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**COUNTY OF
LOS ANGELES
WEATHER
MODIFICATION
PROJECT**

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FINAL MITIGATED NEGATIVE DECLARATION

Originally Prepared by TRC for

The County of Los Angeles Department of Public Works

October 6, 2009

Errata Added to document by

The County of Los Angeles Department of Public Works

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Environmental Checklist Form
Prepared Pursuant to the California Environmental Quality Act (CEQA)

1.0 PROJECT OVERVIEW

1.1 PROJECT TITLE/FILE NO.

County of Los Angeles Weather Modification Project

1.2 LEAD AGENCY

County of Los Angeles Department of Public Works

1.3 CONTACT PERSON

William Saunders

1.4 PROJECT SPONSOR

County of Los Angeles Department of Public Works

1.5 PROJECT LOCATION

The Weather Modification Project is located in Los Angeles County, California. A total of 15 seeding sites are included within the Project Description (see Section 1.8 below). As indicated in Table 1, 10 sites will be used during the initial phase of the project and five additional sites may be used during future expansion of the program. All sites are located on property owned by Los Angeles County Flood Control District (LACFCD) along the southern slope of the San Gabriel Mountains as shown in Figures 1 and 2. Table 1 lists the 15 site names and numbers included within the Project Description. The table indicates the 10 initial sites that will be utilized and the type of equipment to be installed. Table 1 also indicates whether the location has been used for past cloud seeding projects or is a new site near a previously used location.

Table 1. Project Sites

Site Number

Site Name

Manual, Remote, or

Future Installation

New or Prior

Location

1

Pacoima Dam

Future

New

2

Lopez Canyon Channel DRI

Future

New

3

Cassara Debris Basin

Future

New

4

Zachau SPS (near Debris Basin)

Initial - Manual

New

5

Dunsmuir Debris Basin

Initial - Remote

Past

6

Winery Canyon Debris Basin

Initial - Manual

Past

7

Lincoln Debris Basin

Initial - Manual

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New
8
Kinneloa West Debris Basin
Initial - Remote
Past

9
Santa Anita Debris Basin
Future
Past

10
Sawpit Debris Basin
Initial - Remote
Past

11
Spinks Debris Basin
Initial - Manual
New

12
Morris Dam
Initial - Remote
Past

13
Hook West Debris Basin
Initial - Manual
New

14
Big Dalton Debris Basin
Future
New

15
Big Dalton Dam
Initial - Manual
Past

Site numbers correspond to Figures 1 and 2.

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1.6 GENERAL PLAN DESIGNATION

The cloud nuclei generators (CNGs) will be located within various cities and unincorporated county territory along the southern slopes of the San Gabriel Mountains. The project will use dams, debris basins, and sediment placement sites that are owned by the Los Angeles County Flood Control District and are used in conjunction with maintenance activities. The CNGs will not alter the existing use of the sites for flood control and water conservation purposes. Table 2 details the planned land use for each site.

Table 2. Jurisdiction and Land Use

Site	Local Jurisdiction	Planned Land Use
1	UNINCORPORATED LA COUNTY	NON-URBAN
2	UNINCORPORATED LA COUNTY	OPEN SPACE
3	UNINCORPORATED LA COUNTY	OPEN SPACE-NATIONAL FOREST
4	CITY OF LOS ANGELES	OPEN SPACE
5	GLENDALE	RECREATIONAL/OPEN SPACE
6	LA CANADA FLINTRIDGE	PUBLIC OPEN SPACE
7	UNINCORPORATED LA COUNTY	FLOOD CONTROL
8	UNINCORPORATED LA COUNTY	OPEN SPACE
9	ARCADIA	PUBLIC FACILITY
10	MONROVIA	OPEN SPACE/RECREATIONAL
11	BRADBURY	OPEN SPACE
12	UNINCORPORATED LA COUNTY	OPEN SPACE-NATIONAL FOREST
13	GLENDDORA	UTILITY/FLOOD CONTROL
14	GLENDDORA	UTILITY/FLOOD CONTROL
15	GLENDDORA	OPEN SPACE (CONSERVATION)

The target watersheds are within the Angeles National Forest. Ecologically valuable riparian

and wetland areas within the watersheds may benefit from the additional moisture (Weather Modification Program Negative Declaration, 1998). Improved watershed conditions are part of the Forest Service's Land Management plan to manage and assure the sustainability of high quantity and quality water within the ecosystem (Land Management Plan, Part 1 Southern California National Forests Vision, 2005).

1.7 ZONING

The CNGs have different zoning and land use classifications as determined by the jurisdiction. Many fall into the general category of open space or recreation. Table 3 provides information on the zoning for each facility to be used in the project, along with a description of what the zoning classification represents.

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Table 3. Jurisdiction and Zoning

Site

Local Jurisdiction

Zoning

Description

- 1 LA COUNTY WATERSHED
- 2 LA COUNTY M-1.5 MANUFACTURING
- 3 LA COUNTY A-2-1 HEAVY AGRICULTURAL
- 4 LA CITY OS OPEN SPACE
- 5 GLENDALE SR SPECIAL RECREATION
- 6 LA CANADA FLINTRIDGE OS PUBLIC OPEN SPACE
- 7 LA COUNTY R-1-1000 RESIDENTIAL
- 8 LA COUNTY R-A-2 RESIDENTIAL AGRICULTURAL
- 9 ARCADIA R-M RESIDENTIAL-MOUNTAIN
- 10 MONROVIA HR HILLSIDE -RECREATIONAL
- 11 BRADBURY OPEN SPACE OPEN SPACE
- 12 LA COUNTY W WATERSHED
- 13 GLENDDORA E7-200000 RESIDENTIAL
- 14 GLENDDORA

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OS-N
OPEN SPACE-NATURAL ZONE
15
GLENDDORA
OS-N

OPEN SPACE-NATURAL ZONE

The targeted watersheds are located within the Angeles National Forest (ANF) and comprise a large portion of the southern slopes of the San Gabriel Mountains. Land-use zones within the ANF for the target watersheds are:

- Back Country
 - Back Country, Non-Motorized
 - Existing Wilderness
 - Critical Biological
 - Developed Area Interface
 - Experimental Forest
 - Recommended
 - Back Country Motorized
- Wilderness
Use Restricted

Ecologically valuable riparian and wetland areas within the watersheds may benefit from the additional moisture (Weather Modification Program Negative Declaration, 1998). Improved watershed conditions are part of the Forest Service's Land Management plan to manage and assure the sustainability of high quantity and quality water within the ecosystem (Land Management Plan, Part 1 Southern California National Forests Vision, 2005).

1.8 PROJECT BACKGROUND AND DESCRIPTION

Cloud seeding has been practiced throughout California and the Western United States for over half a century. The LACFCD has a long history of utilizing cloud seeding during storm seasons (October to May). The County of Los Angeles Weather Modification Project proposes resuming cloud seeding activities within Los Angeles County.

1.8.1 Project Background

This section provides background on the history of cloud seeding activities within Los Angeles County and the associated environmental reviews. It also discusses recent cloud seeding in other areas of California and the Western United States. The last part of this section describes research findings, recommendations for further studies to improve cloud seeding, and provides insight into which agencies and governments are involved in cloud seeding activities.

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1.8.1.1 The Science of Cloud Seeding

The science of weather modification, or cloud seeding, began in the 1940s with the discovery that certain materials caused the formation and growth of precipitation particles when injected into certain types of clouds. Extensive laboratory and field studies have shown that it is possible to obtain reasonably predictable results from cloud seeding activities.

Precipitation and weather modification depend on the existence of clouds, which are composed of varying concentrations of water droplets or water droplets and ice crystals. These droplets and crystals generally form around naturally occurring, microscopic airborne particles that are classified as either cloud condensation nuclei or ice nuclei. Water vapor condenses to form droplets upon cloud condensation nuclei, whereas ice crystals form upon ice nuclei.

Precipitation is primarily produced within clouds by two temperature-dependent processes, which are typically referred to as "warm cloud" and "cold cloud" processes.

The warm cloud process occurs when cloud temperatures are above freezing and cloud water droplets collide with each other to form larger droplets with sufficient weight to overcome the upward movement of the cloud. The water droplets then fall from the cloud as rainfall. Because cloud temperatures are above the freezing point ice nuclei are not involved in this process.

The cold cloud process occurs when cloud temperatures are below freezing. Cloud droplets can remain unfrozen at below freezing temperatures, but as they come in contact with ice nuclei they will freeze. Once a new ice crystal is formed, it can grow through deposition of water from neighboring cloud droplets or water vapor. Ice crystals within the cloud can also increase in size as they fall collecting unfrozen water droplets on their appendages. One or both of these processes can lead to the growth of a tiny ice crystal into a snowflake. Depending on the ambient air temperature near the ground, the snowflakes will fall as snow if temperatures are below freezing or melt and reach the ground as raindrops if temperatures are above freezing.

Cloud seeding techniques exist for warm and cold cloud processes. Warm cloud seeding generally is considered for augmenting summertime clouds (ASCE, 2006). The arid summertime climate experienced by the Los Angeles County region makes warm cloud seeding impractical. As such, cold cloud seeding has been pursued.

Cloud seeding takes advantage of the physics of the cold cloud process to increase the amount of precipitation that ultimately reaches the ground. In many storm systems, clouds have ample water vapor but lack adequate numbers of natural ice nuclei necessary to efficiently produce precipitation. Cloud seeding operations are most effective in these situations. Artificial ice nuclei can be introduced into portions of clouds that contain cloud droplets below freezing. This causes the formation of additional ice crystals and eventually snowflakes. This makes the cloud system more efficient in producing precipitation. The most commonly used cloud seeding agent in seeding "cold clouds" is silver iodide (AgI). Silver iodide can either be dispersed from ground generators or from aircraft.

Cloud Nuclei Generators (CNGs) and seeding flares proposed for this program efficiently disperse AgI nuclei in the minus 5 degrees Celsius (-5°C) to -15°C range. This is the temperature range in which most clouds lack adequate numbers of natural ice nuclei. The addition of AgI nuclei causes super-cooled liquid water droplets to convert into ice crystals and produces additional precipitation from the seeded clouds.

