IDAHO POWER®
An IDACORP Company

November 1, 2022

Dr. Kandis Boyd, Deputy Director
NOAA/OAR/Office of Weather and Air Quality
1315 East-West Highway, #10339
Silver Spring, MD 20910-3282

Mr. Gary Spackman, Jr.
Director
Idaho Department of Water Resources
Idaho Water Center
322 East Front Street
P.O. Box 83720
Boise, ID 83720-0098

Ms. Susan Cleverley
State Hazard Mitigation Officer
Idaho Bureau of Homeland Security
4040 Guard St. Building 600
Boise, ID 83705

Ms. Andrea Thompson
Section Manager
Division of Plant Industries
Idaho Department of Agriculture
2270 Old Penitentiary Road
Boise, ID 83712

Dear Madams and Sirs,

Idaho Power Company will again be operating a cloud seeding program to enhance wintertime snowfall on the Upper Payette, Boise, and Wood River Basins as well as the upper portions of the Snake River including the Henry's Fork.

The attached documentation is provided as required by state and federal laws. Please feel free to contact me if you have any questions or require any further details of the project.

Sincerely yours,

Derek Blestrud

Derek Blestrud
Meteorologist
Idaho Power Company
208-388-5899
dblestrud@idahopower.com

1221 W. Idaho St. (83702)
P.O. Box 70
Boise, ID 83707

Attachment to accompany NOAA Form 17-4, Nov. 2022
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):

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 Upper Snake Project

2. DATES OF PROJECT
a. DATE FIRST ACTUAL WEATHER MODIFICATION ACTIVITY IS TO BE UNDERTAKEN: 11/01/2022
b. EXPECTED TERMINATION DATE OF WEATHER MODIFICATION ACTIVITIES: 4/30/2023

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

4. (a) SPONSOR

NAME	Idaho Power Company		
AFFILIATION	Self	PHONE NUMBER	(208)388-2200
STREET ADDRESS	1221 W Idaho St.		
CITY	Boise	STATE	ID
ZIP CODE	83702		

4. (b) OPERATOR

NAME	Same		
AFFILIATION		PHONE NUMBER	
STREET ADDRESS			
CITY		STATE	
ZIP CODE			

5. TARGET AND CONTROL AREAS (See Instructions)

TARGET AREA		CONTROL AREA	
LOCATION	Upper Snake Basin	LOCATION	2-3 SNOTEL sites to NW ar
SIZE OF AREA	13250 SQ. MI	SIZE OF AREA	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: 25 units operating from locations indicated on project maps.
   a. Agent for 25 generators: Silver iodide (AgI) at 20 g/hr via acetone carrier and propane flame.
2. Airborne: 1 Aircraft operating from PIH equipped with 150 g end-burning and 20 g ejectable flares.
   a. Agent: Silver iodide
3. Two rawinsondes, located near Afton, WY and Idaho Falls, ID. One radiometers, located on Woodall Mountain, 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	Derek Blestrud		
AFFILIATION	Idaho Power Company	PHONE NUMBER	(208)388-5899
STREET ADDRESS	1221 W Idaho St. (Mail to: CHQ-6 PO Bc		
CITY	Boise	STATE	ID
ZIP CODE	83702		

