b. Agent for 1 generator: Liquid Propane (test generator that will vary dispersal rates for testing purposes)
2. Airborne: 2 Aircraft operating from BOI equipped with 150 g end-burning and 20 g ejectable flares.
   a. Agent: Silver iodide
3. Rawinsonde located near Crouch, ID. Two radiometers, located on Squaw Butte, ID and Hill City, ID.

7. LOG BOOKS *Enter name, affiliation, address, and telephone number of responsible individual from whom log books or other records may be obtained.*

NAME	AFFILIATION	PHONE NUMBER
Derek Blestrud	Idaho Power Company	(208)388-5899

STREET ADDRESS	CITY	STATE	ZIP CODE
1221 W Idaho St. (Mail to: CHQ-6 PO Bc	Boise	ID	83702

8. SAFETY AND ENVIRONMENT

☐ YES	☑ NO	Has an Environmental Impact Statement, Federal or State, been filed? If yes, please furnish a copy as applicable.
☑ YES	☐ NO	Have provisions been made to acquire the latest forecasts, advisories, warnings, etc., of the National Weather Service, Forest Service, or others when issued prior to and during operations? If yes, please specify on a separate sheet.
☑ YES	☐ NO	Have any safety procedures (*operational constraints, provisions for suspension of operations, monitoring methods, etc.*) and any environmental guidelines (*related to the possible effects of the operations*) been included in the operational plans? If yes, please furnish copies or a description of the specific procedures and guidelines.

9. OPTIONAL REMARKS (See Instructions. Use Separate Sheet).

CERTIFICATION: I certify that all statements in this report on this weather modification project are complete and correct to the best of my knowledge and are made in good faith.

NAME OF REPORTING PERSON	
Derek Blestrud	
AFFILIATION: Idaho Power Company	SIGNATURE: Derek Blestrud
STREET ADDRESS: 1221 W Idaho St. (Mail to: CHQ-6 PO Bo	OFFICIAL TITLE: Senior Atmospheric Scientist

CITY	STATE	ZIP CODE	DATE	PHONE NUMBER
Boise	ID	83702	11/15/2023	(208)388-5899

Attachment to accompany NOAA Form 17-4, Nov. 2023
Idaho Power Company Weather Resources Management Project
Payette, Boise, Wood, and Upper Snake River Basins

Item 4: Addresses

Street Address:	Mailing Address:
1221 West Idaho Street Boise, ID 83702	Water Resources & Policy Dept. – CHQ-6 P.O. Box 70 Boise, ID 83707

Item 5: Target/Control:
Not a target – control program; project evaluation to be done by computer assessment of annual runoff.

Item 8. 1. No Environmental Impact Statement required.
2. In addition to the wealth of information available via the internet, Idaho Power Company operates a high resolution Weather Research and Forecasting model that is used for case guidance.
3. Suspension criteria satisfying the constraints listed below (extracted from the overall Project plan and abbreviated for inclusion here):

Any well-designed and responsibly conducted weather modification program includes guidelines for temporarily suspending or completely stopping cloud seeding when certain conditions exist.

This safeguard is intended to avoid contributing to or to give the perception of contributing to, runoff or reservoir levels beyond manageable limits, whether it is a real or perceived hazardous situation. Other hazardous situations include, but may not be limited to, flooding, excessive erosion and sedimentation buildup, and avalanches resulting from natural meteorological or hydrological phenomena. IPC created a list of triggers that it would monitor to determine whether cloud seeding operations should be suspended. These triggers include (and are discussed in detail below):

- Total snowpack
- Potential flood situations (including rain-on-snow)
- Severe weather threats, including tornadoes, locally heavy precipitation, strong or damaging winds, hail, or lightning
- Surface Water Supply Index
- Avalanche conditions
- Special circumstances

Assessing these triggers is a routine facet of ongoing forecasting and cloud seeding activities. The time needed for making decisions and acting on these parameters is shorter than commonly used in routine assessments.

These triggers are monitored on a storm-by-storm and moment-to-moment basis during rapidly changing weather conditions. National Weather Service (NWS) Flash Flood or Severe Weather Warnings pertinent to a target area, its drainage area, or even adjacent watersheds can trigger suspension of cloud-seeding operations. While suspending cloud seeding ahead of a severe weather threat is typically infrequent and short-lived, suspensions during potential flood situations might span several days or terminate cloud seeding for the remainder of the season. Special circumstances such as search and rescue missions, avalanche threats, or other emergencies within or near a target area may result in temporarily curtailing seeding operations, as IPC deems prudent.