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1.8.1.2 Historical Cloud Seeding Activities within Los Angeles County

Prior cloud seeding activities were conducted in Los Angeles County between 1957 and 2002. Experimental cloud seeding activities were conducted in the County between 1957 and 1961. After this period, cloud seeding efforts increased due to the success of the experimental phase and were carried out continuously between 1962 and 1976.

Fire damage in target watersheds rendered the cloud seeding activities to be carried out intermittently on a year-to-year basis from 1976 to 2002. The fires removed vegetation and exposed soil to increased erosion.

The weather modification activities conducted in Los Angeles County between 1999 and 2002 were implemented under a California Environmental Quality Act (CEQA) Negative Declaration (TRC, 1998). The 1998 Final Negative Declaration analyzed potential environmental impacts that could potentially result from seeding unit installation and operation of the cloud seeding program. No significant impacts were found to be associated with cloud seeding activities. In 2002, the Curve and Williams Fires burned a majority of the San Gabriel and Big Tujunga Canyon watersheds and the Cloud Seeding Program was suspended. No cloud seeding has taken place since April 15, 2002.

1.8.1.3 Recent Cloud Seeding Activities in California

During the 2005-2007 seasons, there were 14 active cloud seeding projects or programs within the State of California (DWR, 2009). Table 4 provides a list of the programs and their sponsor. Several of these programs in the Sierra Nevada date back to the 1950's and 1960's.

Proponents for these programs are mainly municipal agencies, water and irrigation districts, and utility companies. Santa Barbara and Monterey Counties both conduct cloud seeding programs. Historically, twelve programs are active during a normal year. The number of programs increases during drought years. There were 20 active cloud seeding programs in California in 1991 (DWR, 2009).

Table 4. 2005-07 California Cloud Seeding Programs and Sponsors

Program

Program Sponsor

Lake Almanor
 Pacific Gas and Electric Company
 Tahoe-Truckee
 Desert Research Institute
 Upper American River
 Sacramento Municipal Utility District
 Upper Mokelumne River
 Pacific Gas and Electric Company
 Carson and Walker River
 Pacific Gas and Electric Company
 Tuolumne River
 Turlock and Modesto Irrigation Districts
 San Joaquin River
 Southern California Edison
 Eastern Sierra
 City of Los Angeles
 Kings River
 Kings River Conservation District
 Kaweah River
 Kaweah Delta Water Conservation District
 Kern River
 North Kern Water Storage District

Santa Barbara County
Santa Barbara County Water Agency
Monterey County
Monterey County
North Fork Stanislaus River
Northern California Power Agency

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The Santa Barbara County Planning and Development Department prepared a Negative Declaration (00-ND-29) for their cloud seeding program. The document determined that there were no adverse impacts associated with cloud seeding that could not be adequately mitigated to a level of less than significant (Santa Barbara County, 2000 and 2008). Pursuant to the California Environmental Quality Act Guidelines (CEQA), the Santa Barbara County Board of Supervisors approved the document and cloud seeding has been conducted from 2001 to the present.

1.8.1.4 Recent Cloud Seeding Activities in the Western United States

Outside of California, there are currently 14 winter cloud seeding programs in operation within the upper Colorado River region of Colorado, Utah, and Wyoming (DWR, 2009).

More

programs are planned for this region, including some within the state of Arizona (DWR, 2009).

The locations of the 14 current program areas and 15 potential new program areas are provided in Figure 3 (Griffith and Solak, 2006). The blue areas represent operational cloud seeding watersheds. The red areas represent potential cloud seeding target watersheds.

There are a number of other winter cloud seeding programs being conducted outside the Colorado River Basin in the states of Idaho, Nevada, Utah, and Wyoming.

1.8.1.5 Support for Cloud Seeding Activities

There is support for cloud seeding activities at federal, state, and local levels in the United States. Research has been conducted in this area for over 50 years. At the federal level, the 111th Congress introduced legislation that may re-establish federal funding for cloud seeding research (Senate Bill S. 601-Weather Mitigation Research and Development Policy Authorization Act of 2009). This bill would authorize the proposed Weather Mitigation Office, under the existing National Science Foundation, to establish a grant program for awarding grants to eligible entities. These entities include state agencies, institutions of higher education, and nonprofits that have expertise in the field of weather mitigation. The grants would provide funding for research and development of projects that pertain to weather mitigation. The Western States Water Council, all 7 Colorado River Basin states, and the Colorado River Board of California support this legislation (DWR, 2009).

The United States Bureau of Reclamation (USBR) has prepared two Environmental Impact Statements under the National Environmental Policy Act (NEPA) for cloud seeding activities (DWR, 2009). The USBR findings are reported within the Project Skywater programmatic environmental statement of 1977 and its Sierra Cooperative Pilot Project environmental impact statement of 1981 (DWR, 2009)

The National Academy of Science (NAS) supports research in cloud seeding activities. In 2003, NAS published the document “Critical Issues in Weather Modification Research”, which recommended:

“Research in weather modification should take full advantage of opportunities offered by other field research programs and operational weather modification activities.”

“Because weather modification could potentially contribute to alleviating water resource stresses.....the Committee recommends that there be a renewed commitment to advancing our knowledge of fundamental atmospheric processes that are central to issues of intentional and inadvertent weather modification.”

Many states in the West experience droughts and limited water supplies. Most of these states support weather modification in the form of cloud seeding. The California Department of Water Resources supports the increased utilization of cloud seeding to enhance water supply within

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the state and feel that state support should be provided to current and future projects (DWR, 2009). DWR also feels further research and development should be supported to increase efficiency and efficacy of cloud seeding programs. DWR's recommendation #1 to increase precipitation enhancement states:

“The State should support the continuation of current projects as well as the development of new projects and help in seeking research funds for both old and new projects. Operational funding support for new projects may be available in the Integrated Regional Water Management program.”

Utah is another state with many years invested in weather modification activities. In 1973, the Utah legislature passed laws 73-15-3 through 8, which form a comprehensive weather modification law for the state of Utah (Stauffer, 2001). This legislation authorizes the Utah Division of Water Resources (UDWR) to regulate and develop cloud seeding programs within the State. The UDWR has been involved in cost sharing with the local cloud seeding programs since the winter of 1975-76. The East Box Elder and Cache County cloud seeding program resulted in a 17 percent average increase in rainfall over a period of 19 storm seasons.

Augmented water supplies are typically used for irrigated agriculture or municipal water supplies. (Griffith, et al, 2009)

At the local level in California, several agencies and local governments are involved in cloud seeding. The LACFCD was one of the first local agencies to participate in weather modification through cloud seeding, as discussed above. The Santa Barbara County Water Agency also supports cloud seeding operations. Their cloud seeding program has resulted in up to 15% increased rainfall within their region. Santa Barbara County's cloud seeding program has added storm runoff water to their reservoirs and has increased groundwater in local aquifers. It has also provided irrigation affects on local grasslands and crops (Water Resources of Santa Barbara County, Santa Barbara Water Agency, July 2000).

Besides these government entities, both the American Meteorological Society and the World Meteorological Organization have issued policy statements that support the assertion that cloud seeding is an effective tool for enhancing and increasing precipitation (DWR, 2009). The California Department of Water Resources summarized the findings of the USBR environmental documents and findings from other cloud seeding review studies (DWR, 2009). DWR found that the available evidence did not show that seeding clouds with silver iodide causes a decrease in downwind precipitation. The report states that in some cases, the increased rainfall may extend up to 100 miles downwind of the target watershed (Ref. 1981 SCPP EIS). According to the USBR, the small amounts of silver iodide used in cloud seeding are minimal. They are often 100 times less than industry emissions into the atmosphere in many parts of the country. They are also lower than the exposure limits people get from tooth fillings. Watershed concentrations would be extremely low because only small amounts of seeding agent are used. Accumulations in the soil, vegetation, and surface runoff have not been large enough to measure above natural background levels. The DWR supports these findings and asserts that utilization of cloud seeding activities can be conducted without significant adverse impacts to the natural and human environment.

1.8.2 Project Description of the LACFCD Cloud Seeding Program

The Los Angeles County Department of Public Works (LACDPW), acting in behalf of the LACFCD, will conduct a cloud seeding program targeting watersheds tributary to reservoirs located in the San Gabriel Mountains. Cloud seeding operations will be conducted by North

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American Weather Consultants, Inc. (NAWC). This professional weather modification company has conducted numerous cloud seeding programs in the western United States and has conducted almost every LACDPW cloud seeding program in the San Gabriel Mountains dating back to 1961.

The following sections discuss a general overview of the program, installation of the manual and remotely operated cloud nuclei generators (CNGs), and operation of the CNGs.

1.8.2.1 General Overview of the Cloud Seeding Program

This project will augment winter precipitation beginning with the 2009-10 storm season. The target watersheds are tributary to Pacoima, Big Tujunga, and San Gabriel Reservoirs as shown in Figure 1. Ground based seeding generators will be used for the program and will be located on lands owned by the LACFCD.

Figure 2 depicts the 15 potential sites that may be utilized for the program as detailed within the San Gabriel Mountains Cloud Seeding Program Report dated April 8, 2009 (Griffith, 2009).

NAWC will utilize ten ground based seeding sites the first year of the program. Other sites may be added later if the program is extended into the additional two years allowed under this program.

The watersheds for the proposed cloud seeding program were targeted because downstream LACFCD facilities exist to capture the additional runoff. The runoff will be impounded in reservoirs and the water will be released once the storms have passed. The water will flow into a series of rivers and channels that lead to water conservation spreading basins. At the spreading basins, the runoff percolates into underground aquifers and is eventually pumped for municipal use.

The cloud seeding generators/dispensers will be installed at the locations listed in Table 1 during the initial phase of the program. Future expansion of the program may utilize the remaining 5 sites. All indicated locations are owned by the LACFCD and are the closest flood control and water conservation facilities to the target watersheds. The 10 sites chosen during the initial phase of the project are based on wind studies as detailed in the Program Report. The initial analysis also considered proximity to the burned areas resulting from the Merak and Padua fires.

All the CNG locations are fenced, and have controlled access through locked gates. No trespassing signs are posted. These measures prohibit public access by potential hikers and prevent unauthorized entry into flood control and water conservation facilities. In all cases, the manual generators will be secured with a chain attached to an existing facility or an "I-bolt" concreted in place. Propane tanks will be locked. Both measures will prevent tampering by unauthorized personnel. Additionally, another chain link fence will be installed around the remote generator installations and slats will be inserted into the chain links.