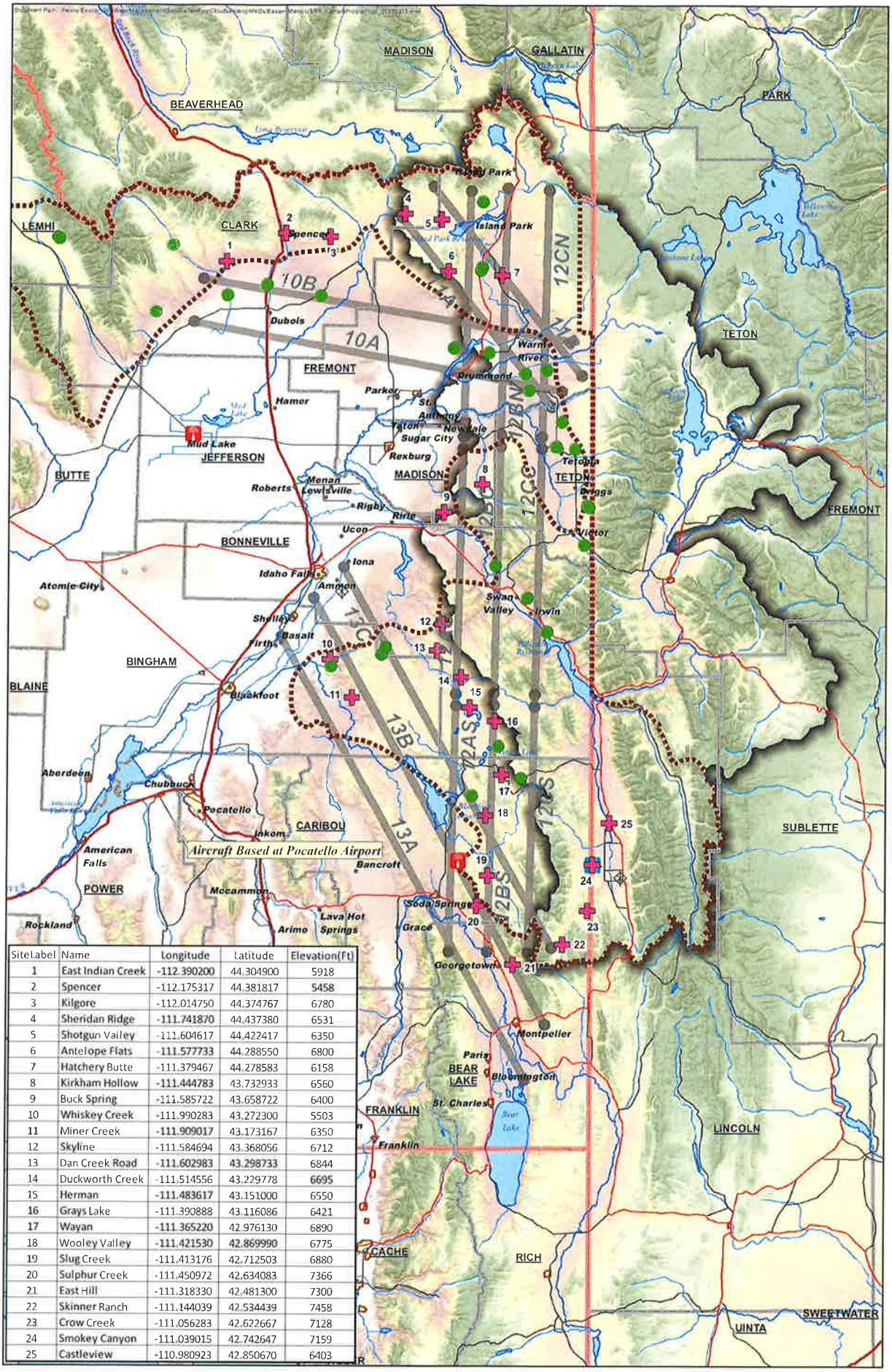
8. SAFETY AND ENVIRONMENT

☐ 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 Bc	OFFICIAL TITLE	Senior Atmospheric Scientist
CITY	Boise	STATE	ID
ZIP CODE	83702	DATE	11/1/2022
PHONE NUMBER	(208)388-5899		



SiteLabel	Name	Longitude	Latitude	Elevation(Ft)
1	East Indian Creek	-112.390200	44.304900	5918
2	Spencer	-112.175317	44.381817	5458
3	Kilgore	-112.014750	44.374767	6780
4	Sheridan Ridge	-111.741870	44.437380	6531
5	Shotgun Valley	-111.604617	44.422417	6350
6	Antelope Flats	-111.577733	44.288550	6800
7	Hatchery Butte	-111.379467	44.278583	6158
8	Kirkham Hollow	-111.444783	43.732933	6560
9	Buck Spring	-111.585722	43.658722	6400
10	Whiskey Creek	-111.990283	43.272300	5503
11	Miner Creek	-111.909017	43.173167	6350
12	Skyline	-111.584694	43.368056	6712
13	Dan Creek Road	-111.602983	43.298733	6844
14	Duckworth Creek	-111.514556	43.229778	6695
15	Herman	-111.483617	43.151000	6550
16	Grays Lake	-111.390888	43.116086	6421
17	Wayan	-111.365220	42.976130	6890
18	Wooley Valley	-111.421530	42.869990	6775
19	Slug Creek	-111.413176	42.712503	6880
20	Sulphur Creek	-111.450972	42.634083	7366
21	East Hill	-111.318330	42.481300	7300
22	Skinner Ranch	-111.144039	42.534439	7458
23	Crow Creek	-111.056283	42.622667	7128
24	Smokey Canyon	-111.039015	42.742647	7159
25	Castleview	-110.980923	42.850670	6403

Legend

IPC Remote Generator - Active
Generators (Manual)
Met Tower
Precip Gauge
Radiometer
Rawinsonde
Target Area
Flight Lines

USRB Project Map

Date: 3/21/2022

0 2.755.5 11 16.5 22 Miles

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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.

	Snake (Heise)	Henrys Fork
Jan	2.7	2.3
Feb	2.5	2.1
Mar	2.2	1.9
Apr	2	1.7

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.

Upper Snake River Basin—River flow and encroachment forecasts are based upon information and predictions supplied by the NWS, NWRFC, USGS, and IPC. Both NWRFC and IPC use a stream flow model that predicts the inflow at multiple 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.
Seeding will be suspended when any of the criteria listed in **Error! Reference source not found.**3 are met or NWS, NWRFC, or IPC are forecasting these river stages to occur within 24 hours.

Location	USGS Gauge Identification	Flood Stage (GH – feet)	Flood Discharge (cfs)
Snake River above Jackson Lake	13010065	10	13,170
Snake River near Jackson	JKSW4	10	25,230
Salt River Above Palisades Res	13027500	5.5	3,540
Snake River near Heise	13037500	8	25,300
Snake River at Blackfoot	13069500	10	21,600
Henry's Fork near St Anthony	13050500	7	9,100
Teton River near St. Anthony	13055000	6	4,900
Henry's Fork near Rexburg	13056500	9.5	7,600

Table 3 - Upper Snake River: 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.