Suspensions can be called for all or part of a basin, based upon deduced threat. An example of this might be that there is a flood warning for Weiser River near Weiser, Idaho; the northern generators in the Payette Basin may be suspended until the threat passes, but the southern generators located in the Payette Basin may remain active to focus augmentation the eastern Payette Basin and the Boise Basin.

Total snowpack

If any of the next 3 variables are met.

1- SNOTEL

Snowpack can begin as early as October and continue through April and sometimes into May. A hazard potential from snowmelt exists after excessive snow accumulations because it creates unmanageable runoff or it creates flood-stage runoff. Therefore, certain percentages of April first's basin-wide average water content are used as cutoff criteria for seeding operations.

Total snowpack status is evaluated from data gathered by other agencies such as the Natural Resources Conservation System (NRCS), snow survey, and snow pillow data. Table 1 lists these percentages. Once suspended, the program may resume seeding operations if subsequent snow survey or snow pillow data indicate the accumulation has fallen below these percentages.

Date	Cut-off value (percentage of April 1 average)
January 1	95%
February 1	110%
March 1	125%
April 1	140%

Table 1 - Snowpack levels that would suspend seeding

2- Surface Water Supply Index (SWSI)

A Surface Water Supply Index (SWSI) is a predictive indicator of the surface water available in a basin compared to historic supply. The SWSI is calculated by summing the two major sources of irrigation water supply; reservoir carryover and spring and summer streamflow runoff. These two sources are analyzed together when determining the total surface water supply available for the season.

	Boise
Jan	2.3
Feb	2.1
Mar	1.9
Apr	1.8

Error! Reference source not found.2 lists the SWSI values of concern for the different basins.

3- Flood Index

Idaho Power has created a new daily-updated long-term suspension criteria named the Flooding Index. As a reminder, Idaho Power uses both short-range and long-range criteria for cloud seeding suspension. Short-range suspension criteria include: flood stage, flood warnings, extreme avalanche danger, and search and rescue operations and are on the range of 1-2 weeks in the future. Short-range criteria remain unchanged. Long-range criteria look at conditions occurring on the order of weeks to months in advance. The monthly NRCS Surface Water Supply Index (SWSI) and Total SWE from SNOTEL sites are currently used for long-range criteria. Drawbacks to SWSI include:

- Monthly distribution so a suspension lasts at least one month
  - Cannot come out of suspension early if conditions change
- Depends on ranking the last 30 years
  - It updates every 10 years which changes interpretation of SWSI
  - Does not include historic years with massive flooding which is a stakeholder concern
- Each streamgage has a different SWSI threshold which makes it harder to interpret at a glance
- Can be difficult to maintain due to database dependencies

The Flooding Index suspension criteria is based on publicly available water supply forecasts from the Northwest River Forecast Center (NWRFC). The methodology requires establishing a water supply threshold for each streamgage where flooding becomes hazardous for the public. Idaho Power estimated initial thresholds based on prior years, but the thresholds are open to change based on feedback from stakeholders. The daily NWRFC 50th percentile water supply forecasts is smoothed to a 7 day average and the index is calculated as water supply forecast divided by flood threshold. Cloud seeding suspension is recommended once the flooding index is > 1 for 3 consecutive days. The 7-day averaging and 3 consecutive day criteria are used to avoid moving in and out of suspension quickly which may cause confusion with stakeholders and partnered operators. An "Action Stage" at 0.95 is also present to give stakeholders a heads up that we are close to suspension and that operations may change. This stage also alerts the operators to take a closer look at the long-range forecasts.

Benefits of the new suspension criteria are:

- Daily updates
  - Operations can resume faster, 3 days after an index falls below 1 instead of 1 month with SWSI
- Is relatively easy to understand
  - If the index is < 1, no suspension
- Standardizes the index across all gages
  - 1 is the output suspension threshold of concern for all gages
- Uses publicly available data that is easy to access
- Can be used for any streamgage in any state
- Stakeholders have a voice in creating the flooding threshold value

Drawbacks of the new suspension criteria are:

- It's new and people are not familiar with it
- There's a short suspension history available for thresholds

Idaho Power will eventually transition to only using the Flooding Index for long-range suspension. This is based on hindcasts for Water Years 2017-2020 indicate the Flooding Index works well to identify when suspensions should occur. The Flooding Index identified times when both the SWSI and Total SWE indicated suspension was prudent. Streamgage water supply thresholds were set based on these water years, but can be moved up or down based on stakeholder feedback.