The cloud seeding program is expected to generate an average annual increase of 10 to 15 percent in seasonal rainfall over the targeted reservoir watersheds during the seeded winter seasons. This represents a maximum increase of 15 percent in rainfall above the levels expected if the same storm went unseeded. Past program results in Santa Barbara County achieved up to 20 percent increases in rainfall.

The added rainfall benefit is determined statistically using a "target" and "control" rain gage comparison technique (Griffith, et al, 2002). Rainfall data for unseeded storms at the target

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and control rain gages are compared to seeded storm data at the same gages. The incremental difference based on mathematical analysis is the benefit achieved by the cloud seeding operation. This direct rainfall measurement method provides the best basis for project evaluation (ASCE, 2004).

1.8.2.2 Cloud Seeding Generator Installation and Removal

Two different types of seeding agent dispensers will be utilized in this program. The first type is a manually operated, ground based silver iodide generator. The second is a remotely controlled, ground based, silver iodide flare tree. Six manually operated sites will be operated at locations 4, 6, 7, 11, 13, and 15 indicated in Figure 2. Four remotely operated sites will be operated at locations 5, 8, 10, and 12 shown in Figure 2. Both types of equipment installations will be secured to withstand 71 mph maximum wind speeds. The average wind speed at which all the equipment is likely to operate is 10-20 mph. The CNGs will be situated to take advantage of winds which carry the seeding material up into storm clouds over the target areas. The remotely controlled silver iodide flare tree installations are considered to be more effective than the manually operated silver iodide generators.

Installation of the generators is detailed within the San Gabriel Mountains Cloud Seeding Program Report, dated April 8, 2009. Installation requires no more than two days per generator and a total of 3 people. A brief description of the installation for each type of unit is described below.

At the end of the season, manually operated CNGs will be removed from the sites for off-season storage (May through September). The solar panel, battery, and some of the electronics equipment associated with the four remote flare sites will also be removed during the off season. The flare trees and central communication mast will remain on site. The removed equipment will be stored in a self-storage facility near the project area.

MANUALLY OPERATED UNITS

Manually operated, ground-based cloud nuclei generators (CNGs) are designed and assembled by NAWC. Figure 4 is a photograph of a manually operated CNG and Figure 5 provides a cut-away schematic of the CNG. Each CNG consists of a tank that holds the seeding solution, a flow meter to regulate consumption of the solution, a burn chamber where the solution is burned in a propane flame, and a windscreen to shield the burn chamber from wind. Each CNG will be secured to the ground, to a dam structure, or fastened securely to railings. The stainless steel manually operated CNGs will be approximately 12 inches in diameter and 36 inches high. Each CNG will connect to a large-capacity propane tank of 250 to 500 gallons. These tanks will be supplied by a third-party propane company.

The specific location of each manual generator site will be clearly marked at the selected facility. A local propane supplier will deliver the propane tank with a 250 to 500 gallon capacity. Once the propane tank is on site, a NAWC technician will install the manual generator using rebar driven approximately 12-18 inches below grade. If the unit is located at a dam structure, the unit may be attached to a metal guard rail. When the unit is appropriately anchored in place and connected to the propane supply, the technician will run the equipment for 10 minutes to determine that it is operating correctly. The manual generator installation process can be completed within one day for each site.

REMOTELY OPERATED UNITS

This project will utilize ground based, remotely controlled silver iodide flare units that will be designed specifically for this project by NAWC. These units will consist of a central control

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mast on which the electronics, battery, solar panel, and communications antenna are mounted. A data modem and program provided by Campbell Scientific will be accessed through a cell phone connection utilizing a special access code. One or two flare masts will be connected to the main mast.

Each flare mast holds 10 to 20 silver iodide flares, which are similar to highway emergency flares used at accident scenes. These flares burn from the mast for approximately 4 minutes and release 15 grams of silver iodide. Each flare is fitted with a cylindrical spark arrester to ensure that no sparks reach the ground. Figure 6 provides a photograph of a NAWC designed unit being used on a winter seeding program in Santa Barbara County. Figure 7 provides a photograph of the seeding flares without the spark arrestors in place.

Installation of the remote units requires two days of labor. On the first day, three holes will be excavated approximately 12 inches in diameter and 36 inches deep. The NAWC technician will then install a 4-inch by 4-inch aluminum base in each hole. Finally, the holes are filled-in with concrete and allowed to harden.

On the second day, a central mast will be bolted to one of the three bases. This mast will be reach approximately 10 feet above the ground. An equipment box will be attached to the mast to house necessary equipment and hardware. This equipment box will include communications equipment, a control panel, a modem, and a 12-volt battery. A solar panel and cell phone antenna will be mounted near the top of this central mast. Finally, one horizontal rail will be mounted between the other two bases to form vertical supports for the rail. This rail will contain hardware for approximately 20 flare positions.

Once installation is complete, one cloud seeding flare will be ignited by remote control to verify that the system is remotely operational and all communications equipment is in working order. No other construction related impacts are anticipated for either the manual or remotely operated cloud seeding generators.

1.8.2.3 Operation of Cloud Seeding Generators

MANUALLY OPERATED UNITS

Manually operated CNGs will require field personnel to visit the site and start the unit at the request of the program director. The CNGs operate by burning a solution of approximately 96 percent acetone (CH_3COCH_3), three percent silver iodide and one percent sodium iodide (NaI). The silver iodide acts as the ice nuclei on which ice crystals form, and the sodium iodide acts as a catalyst to dissolve the AgI in acetone.

Each manually operated CNG holds approximately 8 gallons of acetone/AgI solution. The solution burns at a rate of 0.24 gallons per hour (gal/hr), with the AgI in solution being burned at 24 grams/hr. Propane is burned at a rate of approximately 0.75 gallons per hour, allowing approximately 30 hours of operation before the propane tank requires refilling. Each CNG will be connected to a large-capacity propane tank located 15 to 20 feet away. The propane supply tank will be refilled once or twice per storm season depending upon operational needs.

Periodically, a NAWC employee will visit the site to perform general maintenance and refilling of the seeding solution. Figure 4 is a photograph of a manually operated CNG and Figure 5 provides a cut-away schematic of the CNG.

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REMOTELY OPERATED UNITS

The ground based, remotely controlled, silver iodide flare units are designed specifically for this project and can be activated remotely by the program manager. Flares would only be ignited and burned on the flare tree as a “convection band” passed over one of the sites when rain is present to further reduce any concerns about small sparks hitting the ground.

Former research studies indicate that each winter frontal system passing through coastal Southern California contains at least one convection band, and often contains several. Flares will be ignited at rates as frequent as every 15 minutes during the passage of one of these convection bands over the seeding sites. This type of seeding has proven effective in a research program conducted in Santa Barbara County (Thompson, et al, 1975).

1.8.2.4 Storm Tracking and Targeting

The storm season for Southern California occurs between October and May. Typical cold winter storms in southern California are accompanied by winds blowing from the southwest, west, and northwest. Wind flow and temperature vary greatly from storm to storm. During storm season, a NAWC Project Meteorologist based in Sandy, Utah, will monitor weather conditions from NAWC’s operations center. The operations center has internet access to all relevant National Weather Service (NWS) observations, analyses, weather satellite photographs, prognostic charts, forecasts, weather watches, and warnings.

The National Oceanic and Atmospheric Administration (NOAA) operates a network of sophisticated weather radars, called Next Generation Radars (NEXRAD), with sites in Los Angeles, Vandenberg Air Force Base (AFB), and Edwards AFB. The NEXRAD radar sites provide coverage for the San Gabriel Mountain range. These radars provide continuous depictions of weather echoes and the wind direction and wind speed at 1,000 foot intervals above the earth’s surface as storms pass over the target area.

The meteorologist will also have access to the LACDPW Automated Local Evaluation in Real Time (ALERT) precipitation system to monitor rainfall as storms pass over the target area. The ALERT system is a countywide network of 166 radio transmitting gauges including 126 rain gauges distributed throughout the target region, of which 21 are located within the San Gabriel Mountains at altitudes varying from approximately 1,200 to 5,000 feet. The LACDPW maintains this system, which provides frequent real-time readouts of precipitation, reservoir levels, and stream flow.

As a “seedable” weather system is observed moving into the area, the Project Meteorologist will utilize all of the information from the sources above to make seeding recommendations. After consultation and approval from LACDPW, the meteorologist will devise a seeding schedule indicating which CNGs should be activated and the likely duration of the activation. The meteorologist will then continue to monitor the intensity and movement of storms through the target area. Special attention will be given to the potential for flash flooding development within the target watersheds. Updates to the seeding recommendations will be provided as needed throughout the storm event.

Due to varying conditions from storm to storm, not all of the CNGs or flare units may be used during each storm episode, nor would they necessarily operate for the same length of time. The Project Meteorologist will consider a number of factors in determining the proper targeting of the seeding effects. The meteorologist will recommend a time to discontinue seeding, pending LACDPW approval, based on observations later in the storm episode.

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1.8.2.5 Initiation of Cloud Seeding Activities

The LACDPW will make the final decision to initiate cloud seeding. Upon receiving a recommendation from the NAWC Project Meteorologist to initiate seeding, LACDPW staff will consider a variety of factors before agreeing to the recommendation. These factors include, but are not necessarily limited to:

- Water surface elevations behind LACDPW dams;
- Current inflow into the reservoirs;
- Estimated antecedent soil moisture in the target watersheds;
- Capacity in the channels downstream of the dams;
- Capacity at downstream spreading grounds;
- Forecasts of rainfall amounts from the approaching storm;
- Timing of the approaching storm within the storm season;
- Proximity of seeding sites to burned watersheds;
- Recent earthquakes within the targeted watersheds;
- NWS warnings within the targeted watersheds;
- Current search and rescue operations within the targeted watersheds; and
- Significant construction activities within the watersheds.

The Los Angeles County Flood Control District is the local agency responsible for flood control and stormwater conservation and LACDPW administers all flood control facilities on behalf of LACFCD. LACDPW will consider all circumstances surrounding an approaching storm and will use professional judgment to make the decision whether to initiate seeding.

1.8.2.6 Restrictions and Suspension Criteria

To ensure that the project will not contribute to personal, property, or environmental injury, project suspension guidelines have been developed. Suspension of seeding may be necessary due to hazardous weather, lack of runoff storage capacity, precipitation-caused problems, or other special circumstances. Seeding will be temporarily suspended over areas that have recently burned, or exhibit unstable soils due to seismic events until natural re-vegetation occurs. This protective measure will help prevent undue erosion, landslides, mud flows, and/or downstream flooding.

