NOAA FORM 17-4 (4-81)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Form Approved OMB Control No. 0648-0025
Expires 05/31/2024

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
Mokelumne

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: 05/31/2023

3. PURPOSE OF PROJECT OR ACTIVITY
Increase high-elevation snowpack and subsequent dry season runoff

4. (a) SPONSOR
NAME: Pacific Gas & Electric
AFFILIATION: Same as above
PHONE NUMBER:
STREET ADDRESS: 300 Lakeside Drive
CITY: Oakland
STATE: CA
ZIP CODE: 94612

4. (b) OPERATOR
NAME: Same as sponsor
AFFILIATION:
PHONE NUMBER:
STREET ADDRESS:
CITY:
STATE:
ZIP CODE:

5. TARGET AND CONTROL AREAS (See Instructions)

TARGET AREA		CONTROL AREA	
LOCATION: Central Sierra Nevada Range	SIZE OF AREA: 170 SQ. MI	LOCATION: Same as target area	SIZE OF AREA: 170 SQ. MI

6. DESCRIPTION OF WEATHER MODIFICATION APPARATUS, MODIFICATION AGENTS AND THEIR DISPERSAL RATES, THE TECHNIQUES EMPLOYED, ETC. (See Instructions)
Seven ground-based, high-elevation, radio-controlled, propane-acetone silver iodide and ammonia iodide seeding generators. Silver-iodide is dispensed at a rate of 21.5 grams per hour. Local wind and temperature data are obtained from a meteorological site on Mt. Reba.

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

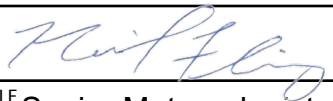
NAME: Neil C Flaiz
AFFILIATION: Pacific Gas and Electric Company
PHONE NUMBER: (925) 222-0160
STREET ADDRESS: 6121 Bollinger Canyon Road, Bldg Z1, 5430
CITY: San Ramon
STATE: CA
ZIP CODE: 94583

8. SAFETY AND ENVIRONMENT

	YES	X	NO	Has an Environmental Impact Statement, Federal or State, been filed? If yes, please furnish a copy as applicable.
X	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.
X	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: Neil C Flaiz
AFFILIATION: Pacific Gas and Electric Company
SIGNATURE: 
STREET ADDRESS: 6121 Bollinger Canyon Road, Bldg Z1, 5430
OFFICIAL TITLE: Senior Meteorologist

CITY	STATE	ZIP CODE	DATE	PHONE NUMBER
San Ramon	CA	94583	10/11/2022	(925) 222-0160

MOKELUMNE WEATHER MODIFICATION

OPERATING INSTRUCTIONS

2022-2023

PG&E's meteorologists in Meteorology Operations and Analytics will direct the cloud seeding operations during the 2022-2023 winter season based on the specifications in Section I of this document and work procedure WP 349-13. The roles of all personnel involved in the Mokelumne Weather Modification Project are specified in Section II of this document.

Section I

The operation of the Mokelumne Weather Modification Project will be dependent on meteorological data obtained from various meteorological forecast models produced by PG&E Meteorology Operations in San Ramon, California as well as the Mt. Reba monitoring site located at the Bear Valley ski resort. Seeding operations will be done according to the following specifications:

A. General Specifications

1) Storms which meet the criteria as specified in Section B will be selected for a seed operation for a maximum of twelve hours. Seed orders may be less than twelve hours and no less than six hours at the discretion of the PG&E forecaster.
2) The silver iodide burners will be identified and operated by number as follows: 1- RTU#51 (Tamarack), 2 - RTU #52 (Hermit Springs), 3 - RTU #53 (Big Meadow), 4 - RTU #54 (Black Springs), 5 – RTU #55 (Little Beaver), 6 – RTU #56 (Shoofly), and 7 - RTU #57 (Osborne Ridge).
3) An actual seeding order will cover a maximum of twelve hours. Orders may be for less than a twelve-hour period at the discretion of the weather forecaster.
4) During the seed operation, the weather forecaster may cancel the operation if weather conditions no longer meet seeding criteria for a specific operating mode.
   A subsequent seed order may be initiated if the criteria as specified in Section B are met for any of the remaining operating modes.

B. Seeding Criteria

The following criteria are specified as limiting conditions for weather modification operations.