Rain-induced winter floods

IPC will take every precaution to ensure timely suspension of operations during these situations, because of the potential for flooding. Suspending operations under these conditions is intended to limit the effect of seeding when any increase in precipitation might contribute to the potential flood hazard or be perceived to do so. Seeding will be suspended when any of the criteria listed in Table 2 or Table 3 are met or forecast to occur within 24 hours.

River flow and encroachment forecasts are based upon information and predictions supplied by the NWS, Northwest River Forecast Center (NWRFC), USGS, and IPC. Both NWRFC and IPC use a stream flow model that predicts the inflow to Brownlee Reservoir and other upper Snake River locations, as well as tributaries of the system. Primary input to the model includes existing basin wetness and a Quantitative Precipitation Forecast (QPF). These forecasts are extremely sensitive to predicted condensate supply rates and temperatures. Suspension of seeding will occur whenever the NWS, NWRFC, or IPC forecasts exceed these criteria.

To provide an added level of caution during possible flood situations, seeding can be suspended at the discretion of IPC meteorologists and when indicated by the QPF. Suspension can occur even if criteria are not explicitly met.
Central Mountains - Winter flooding from excessive rainfall is possible in the Central Mountains. A large portion of the basin lies below 4,500' elevation and frequently receives rain rather than snow. Sometimes, heavy rain falls well above the 4,500' contour.

Error! Reference source not found.3 shows several river locations that are monitored to determine whether cloud seeding operations should be suspended. Seeding will be suspended when any of the criteria listed in **Error! Reference source not found.**3 are met or forecast to occur within 24 hours.

Location	USGS Gauge Identification	Flood Stage (GH – feet)	Flood Discharge (cfs)
Weiser River near Weiser	13266000	9.5	8,890
Snake River at Weiser	13269000	12	67,560
South Fork Payette at Lowman	PRLI1	7.5	7,205
Payette River near Emmett	13249500	10.51	16,000
Boise River at Glenwood Springs	13206000	10.31	7,000
Big Wood River at Hailey	13139510	6	4,150
Little Wood near Carey	13148500	6	1,660

Table 3 – Central Mountains: Critical river stages

Severe Weather Warnings

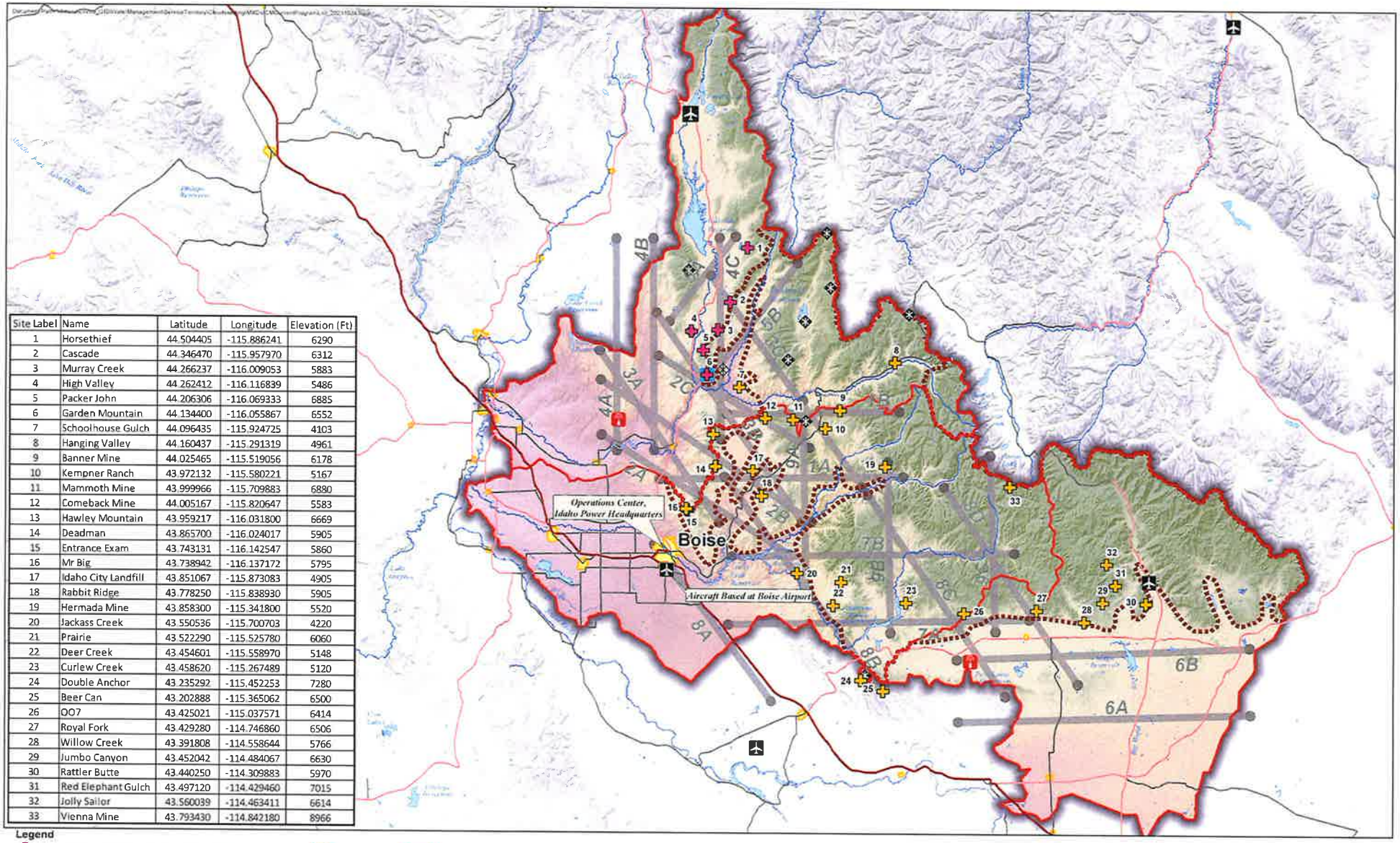
Seeding operations will be suspended whenever the NWS issues a severe weather warning for a cloud seeding region. This includes warnings for adjacent areas if the weather activity prompting the warning is likely to move into a cloud seeding region.