The NAWC Project Meteorologist will recommend whether any restrictions or suspensions related to the weather may be necessary during each seedable storm event. The LACDPW Storm Operations Director will then decide whether to conduct cloud seeding using the meteorologist's input, and information on reservoir levels, ALERT system data, special event schedules, etc... The Storm Operations Director or his/her designated agent will be available at all times during seeding operations to make real-time decisions.

Certain weather-related circumstances may prevent seeding activities or trigger an immediate suspension of cloud seeding activities already in progress. The NWS issues special weather bulletins based on forecasts during periods of hazardous weather. These bulletins include Flash Flood Watches, Flash Flood Warnings, Traveler's Advisories, and Winter Storm Warnings. Flash Flood Warnings are issued when flash flooding has been reported or is forecast as imminent for certain streams or designated areas. Weather conditions resulting in the issuance of these flood warnings often occur in the program's target areas. If a Flash Flood Warning is issued for the target area, seeding would not be initiated. If seeding was already in progress, it would be suspended unless additional meteorological information from the NWS or the NAWC Project Meteorologist indicates that the forecast on which the warning was based had been down-graded. This ensures that portions of storms forecast to produce peak flows

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and floods are not seeded in order to prevent personal, property, or environmental injury caused by naturally occurring weather phenomena. In addition, cloud seeding activities will not be initiated, or will be temporarily suspended, during any storm predicted to produce over 5.0 inches of rainfall within a 24-hour period in the target area.

Seeding will not necessarily be suspended solely on the issuance of NWS bulletins for less intense storm events such as a Traveler's Advisory, Winter Storm Warning, or Flash Flood Watch. These bulletins will be considered with other relevant data to determine impacts due to increases in precipitation in the relatively remote mountain areas. However, if the NWS issues a hazardous weather bulletin, the Project Meteorologist could recommend suspending seeding based on an analysis of weather conditions.

Suspension of seeding will occur during periods of heavy rainfall when the soil approaches the limit of its water-holding capacity. It will also be suspended if inflow to the reservoirs has substantially increased.

Rainfall and inflow will be closely monitored during all seeded storm events to determine if suspension of seeding is appropriate and/or necessary. If the targeted reservoirs were to become full, or nearly full, and capacity for containing excess runoff becomes questionable, seeding would be suspended for future storm events until sufficient reservoir storage capacity becomes available. Special conditions may develop within the target areas creating situations where precipitation is undesirable. These situations may include, but are not limited to, significant construction activities and search and rescue operations. Seeding will not be initiated during these situations. Suspension criteria for the program are outlined in Table 5.

The process of suspending activities will involve continually monitoring the criteria conditions described in Table 5. Once suspension criteria have been met, the LACDPW Storm Operations Director, in coordination with NAWC, will halt cloud seeding operations. NAWC operational personnel will turn off individual manually operated cloud seeding equipment within one hour. Remotely operated cloud seeding generators will be halted within 10 minutes. LACDPW will consider all relevant circumstances prior to restricting or suspending cloud seeding operations. Cloud seeding locations below suspension criteria thresholds will continue to be operated until the targeted storm has passed.

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Table 5. Weather Modification Program Suspension Criteria

Description

1. Dam Operations

Cloud seeding operations for upcoming storms may be suspended if reservoir storage is at a level where additional inflow to the reservoir from upcoming storms may result in water releases greater than the capacity of the downstream water conservation facilities. This would result in loss of water to the ocean. Additionally, suspension could occur if dam and reservoir construction efforts are being significantly impaired by increased inflow from cloud seeding activities. Cloud seeding may resume when the probability of water loss to the ocean is reduced or risk to dam maintenance and construction activities are mitigated.

2. Precipitation

Seeding may be suspended if precipitation rates exceed 1.0 inch per hour within the target area. Seeding will be suspended if any storm is forecast to produce over 5.0 inches of rainfall within a 24-hour period in the target areas.

3. WeatherWatch

Seeding will be suspended whenever the NWS issues a flash flood warning for the target areas. Whenever the NWS issues a Traveler's Advisory, Winter Storm Warning, or Flash Flood Watch, these notifications will be factored with other variables to determine whether seeding should be suspended.

4. Fire Damage

Fires within target areas will lead to immediate suspension of seeding activities in order to prevent undue erosion, mud flow hazards, or flooding downstream of an area that has been burned. Seeding suspension will continue until sufficient natural re-vegetation occurs to mitigate excessive erosion and sediment flows during storms.

5. EarthquakeDamage

Earthquake damage to the soil structure may occur in target areas depending on the intensity and distance from the epicenter of an earthquake. During the storm season, if a 5.0 (Richter Scale) earthquake occurs within 50 miles, or a 4.0 (Richter Scale) earthquake occurs within 25 miles of any CNG installation site or target watershed, the suspension criteria will be activated. Damage to the soil structure may increase the potential for damaging landslides and mud flows during periods of moderate to heavy rainfall. After an earthquake, cloud seeding in the affected area may be suspended for the remainder of the storm season. LACDPW geology, geo-technical, and sedimentation personnel will analyze the impact to the soil structure and sediment transport potential to decide when cloud seeding may resume in the affected area.

6. Special Conditions

Seeding may be suspended due to special conditions such as significant construction activities, search and rescue operation, higher than normal public use such as holidays, and special events such as bicycle races or large public gatherings.

7. Los Angeles Basin

Seeding operations will not be conducted if they are predicted to have an impact within the Los Angeles Basin.

8. Special Authority

Seeding activities may be suspended for any circumstances that the LACDPW Operations Director or NAWC's Project Meteorologist deem unsafe. The Operations Director will make the final decision in the event of disagreement.

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1.9 SURROUNDING LAND USES AND SETTING

The CNGs will be located in the foothill areas upwind of the target watersheds. Due to the large population within the County of Los Angeles, there are many foothill communities. These communities border the flood and debris control facilities that will be used for the seeding generators.

The targeted watersheds are located within the Angeles National Forest (ANF) and comprise a large portion of the southern slopes of the San Gabriel Mountains. These areas are used for many recreational purposes, including: hiking, camping, fishing, biking, wilderness area, and skiing. The mountains and foothills are the home of many plant and wildlife species that are threatened and endangered. Special care must always be taken to prevent damage to the ecosystems during construction activities.

In order to prevent damage to the ecosystems, all of the CNGs will be located on previously graded sites on property owned by the Los Angeles County Flood Control District and used for flood control and water conservation activities. All the locations are currently used in conjunction with maintenance activities and have been developed with concrete and/or asphalt, and are surrounded by protective chain link fence to restrict public access.

1.10 REQUIRED APPROVAL OF OTHER PUBLIC AGENCIES

This section discusses the need to get approval from other agencies for permits, financing approval, or due to a participation agreement.

There are currently no permit requirements for sites located within the unincorporated county areas. No permit requirements are expected at the local city level since the CNGs will be located at flood control and water conservation permitted sites on property owned by the LACFCD and managed by LACDPW. The CNGs will accompany existing features of the dams, debris basins, and sediment placement sites and are part of the water conservation program. Table 6 provides the jurisdictional agency for each Seeding Program site.

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Table 6. Jurisdictions for All Seeding Program Sites

Site

Local Jurisdiction

- 1
UNINCORPORATED LA COUNTY
 - 2
UNINCORPORATED LA COUNTY
 - 3
UNINCORPORATED LA COUNTY
 - 4
CITY OF LOS ANGELES
 - 5
GLENDALE
 - 6
LA CANADA FLINTRIDGE
 - 7
UNINCORPORATED LA COUNTY
 - 8
UNINCORPORATED LA COUNTY
 - 9
ARCADIA
 - 10
MONROVIA
 - 11
BRADBURY
 - 12
LA COUNTY
 - 13
GLENORA
 - 14
GLENORA
 - 15
GLENORA
-

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Figure 1. Project Vicinity

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Figure 2. Project Location

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Figure 3. Operational and Potential Cloud Seeding Target Areas - Colorado River Basin

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Figure 4. Manually Operated Cloud Seeding Generator and Propane Tank

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Figure 5. Cut-away View of Manually Operated Cloud Seeding Generator

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Figure 6. Remotely Operated Silver Iodide Flare Dispenser with Spark Arrestors

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Figure 7. Silver Iodide Flares without Spark Arrestors

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2.0 ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors checked below would be potentially affected by this Project as indicated by the checklist on the following pages.

- Aesthetics
- Agriculture Resources
- Air Quality
- Biological Resources
- Cultural Resources
- Geology/Soils
- Hazards and Hazardous Materials
- Hydrology/Water Quality
- Land Use/Planning
- Mineral Resources
- Noise
- Population/Housing
- Public Services
- Recreation
- Transportation
- Utilities/Service Systems
- Mandatory Findings of Significance

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3.0 DETERMINATION

On the basis of this initial evaluation:

I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Signature

_____ Date

_____ Printed Name



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4.0 EVALUATION OF ENVIRONMENTAL IMPACTS

Environmental Factors

Potentially
Significant
Impact
Less Than
Significant
with
Mitigation
Incorporated
Less Than
Significant
Impact
No
Impact

4.1 AESTHETICS

-- Would the project:

a) Have a substantial adverse effect on a scenic vista?

-
-
-

b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

-
-
-

c) Substantially degrade the existing visual character or quality of the site and its surroundings?

-
-
-

d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

-
-
-

a) Discussion of Effects: There are no scenic vistas within or adjacent to the 15 project sites. Therefore, no adverse direct or indirect impacts are anticipated in relation to the project.

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There are no direct, indirect, or cumulative impacts.

Mitigation: None required.

b) Discussion of Effects: The project sites are not adjacent to streets that are designated by the State of California Department of Transportation as a scenic highway (www.dot.ca.gov). In addition, there are no historic buildings or any scenic resources identified on the project sites. Therefore, no adverse direct or indirect impacts are anticipated. There are no direct, indirect, or cumulative impacts.