1) Seeding will not be started or will cease if underway when the freezing level over the watershed is above 8,500 feet MSL.
2) Seeding will not be started or will cease if underway when the average wind speed in the layer from 8,000 feet to the -10º C layer is > 48 knots
3) Seeding will not be started or will cease if underway when in the judgment of Mr T Covich, Ms. M Lent, Mr. K Richards, Mr E Duffey, Mr. K Ericsson, and Mr. N Flaiz if abnormal runoff conditions or heavy snow loading on structures potentially exist in the watershed.
4) South storm seeding will be ordered when the most recent forecast model guidance and Mt. Reba wind direction is between 140 and 240 degrees, Mt. Reba temperature is less than 0 degrees C, and Oakland RAOB 700 mb wind speed is less than 50 knots. All burners will be activated for a south order (1- (Tamarack, 2 - Hermit Springs, 3 - Big Meadow 4 - Black Springs, 5 – Little Beaver, 6 – Shoofly, and 7 - Osborne Ridge).
5) Southwest storm seeding will be ordered when the most recent forecast model guidance and Mt. Reba wind direction is between 230 and 250 degrees, Mt. Reba temperature is less than 0 degrees C, and Oakland RAOB 700 mb wind speed is less than 50 knots. The burners operated for a southwest order are (1- (Tamarack, 2 - Hermit Springs, 3 - Big Meadow 4 - Black Springs, and 7 - Osborne Ridge). (Do not activate burners 5 and 6).
6) Westerly mode (NCPA) storm seeding will be ordered when the most recent forecast model guidance and Mt. Reba wind direction is between 240 and 280 degrees, Mt. Reba temperature is less than 0 degrees C, and Oakland RAOB 700 mb wind speed is less than 50 knots. The burners operated for an NCPA westerly mode order are numbers 1 (Tamarack), 2 (Hermit Springs), 3 (Big Meadow), 4 (Black Springs), and 7 (Osborne Ridge).
7) Northwesterly mode (NCPA) storm seeding will be ordered when the most recent forecast model guidance and Mt. Reba wind direction is between 280 and 340 degrees, Mt. Reba temperature is less than 0 degrees C, and Oakland RAOB 700 mb wind speed is less than 50

knots. The burners operated for an NCPA northwesterly mode order are numbers 1 (Tamarack), 3 (Big Meadow), and 7 (Osborne Ridge).

Section II

Successful operation of the Mokelumne Weather Modification Project depends on the coordinated actions of PG&E Meteorology Operations, Operators at Tiger Creek Powerhouse, and support personnel at Angels Camp. The roles of these personnel follow:

A. Seeding Procedures

Weather Forecaster--PG&E Meteorology Operations

1) The weather forecaster will issue seeding instructions to the operators at Tiger Creek Operations Center.
2) All orders for silver iodide burner operations will be logged via email correspondence and on the cloud seeding order form in the space provided (Figure 1). All cancellations and the reason therefore must also be logged via email correspondence and on the cloud seeding order form.
3) The weather forecaster will be responsible for informing, Mr T Covich, Ms. M Lent, Mr. K Richards, Ms Annie Zaccarin, Mr E Duffey, Mr. K Ericsson, and Mr. N Flaiz of an approaching severe storm that could produce flooding or heavy snow loading on structures in or surrounding the Mokelumne watershed and/or downstream of the watershed.
4) The weather forecaster will be responsible for maintaining data files and completing the verification of cloud seeding form.
5) Weather forecaster availability during the weather modification season will be 0500 through 1500 PST with extension to later hours, as needed, during cloud seeding operations. These office hours will be maintained on both weekdays and weekends.

Forecaster Office Phone: Company – 244-4630/4632
Outside - (925) 244-4630/4632

Powerhouse Operators--Tiger Creek Operations Center:

1) The Tiger Creek operator will control the silver iodide burners in accordance with the instructions received from the weather forecaster.
2) All instruction received from the weather forecaster will be logged on the form entitled, "Record of Cloud Seeding Operations," Figure 2. The original will be sent via electronic mail or company mail to Neil Flaiz, Meteorology Operations and Analytics, 6121 Bollinger Canyon Road, Bldg. Z1, San Ramon, CA 94583 on a weekly basis. A copy will be retained at the Tiger Creek Operations Center.

B. Routine Equipment Service and Calibration

Angels Camp personnel will be responsible for installing and servicing all seeding burners as needed based on burner diagnostic output from the Pi ProcessBook data screen.

C. Routine Data Collection

Angels Camp personnel will be responsible for collecting all pertinent burner operation data in accordance with the following schedule:

1) All burner maintenance logs (Figure 3) should be completed following each service visit.
2) A detailed operational summary of each seeder will be sent via electronic mail or company mail to Neil Flaiz, Meteorology Operations and Analytics, 6121 Bollinger Canyon Road, Bldg. Z1, San Ramon, CA 94583 on a weekly basis.