Usually warnings are issued when strong convective activity is expected. The official criteria are heavy local rainfall, winds at 50 knots (60 mph or higher) or if the winds cause observed damage, large hail (hailstones ¾ inches in diameter or larger), tornadoes, or funnel clouds.

Other Special Circumstances

IPC has the authority to suspend or terminate seeding activities under any special or unusual circumstances that may be deemed hazardous or might be perceived to be so by the public. Examples of special circumstances are extreme avalanche hazard as reported in United States Forest Service USFS avalanche status bulletins, very strong winds, unusually warm temperatures, heavy snow at low elevations, or other unforeseen circumstances.

Note: If suspension criteria are met during a seeding period, IPC will stop seeding operations immediately.



Site Label	Name	Latitude	Longitude	Elevation (Ft)
1	Horsethief	44.504405	-115.886241	6290
2	Cascade	44.346470	-115.957970	6312
3	Murray Creek	44.266237	-116.009053	5883
4	High Valley	44.262412	-116.116839	5486
5	Packer John	44.206306	-116.069333	6885
6	Garden Mountain	44.134400	-116.055867	6552
7	Schoolhouse Gulch	44.096435	-115.924725	4103
8	Hanging Valley	44.160437	-115.291319	4961
9	Banner Mine	44.025465	-115.519056	6178
10	Kempner Ranch	43.972132	-115.580221	5167
11	Mammoth Mine	43.999966	-115.709883	6880
12	Comeback Mine	44.005167	-115.820647	5583
13	Hawley Mountain	43.959217	-116.031800	6669
14	Deadman	43.865700	-116.024017	5905
15	Entrance Exam	43.743131	-116.142547	5860
16	Mr Big	43.738942	-116.137172	5795
17	Idaho City Landfill	43.851067	-115.873083	4905
18	Rabbit Ridge	43.778250	-115.838930	5905
19	Hermada Mine	43.858300	-115.341800	5520
20	Jackass Creek	43.550536	-115.700703	4220
21	Prairie	43.522290	-115.525780	6060
22	Deer Creek	43.454601	-115.558970	5148
23	Curlew Creek	43.458620	-115.267489	5120
24	Double Anchor	43.235292	-115.452253	7280
25	Beer Can	43.202888	-115.365062	6500
26	OO7	43.425021	-115.037571	6414
27	Royal Fork	43.429280	-114.746860	6506
28	Willow Creek	43.391808	-114.558644	5766
29	Jumbo Canyon	43.452042	-114.484067	6630
30	Rattler Butte	43.440250	-114.309883	5970
31	Red Elephant Gulch	43.497120	-114.429460	7015
32	Jolly Sailor	43.560039	-114.463411	6614
33	Vienna Mine	43.793430	-114.842180	8966

Legend

- IPC Liquid Propane + Agl GGEN
- IPC GGEN
- Met Station
- Met Tower
- Precip Gauge
- Radiometer
- Rawinsonde
- Basins Targeted
- Flight Lines
- Target Area

CM Project Map

Date: 11/1/2023

N W E S

0 5 10 20 30 40 Miles

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