Mitigation: None required.

c) Discussion of Effects: The majority of the cloud seeding stations will be manually operated, and are approximately 36 inches by 12 inches in diameter. Remotely operated stations will be installed horizontally and be approximately 48 inches tall and approximately 24 inches in diameter. An antenna mast, which reaches 7 feet, will be used for remote equipment. All stations will be located at debris basins owned by the County of Los Angeles. These basins are large depressions in the landscape and can be hundreds of feet wide and/or long. A cloud seeding station situated at one of these basins would be small in comparison to the existing structures and facilities located nearby, and therefore would not degrade the existing visual character of the site or quality of the site and its surroundings. Although the sites will be located in watersheds with existing vegetation and wildlife, views from residences located adjacent to the debris basins would not be impacted by the project due

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to the project's size in relation to the setting. Therefore, there are no direct, indirect, or cumulative impacts.

Mitigation: None required.

d) Discussion of Effects: Some new lighting would be introduced to the site from a small shielded flame with the development of the project. The manual generators have a wind screen which partially blocks out this light. The flame associated with the manual units is not visible during the daytime. The flares emit very little light as they burn in place. This light is partially shielded by the spark arrestors that surround each flare.

Several of the manual sites are in remote areas with no near-by residences. The specific locations of the other manual sites will consider this light factor in order to minimize visibility by surrounding residences. In addition, remote flare sites will be surrounded by chain-link fencing with inserted slats to further screen the flare light from viewers. Due to the design features described above, no direct or indirect impacts are anticipated. There are no direct, indirect, or cumulative impacts.

Mitigation: None required.

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4.2 AGRICULTURE RESOURCES

-- In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. Would the project:

Potentially Significant Impact Less Than Significant with Mitigation Incorporated Less Than Significant Impact No Impact

a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

-
-
-

b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?

-
-
-

c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?

-
-
-

a) Discussion of Effects: The CNG sites are to be located within debris basins and other flood control facilities with no agricultural uses, nor are they designated as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. As a result, no adverse direct or

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indirect impacts are anticipated. There are no direct, indirect, or cumulative impacts
Mitigation: None required.

b) Discussion of Effects: Construction and operation of the project will not adversely impact or conflict with any existing land that is zoned or designated for agriculture. All 15 project sites are located on existing LACDPW flood control facilities and all project features are consistent with the existing uses at each site. Furthermore, there are no Williamson Act contracts in effect on any of the subject sites. Therefore, no direct or indirect impacts to agricultural uses are anticipated, nor would there be any conflict with existing zoning or Williamson Act contracts. There are no direct, indirect, or cumulative impacts
Mitigation: None required.

c) Discussion of Effects: The project sites are not zoned, designated, or utilized for agricultural use. As such, there is no potential for direct conversion of any farmland. Project operations will not affect the current land use on any parcel within or outside of the target area. The project is consistent with applicable land use plans and the development standards. There are no direct, indirect, or cumulative impacts.
Mitigation: None required.

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4.3 AIR QUALITY

-- Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:

- Potentially Significant Impact**
- Less Than Significant with Mitigation Incorporated**
- Less Than Significant Impact**
- No Impact**

a) Conflict with or obstruct implementation of the applicable air quality plan?

-
-
-

b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?

-
-
-

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?

-
-
-

d) Expose sensitive receptors to substantial pollutant concentrations?

-
-

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e) Create objectionable odors affecting a substantial number of people?



a) Discussion of Effects: The emissions from the seeding devices have less than significant impact. These emissions are discussed under 3b and 3c. The Appendix A emissions model results show compliance with the South Coast Air Quality Management District's Final 2007 Air Quality Management Plan

Mitigation: None required.

b) Discussion of Effects: As discussed in the project description, two types of seeding agent dispersal methods will be employed: manually operated cloud nuclei generators (CNG's) and remotely controlled flare units.

The CNGs will be constructed of stainless steel. The manually operated devices will be approximately 12 inches in diameter and three feet tall. Each CNG will be connected to a large-capacity propane tank (250-500 gal) supplied by a third-party propane company. Propane tanks will be located 15 to 20 ft away from the CNGs. The CNGs operate by burning a solution of approximately 96% acetone (CH_3COCH_3), 3% silver iodide (AgI), and 1.0% sodium iodide (NaI). The AgI acts as the ice nucleation which ice crystals form, and the sodium iodide acts as a catalyst to dissolve the AgI in acetone. Each manually operated CNG holds approximately 8 gal of acetone/AgI solution. The solution burns at a rate of 0.24 gal/hr, and the AgI in solution burns at 24 grams/hr. Propane is burned at a rate of approximately 0.75 gallons per hour. This combustion process produces microscopic silver iodide crystals. Combustion of acetone only produces carbon dioxide and water ($\text{C}_3\text{H}_6\text{O}(\text{l}) + 4\text{O}_2(\text{g}) \rightarrow 3\text{CO}_2(\text{g}) + 3\text{H}_2\text{O}(\text{g})$). Combustion of propane also produces carbon dioxide and water ($\text{C}_3\text{H}_8 + (5)\text{O}_2 \rightarrow (3)\text{CO}_2 + (4)\text{H}_2\text{O}$).

The flare consists of 150 grams of glaciogenic pyrotechnic composition glued into a phenolic paper tube with the igniter held into the end and sealed with a plastic cap. The electronic

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igniter is activated using the voltage supplied from the ground unit to the firing box. When activated, the flare burns in place for between 3.5 and 4 minutes. The flare contains ammonium perchlorate, zinc powder, aluminum powder, silver iodide, copper iodide and ammonium iodide. None of these chemicals are listed as hazardous materials by the U.S. Environmental Protection Agency (USEPA). Burning a seeding flare releases approximately 15 grams of microscopic silver-copper iodide particles.

Silver iodide is the most common seeding agent used for winter orographic cloud seeding programs. The potential environmental impacts of silver iodide have been studied extensively. Klein (1978) in a book entitled "Environmental Impacts of Artificial Ice Nucleating Agents" concludes:

"The major environmental concerns about nucleating agents (effects on plant growth, game animals, and fish, etc.) appear to represent negligible environmental hazards. The more subtle potential effects of silver-based nucleating agents, such as their possible ability to potentiate the movement or effects of other materials of environmental concern, or to influence the activity of microorganisms in soils and aquatic environments after being bioconcentrated by plants, warrant continued research and monitoring. Effects, if they occur, are not expected to involve unacceptable risks. The long-term use of silver iodide and the confidence which the weather modification profession has in delivery systems and in the efficacy of this material, make it unlikely that other agents, with the exception of dry ice, will be used on a large scale, unless there are improvements in delivery systems and major changes in the economics of silver availability."

In the same book a summary of potential impacts on humans is presented as follows:

"The effects on humans of ingestion or topical contact with silver iodide used in cloud seeding can be considered negligible. Decade-long observations of cases (unrelated to cloud seeding) of ingestion of large silver doses revealed no physiological concern. In addition, surveys of seeding generator operators who have had long-term intensive contact with silver iodide reveal that they have not experienced medical difficulties."

A report prepared by the Metropolitan Water District of Southern California (Ryan, 2005) contains the following summary on the topic of possible toxicity of silver iodide:

"There has been a concern about the toxicity of the most common cloud seeding material, silver iodide (AgI) on the environment. The typical concentration of silver in rainwater or snow from a seeded cloud is less than 0.1 micrograms per liter. The Environmental Protection Agency recommends that the concentration of silver in drinking water not exceed 0.10 milligrams per liter of water. Many regions have much higher concentrations of silver in the soil than are found in seeded clouds. Industry emits 100 times as much silver into the atmosphere in many parts of the country, and silver from seeding is far exceeded by individual exposure from tooth fillings. The concentration of iodine in iodized salt used on food is far above the concentration found in rainwater from a seeded storm. No significant environmental effects have been noted around operational programs, many of which have been in operation for 30 to 40 years (WMA, 1996)".

The concentration of silver in rainwater or snow from a seeded cloud using the above information is on the order of 1000 times less than the EPA Standard.

Also worth noting here is a statement by the Weather Modification Association in its formal policy statement (WMA 2005):

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“The potential environmental impacts of cloud seeding have been addressed in many studies. No significant adverse environmental impacts have been found due to use of silver iodide, the most commonly used seeding material, even in program areas where seeding has been conducted for fifty years or more”.

Specific to silver concentrations in snowmelt water, Marler (2007) reported on lake water and sediment studies conducted for two long-term seeding programs operated by the Pacific Gas and Electric Company (PG and E) in the Sierra Nevada of California. Samples from a number of surface sites were analyzed for their silver content. The program areas are subject to moderate seeding material releases over periods of nearly fifty years, with annual amounts varying from 9-90 pounds for the Mokelumne area and from 45-180 pounds for the Lake Almanor area.

The report presented the following characteristics regarding silver iodide and silver chloro-iodide compounds used in cloud seeding:

- *“Have extremely low solubility in water*
- *Remain solid particles in air, cloud, precipitation*
- *Do not ionize to produce Ag⁺ under ambient environmental conditions*
- *Are not very bio-available in the environment*
- *Background Ag concentrations in Sierra snow < 2.0 ppt (ppt= gAg/ml x 10⁻¹²)*
- *[Ag] in seeded snow typically range 40–60 ppt in layers sandwiched between unseeded snow.*
- *Total snowpack profile mean Ag concentrations average 5-20 ppt in highly effective seeding programs”*

Conclusions from the overall study include the following (from Marler, 2007):

- *“High resolution analysis of water, sediment and biological samples from areas subjected to long-term, 50 year+, cloud seeding programs, specifically PG and E’s Mokelumne and Lake Almanor cloud seeding programs, support the following:*
- *The amount of silver iodide released to the atmosphere in cloud seeding is small, and even after many years of cloud seeding operations the resulting environmental concentrations are very small to non-detectable.*
- *Given the stability of silver iodide compounds, extreme insolubility of silver iodide in water and the absorptions of ionic silver by colloids found in the sediments and aquatic vegetation, silver concentrations in the Mokelumne and Lake Almanor Basin from cloud seeding are expected to be minimal.*
- *Since the monitored levels are low, usually below the detection limit in the target watershed, it is unlikely that continued cloud seeding operations would result in any significant increase in silver concentrations in the target watersheds.*
- *Silver concentrations were below regulatory standards. Therefore, continued operations should not result in any significant chronic effect to sensitive aquatic organisms.*

There is little to suggest the silver from cloud seeding gets into the system and bio-accumulates in organisms.”