D. Reporting

PG&E Meteorology Operations will be responsible for data reduction, evaluation, and reporting. Reports as required by the State of California and the federal government will be completed and distributed to the following:

Eric Van Deuren

Tyler Covich

Kevin Richards

Evan Duffey

Michelle Lent

Neil Flaiz

Ken Ericsson

State - Department of Water Resources

Federal - National Oceanic and Atmospheric Administration
Office of Oceanic and Atmospheric Research

Figure 1
CLOUD SEEDING ORDER FORM
SEASON: 2022-2023
WATERSHED: MOKELUMNE

TIGER CREEK OPERATIONS CENTER: 8-841-2601 or 209-295-2601

Orders Issued To Tiger Creek Operations Center	**Local Time** **Start Date/Hour**	 **Stop Date/Hour**	**Remarks/Cancellations**
ORDER # ________________			Issued By:
☐ S 140°-240° ☐ SW 230°-250° ☐ W 240°-280° ☐ NW 280°-340°	____/____/____ ______:_______	____/____/____ ______:_______	Instructions given to: Remarks:
ORDER # ________________			Issued By:
☐ S 140°-240° ☐ SW 230°-250° ☐ W 240°-280° ☐ NW 280°-340°	____/____/____ ______:_______	____/____/____ ______:_______	Instructions given to: Remarks:
ORDER # ________________			Issued By:
☐ S 140°-240° ☐ SW 230°-250° ☐ W 240°-280° ☐ NW 280°-340°	____/____/____ ______:_______	____/____/____ ______:_______	Instructions given to: Remarks:
ORDER # ________________			Issued By:
☐ S 140°-240° ☐ SW 230°-250° ☐ W 240°-280° ☐ NW 280°-340°	____/____/____ ______:_______	____/____/____ ______:_______	Instructions given to: Remarks:

FIGURE 2
RECORD OF CLOUD SEEDING OPERATIONS
ANGELS CAMP OPERATIONS CENTER

Date: _____

Order	Code Order			Start		Stop		Order Received
Number	S	SW	NW	Date	Time	Date	Time	By

Code Orders	Angular Sector	Agl Burners Operated
South	150 deg. to 225 deg.	1-3-4-7
Southwest	226 deg. to 250 deg.	1-2-3-4-5-6-7
Northwest	251 deg. to 325 deg.	5-6

Order	Actual Start		Actual Stop		
Number	Date	Time	Date	Time	Remarks

FIGURE 3
SILVER IODIDE BURNER MAINTENANCE LOG

SITE: _____ DATE: _____ TIME: _____

1. PILOT LIGHTS: BURNING - YES _____ NO _____
   COMMENTS: _____
2. PILOT GENERATORS: NO LOAD VOLTAGE: _____
   COMMENTS: _____
3. ATOMIZER:
   PROPANE SIDE: OPEN _____ PLUGGED:_____
   SOLUTION SIDE: OPEN _____ PLUGGED:_____
   COMMENTS: _____
4. AGI SOLUTION: FLOWRATE _____ GPH
   PUMP RPM _____
5. PUMP MOTOR: FUNCTIONS - YES _____ NO _____
6. SOLUTION PUMP: TUBING CHANGED - YES _____ NO _____
*7. AGI SOLUTION LEVEL IN TANK: BEGINNING INCHES OF LIQUID IN TUBE: _____
   SOLUTION ADDED: - YES _____ NO _____
   FINAL LEVEL IN TANK: _____ (INCHES)
8. PROPANE: TANK GAGE NO. 1 _____ NO. 2 _____
   TANK IN USE: NO. _____
9. 12 VOLT BATTERIES: VOLTS _____
   COMMENTS: _____
10. SOLAR PANEL: COVERED _____ OPEN _____
    VOLTAGE OUTPUT: _____
11. RADIO RECEIVER AND TIMER: ON SIGNAL RECEIVED - YES _____ NO _____
    OFF SIGNAL RECEIVED - YES _____ NO _____
    TIMER FUNCTIONS - YES _____ NO _____
    COMMENTS: _____
12. PRESSURE RECORDER: CHART DRIVE FUNCTIONS - YES _____ NO _____
    PEN INKING - YES _____ NO _____
13. SHUT DOWN DEVICE: OPERATING - YES _____ NO _____
    TIMER COUNT _____ SECONDS
14. SITE CONDITION AS LEFT: OPERATIONAL - YES _____ NO _____
    COMMENTS: _____
15. SPARE PARTS USED: _____
    _____

* PLEASE CLEARLY NOTE:

A. On the cloud seeding burner chart, the date and time the chart was placed ON and taken OFF the recorder.
B. Beginning inches of AGI liquid in tube, and final level in the tank after solution added.