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Global Climate Change

Global climate change is the occurrence of climate changes within the Earth's atmosphere due to the anthropogenic and non-anthropogenic increase of greenhouse gases (GHGs).

The greenhouse effect describes the process by which GHGs collect in the upper atmosphere and create a barrier for harmful infrared radiation that inhibits the radiation from leaving the atmosphere. This process leads to increased levels of radiation and overall temperature on the Earth's surface. Los Angeles County has not adopted a threshold or any GHG standards which are binding on County projects of this nature.

"Greenhouse gas" or "greenhouse gases" includes, but is not limited to: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride (Reference: Health and Safety Code section 38505(g)). Estimates for total GHG emissions are expressed using CO₂ as a reference. This makes carbon dioxide important because other green house gases are compared to it using "carbon dioxide equivalents". "Carbon dioxide equivalent" means the amount of carbon dioxide by weight that would produce the same global warming impact as a given weight of another greenhouse gas, based on the best available science (Reference: Health and Safety Code section 38505(c)).

During the year 2007, approximately 7,282.4 million metric tons of CO₂ equivalents (MMTCO_{2e}) were emitted within the United States (EIA, 2008) and approximately 451.5 MMTCO_{2e} were emitted in the State of California (CalEPA, 2009 and EIA, 2008).

GHGs are defined within the Office of Planning and Research's (OPR) *Preliminary Draft CEQA Guideline Amendments for Greenhouse Gas Emissions* as:

"all of the following gases: Carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. (Reference: Health and Safety Code section 38505(g))"

The state of California has begun to make important legislative and legal precedence that will alter how air quality analysis is handled within the CEQA framework. On September 27, 2006, Governor Arnold Schwarzenegger signed AB 32, the California Global Warming Solutions Act of 2006. AB 32 outlined goals for the reduction of GHGs within California. The most important goal outlined within AB 32 is the reduction of statewide GHGs to 1990 levels by the year 2020. AB 32 further states that the California Air Resources Board (CARB) shall develop a scoping plan that details measures that will be utilized to gain the 2020 GHG reduction goal. The CARB is also charged within AB 32 to regulate large emitters of GHG (greater than 25,000 MTs per year).

Additionally, California Senate Bill 97 (SB 97) requires the Governor's Office of Planning and Research (OPR) to develop draft CEQA guidelines "for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions." OPR is required to "prepare, develop, and transmit" the guidelines to the Natural Resources Agency on or before July 1, 2009. The Natural Resources Agency must certify and adopt the guidelines on or before January 1, 2010.

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As part of SB 97, changes will be made to Appendix G of the CEQA Guidelines. Specifically, a section addressing green house gases will be added including two questions which ask if the project will:

- a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?
- b) Conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?

The above questions are from the Proposed CEQA Guidelines Amendment for Green House Gas Emissions dated January 8, 2009. It should be noted that the climate change analysis included in this MND complies with the suggested format proposed under SB97 even though it is not required.

PROJECT GHG EMISSIONS

Project construction and operations will result in very small emissions of CO₂ from the utilization of motor vehicles and other small-scale gas-powered construction equipment such as a jackhammer. These emissions will be very small and temporary in duration. Project construction will not involve any large construction equipment such as bulldozers, graders, or cranes and will not involve heavy construction activities such as grading, trenching, and demolition. Furthermore, construction activities will be limited to a few days at each site. No impacts are anticipated from construction emissions of CO₂ due to this small scale and limited duration.

Project operations associated with the manually operated CNG units include the combustion of propane and seeding solution, which is approximately 96% acetone. The combustion of both propane and acetone utilized within the manually operated CNG units will result in CO₂ emissions. However, the operational CO₂ emissions associated with the combustion of propane and the seeding solution will have no impact due to the limited duration of actual operations and the small amounts of fuel being consumed. The combustion of propane and seeding solution does not result in the emission of any other GHGs. The remote flare units do not emit any GHGs.

PROJECT GHG EMISSION CALCULATIONS AND QUANTITATIVE THRESHOLDS

The CNG units burn approximately 0.75 gallons of propane per hour during active operation (cloud seeding). Assuming 8 hours of operation per storm event and 8 storm events per year, an estimated 48 gallons of propane would be consumed at each manual CNG site per year. As stated in Section 1.8, six sites will initially be utilized to house manual CNG units. Therefore, during the first year of operation (with the above assumptions) a total of 288 gallons of propane would be consumed. Propane combustion CO₂ emissions per gallon are approximately 5.73 kilograms (kg). This calculation results in an estimated 1,651 kg (1.651 metric tons [MT]) of CO₂ emitted during the first year of operation from propane combustion. This represents 0.366×10^{-7} percent of California 2007 GHG emission levels, (CalEPA, 2009 and EIA, 2008). Stated another way, the project will emit 0.366 millionth of 1 percent of the total GHG generated by California in 2007.

Currently, no thresholds for GHGs have been formally established at the Federal, State, or local level. However, both the California Air Resources Board (CARB) and the South Coast Air Quality Management District (AQMD) have published draft qualitative and quantitative

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CEQA thresholds of significance for GHG emissions. The California Air Pollution Control Officers Associated (CAPCOA) prepared a report (White Paper) in 2007 outlining suggested GHG thresholds, analysis tools, and levels of significance for CEQA analysis. Many of these draft thresholds are, at this point, potential long term significance thresholds (such as area-specific or market/project type driven thresholds) that cannot yet be properly applied for impact assessment. The CAPCOA White Paper discusses the use of quantitative thresholds similar to those drafted by the CARB and AQMD. The quantitative draft thresholds discussed within the CAPCOA White Paper range from 900 to 25,000 MTs of CO₂ equivalent per year.

The CARB draft thresholds do not include a quantitative draft threshold for non-industrial projects. For the purposes of this analysis, the project will be considered an industrial project so that the draft CARB CO₂ emissions threshold can be used within this analysis. The draft industrial thresholds can be applied because the introduction of silver iodide into the atmosphere for rain making purposes is a unique industrial process which provides goods (i.e. drinking water) to the public. The relevant CARB draft quantitative threshold for CO₂ emissions is 7,000 MTs of CO₂ per year for industrial projects (CARB, 2008). The estimated 1.651 metric tons represents approximately only 0.024 percent of this draft threshold. It is important to note that the CARB industrial sector CO₂ draft threshold was developed specifically for application to industrial projects that involve the combustion of fossil fuels. The CARB further states that combustion of fossil fuels represents approximately 63 percent of industrial GHG emissions statewide (CARB, 2008).

The AQMD included draft thresholds for industrial and commercial/residential projects. The AQMD draft industrial project threshold is 10,000 MTs of CO₂ per year. The estimated project CO₂ emissions from propane combustion for the first year would represent approximately only 0.016 percent of this draft threshold. Furthermore, even if the more stringent commercial/residential draft threshold (3,000 metric tons of CO₂ per year) was used for comparison, the estimated project propane combustion emissions would only reach 0.055 percent of the draft threshold.

Finally, the estimated CO₂ emissions from propane combustion could be increased to reflect the assumption that all 5 future sites were utilized to house manual CNG units (note that this assumption is only to show emissions for a future worst case scenario). This assumption allows for the projection of CO₂ emissions for a "worst case" future project year at full build out. With 11 sites utilizing manual CNGs, CO₂ emissions per year (with the above stated assumptions) would increase to 3.027 MTs. Furthermore, if it is assumed that the CO₂ emissions from combustion of the seeding solution would be equal to the CO₂ emissions from propane combustion of 1.651 MTs for year one and 3.027 MTs for the future worst case scenario year then the project operational CO₂ emissions per year would be equal to 3.302 MTs for year one and 6.054 MTs for the worst case future year. It is important to note that the actual CO₂ emission from combustion of seeding solution would in reality be much less than the CO₂ emissions from propane combustion because the volume of seeding solution combusted would be far less than the volume of propane combusted. These estimates of 3.027 MTs CO₂ per year (year one) and 6.054 MTs CO₂ per year (worst case future year) would only account for approximately 0.047 percent and 0.086 percent of the draft CARB threshold, respectively. With respect to the draft AQMD industrial project threshold (10,000 MTs per year), the estimates of 3.027 MTs (year one) and 6.054 MTs (worst case future year) would only account for 0.033 percent and 0.061 percent of the AQMD draft threshold, respectively. In summary, project emissions of GHGs, while quantifiable, are significantly less than all available draft non-zero thresholds. Thus, project GHG emissions are considered less than significant and no mitigation is required.

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Mitigation: None required.

POTENTIAL CUMULATIVE IMPACT OF GHG EMISSIONS

GHG emissions are considered mainly a cumulative impact under CEQA due to the fact almost no project is large enough to solely emit enough GHGs to create a discernable direct impact to the environment. Therefore, draft thresholds of significance detailed within the previous section should take potential cumulative impacts into account. It should be noted that Los Angeles County has not adopted a threshold or any GHG standards which are binding on County projects of this nature.

Under California Code of Regulations, Section 15064, Subsection h, Part 4:

“The mere existence of significant cumulative impacts caused by other projects alone shall not constitute substantial evidence that the proposed project's incremental effects are cumulatively considerable.”

Thus, the occurrence of global climate change due to the accumulation of GHG in the atmosphere due to other projects alone cannot demonstrate that the cloud seeding project will have a significant cumulative GHG impact. According to California Code of Regulations, Section 15064, Subsection h, Part 3:

“A lead agency may determine that a project's incremental contribution to a cumulative effect is not cumulatively considerable if the project will comply with the requirements in a previously approved plan or mitigation program which provides specific requirements that will avoid or substantially lessen the cumulative problem (e.g. water quality control plan, air quality plan, integrated waste management plan) within the geographic area in which the project is located.”

Project GHG emissions are found to be well below potential levels of significance when quantitative thresholds are utilized, such as the CARB and AQMD draft thresholds. The project's incremental contribution to the cumulative effects of GHGs is not considered cumulatively considerable because the emissions levels are well below draft threshold standards which are part of GHG mitigation legislation. Therefore, utilization of potential quantitative significance draft thresholds for GHG emissions dictates that cumulative impacts due to emissions of CO₂ from project operations should be considered insignificant. Furthermore, project features facilitate the reduction of potential GHG emissions. The use of modern remotely operated cloud seeding equipment would provide on- and off-site cumulative impact mitigation through GHG reduction. Modern remote CNG units do not emit any GHGs. The project is reducing potential GHG emissions from the amount that would be emitted if only manual units were utilized by introducing state-of-the-art cloud seeding technology which does not emit green house gases. This use of cutting edge technology to reduce green house gases complies with Los Angeles County's Energy and Environmental Policy. The Energy and Environmental Policy provides guidelines for development and enhancement of energy conservation and environmental programs within County departments while conducting operations. By using the new technology, the County is demonstrating its environmental stewardship by reducing its "environmental footprint." An organization's environmental footprint is determined by the quantifiable impact of operations in terms of resource consumption, waste generation, and generation of pollutants

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(Countywide Energy and Environmental Policy, 2007). The cumulative green house gas impact is mitigated within the project by:

- 1) Utilizing 4 state-of-the-art remotely controlled cloud seeding units. The manual CNG units are far easier and less expensive to utilize for weather modification projects. By utilizing 4 remote units for the project's first year, as stipulated within the project Scope of Work, potential GHG emissions are reduced by 40 percent.
- 2) Utilization of propane fuel within the manual units further reduces potential GHG emissions due to the relatively low GHG emissions generated from propane combustion when compared with the combustion of other fuels, such as ethanol, for cloud seeding purposes.

Therefore, utilization of the draft non zero threshold to determine the potential cumulative significance of project operational GHG emissions also leads to the conclusion that project operational GHG emissions are less than significant and no mitigation is required.

Mitigation: None required.

c) Discussion of Effects: The only criteria pollutant released from either generation method would be particulate matter in the 2.5 to 10 micron size ranges. NAWC retained Meteorological Solutions, Inc. of Salt Lake City, Utah to perform calculations of particulate matter concentrations that would result from each seeding method (generator or flare). These calculations were based upon the maximum amounts of seeding material that would be released from a single seeding site on a 24-hour basis and converting the entire mass of the seeding material into 2.5-micron particles (representing the worst case scenario). The maximum concentrations predicted by the model at a fence line location (assumed to be 100 feet from the release point) were less than the 24-hour standard of $35\mu\text{g}/\text{m}^3$. The nearest fence line is a common feature used in modeling air quality impacts. It represents the closest location to which the predicted pollutant levels would impact someone in the near vicinity of the equipment. The closest residences are approximately 300 feet from the proposed release point.

Details regarding this modeling work are provided in Appendix A. Appendix B provides a calculation of the amount of heat produced by a single unit operating for one hour (89,590 Btu's).

Based on the CNG installation described in the Program Report (Griffith, 2009), a single vehicle is anticipated to be used for project installation and operation purposes. Installation would take 1 day per site. During storm season (October 15th through April 15th), LACDPW Flood Maintenance Division personnel patrol the debris basins on a daily basis. At the reservoirs, dam tenders monitor the facility continuously. Thus the installation and operation of equipment will not result in a direct, indirect or cumulatively considerable net increase of any criteria pollutant and will have no impact.

Mitigation: None required.

d) Discussion of Effects: As discussed in 3b, there would not be any substantial pollutants emitted using either seeding method, therefore, there is no direct, indirect or cumulative-impact.

Mitigation: None required.

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e) Discussion of Effects: No objectionable odors will be produced using either seeding method. Therefore, no direct, indirect, or cumulatively significant impacts are anticipated. Mitigation: None required.

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4.4 BIOLOGICAL RESOURCES

-- Would the project:

**Potentially
Significant
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Less Than
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Less Than
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No
Impact**

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

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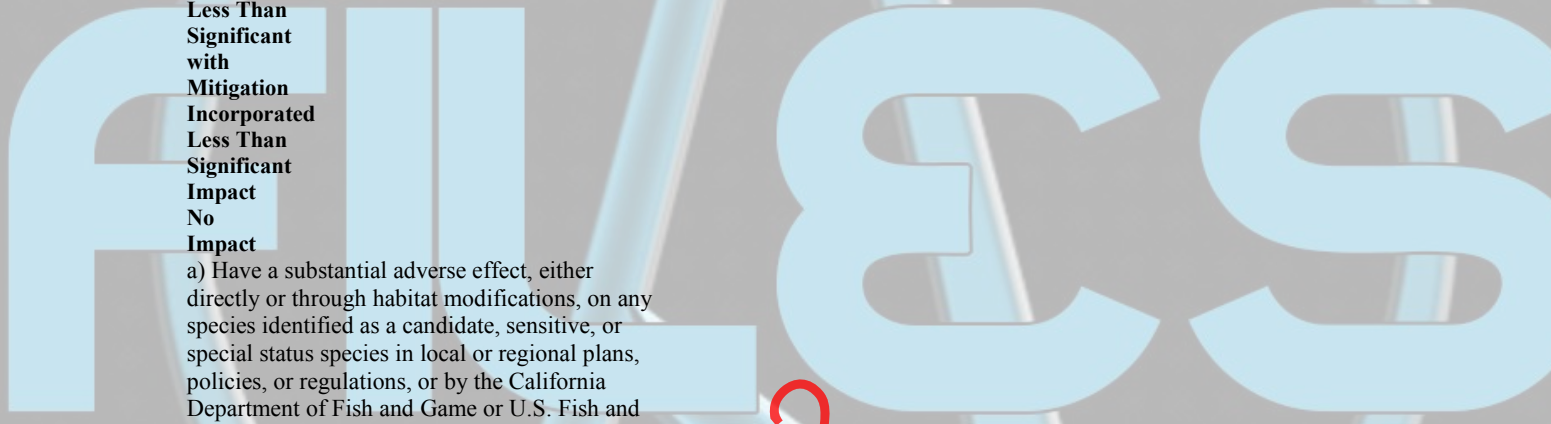
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?

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c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

-
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-

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of



JAR 2

JAR 2

native wildlife nursery sites?

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

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f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

a) Discussion of Effects: The program region is within the boundaries for the San Fernando, Agua Dulce, Sunland, Acton, Condor Peak, Pacifico Mountain, Chilao Flat, Mount Wilson, Waterman Mountain, Azusa, Crystal Lake, Glendora, Mescal Creek, Mount San Antonio, and Mount Baldy 7.5-minute topographic quadrangles developed by the United States Geological Survey (USGS). The California Department of Fish and Game (CDFG), California Natural Diversity Data Base (CNDDDB) RareFind2 data (2006) for these quadrangles, along with the biological study affiliated with the 1998 Los Angeles County Weather Modification CEQA Negative declaration, show the listed species found within the project region. There are 55 species of plants with Federal and State-listed status, and/or California Native Plant Society (CNPS) Listed status, 36 species of wildlife that are federally- or State-listed or have other special status, and four sensitive terrestrial natural communities

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or habitat types that are reported from historical information for the two quadrangles as shown in Appendix C.

The project will not have an adverse impact on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service. Discussion of the plants and wildlife in the CNG locations and target watersheds, along with significance criteria and expected conditions, are provided below.

EXISTING CONDITIONS

Vegetation

Within the target area, low slopes near the base of the mountains support coastal sage scrub, a more open community generally characterized by species such as California Buckwheat, Coastal Sagebrush, White Sage, Black Sage, and Laurel Sumac.

The predominant plant community in the watersheds is chaparral, a dense community typically composed of various evergreen shrubs including Chamise, California Lilac, Manzanita, Scrub Oak, Yerbasanta, and Mountain Mahogany. Several varieties of chaparral (dependent on species composition and density) occur in the watersheds. The most typical are Chamise Chaparral and Mixed Chaparral, as classified by USDA (1987), or Northern Mixed Chaparral, Chamise Chaparral, and *Ceanothuscrossifolius* Chaparral, as classified by Holland (1986). Oak Woodlands occur near the canyon bottoms, and shaded canyon slopes contain a variety of oaks including Coast Live Oak, Scrub Oak, Canyon Live Oak, and Interior Live Oak. A variety of species from chaparral and coastal sage shrub typically comprises the understory. In mid- to high-elevation areas (4,000 to 6,000 ft) with northern exposures, Canyon Live Oak and Scrub Oak often associate with conifers such as Big-Cone Douglas Fir, Incense Cedar, and Coulter Pine. Low-elevation Coulter Pine and Big-Cone Douglas Fir stands are unique to southern California (USDA 1987). Additional tree species typical of high-elevation coniferous forests in the range include Ponderosa Pine, Jeffrey Pine, Sugar Pine, and White Fir. Common high-altitude understory species includes Bush Chinquapin, Green Manzanita, and Snow Bush. Riparian areas along the canyon bottoms commonly support tree species such as Western Sycamore, California Bay Laurel, Coast Live Oak, Arroyo Willow, and occasionally Fremont Cottonwood. Big-leaf Maples occur as riparian associates in mid- to high-elevation areas. Mulefat is a widespread willow-like shrub along drainages. A wide range of herbaceous species are typical of riparian/wetland habitats in the target area and commonly include rushes, sages, and several species of Monkey Flower.

Wildlife

The targeted watersheds are part of the extensive undeveloped habitat areas in the San Gabriel Mountains. They support a wide variety of bird and mammalian species, including wide-ranging predators and species adapted to high-elevation forests. Common mammals include the Striped Skunk, Mule Deer, Gray Fox, Coyote, Bobcat, Mountain Lion, and several granivorous small mammals. Bird species typical of the chaparral community are the California Quail, Greater Roadrunner, Ash Throated Flycatcher, California Thrasher, Phainopepla, White-crowned Sparrow, and House Finch. The riparian areas provide nesting, roosting, and forage resources for Nuttall's Woodpecker, Black Phoebe, Warbling Vireo, Black-Headed Grosbeak, and Song Sparrow. Raptors, including Red-tailed Hawks, Great Horned Owls, and Turkey Vultures, hunt and forage over the entire watersheds. Dark-Eyed Juncos, Brown Creepers, and Blue-Gray Gnatcatchers are common in high-elevation

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coniferous habitat, Amphibians are restricted in many of the canyons because of dry conditions, but the California Red Legged Frog and California Newt inhabit streams, ponds, and reservoirs. Reptiles are well represented and include the Southwestern Pond Turtle, Side-Blotched Lizard, Western Fence Lizard, Western Whiptail, Gopher Snake, and Western Pacific Rattlesnake.

Aquatic Resources

Aquatic habitats in the target areas include intermittent mountain streams, perennial streams and rivers, and five reservoirs (Pacoima, Big Tujunga, Cogswell, San Gabriel and Morris). A wide variety of aquatic organisms are present in the project area. Aquatic insects and the early stages of several terrestrial insects are found in both lake and stream habitats. These include Mayflies, Midges, Dragonflies, Damselflies, Water Striders, and beetles. Native fish species found in the San Gabriel River system include the Santa Ana Sucker, Arroyo Chub, and Santa Ana Speckled Dace. These fish are also considered likely to occur in Big Tujunga and Pacoima drainages. Warm water game fish, including Bluegill and Small Mouth Bass, have been introduced into the reservoirs. Rainbow Trout are stocked in the San Gabriel Reservoir and a population breeds naturally below the Cogswell Dam in the west fork of the San Gabriel River (SAIC 1993).

Threatened, Endangered, and Sensitive Species

Several threatened, endangered, and sensitive plant and animal species are known or considered to potentially occur in or near the targeted watersheds and the CNG site locations. These species, their distributions, and their sensitivity status according to the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game's (CDFG's) California Natural Diversity Database (CNDDDB) are listed in Appendix C.

Sensitive Plant Communities/Habitats

For this analysis, plant communities are considered sensitive if they are naturally limited in distribution, have been heavily impacted throughout their range, or provide important habitat (i.e., foraging, cover, migration corridors) for wildlife species. In the targeted watersheds, Coastal Sage Scrub, Oak Woodland, Riparian Woodland, Coniferous Forest, and Wetland are considered sensitive communities. Coastal Sage Scrub is one of the most heavily disturbed vegetation types in California; it is estimated that 36-85% of native stands have been destroyed (USDA 1987). Oak Woodland, Riparian Woodland, and Coniferous Forest provide high habitat values to a variety of wildlife species, including large mammals and predators. Wetlands are considered sensitive ecological resources for several reasons, including their value to wildlife and their history of human-caused degradation. Wetlands in the project area occur in the vicinity of springs and seeps along the margins of perennial and larger intermittent streams. There is no critical habitat for endangered species within the targeted watersheds (personal communication, July 31, 1998, with Bill Brown, Wildlife Biologist, ANF - TRC Mariah, 1998). Three terrestrial natural communities known or believed to be of high priority for inventory in the CNDDDB occur in or near areas where CNGs would be located. These communities are:

- Southern Sycamore-Alder Riparian Woodland (Site No. 6 and Site No. 10);
- Riversidian Alluvial Fan Sage Scrub (Site No. 6);
- Southern Coast Live Oak Riparian Forest (Site No. 5); and
- Big Tujunga Creek and the San Gabriel River East Fork are recognized by the CNDDDB as Southern California Arroyo Chub/Santa Ana Sucker stream communities. These

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declining habitat communities are not presently protected under endangered species laws, but they are on a watch list.

IMPACTS

Significance Criteria

Impacts to biological resources would be considered significant if one or more of the following conditions occur:

- the project would result in substantial long-term loss of vegetation and of the overall capacity of the habitat to support native wildlife populations;
- the project would result in a net loss of riparian zone acreage or adversely affect Oak Woodlands, Coastal Sage Scrub, Coniferous Forest, or other plant communities considered to be rare, unique, or sensitive by federal, state, or local agencies;
- the project would adversely affect a threatened or endangered species or its critical or essential habitat (as designated by the federal *Endangered Species Act of 1973*, as amended, or the *California Endangered Species Act of 1984*); or
- the project would adversely affect wetlands, wilderness areas, research natural areas, designated natural areas, or other ecologically critical areas.

Potential Impact - CNG Location Site

Because all CNGs would be located on previously graded sites, installation impacts would not be significant. Operation of the CNGs during seeding activities, occasional maintenance, and refilling of tanks may cause short-term avoidance of the sites by wildlife, but these impacts would not be significant. Coordination with the United States Forest and Wildlife Service and the California Department of Fish and Game determined that no threatened, endangered, or sensitive species would be affected by the installation of CNGs, due to their locations on previously graded sites (TRC Mariah, 1998).

Potential Impact - CNG Target Site

The climatic effects of the project cannot be precisely determined because of the variability of success of cloud seeding operations. For average years, a 10-15% increase in annual precipitation is predicted, as well as a slight increase in snow pack and duration of snow cover in high-elevation areas. Because seeding would increase precipitation efficiency in average storms rather than create peak precipitation events, these changes in annual precipitation would be within the limits of natural variation for the target areas.

Analysis of impacts to biological systems from seeding operations is difficult and somewhat speculative, as any changes that may occur as a result of cloud seeding are expected to be gradual. Long-term changes within the watershed would be difficult to ascribe to weather modification activities. Over the long term, the project could slightly modify the climate in such a way as to cause minimal alterations in the distribution of plant communities and/or specific plant species, particularly those already occurring at or near their tolerance limit for moisture. For example, due to increased rainfall, coniferous forests might extend slightly down slope into areas now occupied by chaparral, or the distribution of species more adapted to xeric (dry) habitats could decline as these plants are replaced by more mesic (wetter habitat) species. The potential changes are expected to be minimal. However, plant distribution is determined by a variety of ecological factors including: average annual

precipitation, average temperature, soil type, and aspect. An important factor affecting the distribution of many sensitive species is the successional state of the plant community in which they occur (i.e., some are found only in early successional stages after disturbances). Plant species within the target areas have adapted to the wide variety of climatic and environmental conditions typical of the unpredictable Southern California climate. Significant impacts to vegetation caused by the project are therefore not anticipated. Ecologically valuable riparian and wetland areas within the watersheds may benefit from the additional moisture as these habitats are generally limited in Southern California due to lack of moisture. Because any potential changes in the structure or location of plant communities would be gradual and similar to natural cycles and succession, wildlife species would be only indirectly impacted since they would slowly relocate to appropriate foraging and nesting grounds as the plant communities around them changed. These impacts would be minimal. In high-elevation areas, seeding activities are expected to slightly increase snow pack, causing snow to cover the ground later into the spring. This longer period of snow cover could shorten the growing season for alpine plants and potentially result in decreased biomass production. Delayed spring growth could have secondary effects on herbivores, whose available food supply would be slightly reduced early in the season. Plants and animals adapted to high altitudes in the target areas are accustomed to wide fluctuations in snow pack and duration of snow cover due to typical variations in Southern California weather patterns. No sensitive plant species inhabit the high mountain areas; none occur above 3,500 feet with most found below 2,000 feet (TRC-Weather Modification Program Negative Declaration, 1998). Impacts, therefore, are expected to be minimal. Potential high-elevation impacts might also be offset by the increased average annual precipitation that would encourage plant growth once the snow pack has melted. At middle and lower elevations where many annual plants die off during the summer months, increased precipitation during the spring may increase the period of time that soil moisture is available to support plant growth.

AgI, the seeding agent proposed for the project, is not expected to adversely affect vegetation in the target areas. In a review of existing data, Klein (1978) concluded that "available field and laboratory studies, using silver iodide at levels much higher than might be expected to occur as a result of weather modification, indicate that the accumulation of this type of nucleating agent in surface soil zones should have no discernable [sic] effects on plant growth or physiological processes."

Weaver and Super (1972) found no significant effects on plant growth or soil microorganism activity in soils enriched with 10, 100, and 1000 ppm AgI (simulating up to 1 million years of cloud seeding). They concluded that no silver damage would occur from cloud seeding programs lasting up to 100 years in duration. Weaver (1973, cited by Summers et al. 1983) also reported that it would be unlikely that silver effects would be detectable after 1,000 years of cloud seeding. Klein and Molise (1978) analyzed the potential for AgI accumulation in top soils to affect soil microbiological processes. They concluded that silver levels detected in soils from two weather modification programs were "at least 1-2 orders of magnitude below where possible changes in decomposer functions might be observed." They also noted that analyses of plants from some urban and forest areas have shown much higher concentrations of silver than plant material and soils occurring in areas undergoing weather modification.

A study reported by Klein (1978) found that AgI ingested with vegetation by herbivores did not affect the animals' digestive capabilities. Klein (1978) also stated that no medical difficulties have been reported by CNG operators who have had long-term intensive contact

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with AgI. However, the effects of AgI on terrestrial animals are largely unknown because most studies have used "free" silver in high concentrations rather than AgI at levels likely to be encountered in cloud seeding applications. In humans and other vertebrates, the majority of silver is rapidly metabolized by the liver and excreted; it does not accumulate like lead or mercury (British Columbia Ministry of Environment, Lands and Parks 1996). Even the highly soluble form of silver is only moderately harmful to humans in relatively massive doses (HDR 1975).

Similarly, the iodine component of AgI is also unlikely to cause adverse impacts. According to Cooper and Jolly (1969, cited in Engineering-Science, Inc. 1992), a person would have to drink 130 gallons of rainwater from a seeded storm to ingest the same amount of iodine contained in a meal of eggs seasoned with iodized salt. Therefore, no adverse impacts to terrestrial animals are expected to result from the use of AgI in cloud seeding operations.

A recent study (Williams and Denholm, 2009) concerned with a winter research cloud seeding program in Australia concluded, "We consider the risk of an adverse ecotoxicological impact for this project to be negligibly small for the following reasons."

Some of these reasons included:

- Although silver ions from soluble silver salts have been shown to be toxic to aquatic species, this is not the case for insoluble silver iodide.
- Where silver toxicity studies have been attempted using insoluble silver salts, researchers have had to resort to indirect methods to achieve the desired concentration of silver ion.
- The majority of studies into acute chronic effects of silver ion have used soluble silver nitrate.
- A number of studies have shown that the toxicity of silver ion in water is significantly ameliorated by the presence in water of chloride ion, carbonate ion, sulfide ion and dissolved organic carbon. In addition, silver is strongly absorbed onto particulate matter in water. Findings from recent studies point to the fact that silver ion concentrations in natural waters are negligibly small.

The project could directly or indirectly impact aquatic habitats. Increased precipitation and runoff could increase erosion and transportation of sediments into surface waters. Impacts on aquatic organism are not predicted to be significant because the increased turbidity and rate of deposition would be within the range of natural variability.

Storm precipitation resulting from seeding would introduce AgI into aquatic systems. Silver can be toxic to fish and anaerobic microorganisms. However, AgI's negligible dissociative tendencies and low solubility in water limit its availability to aquatic organisms. The AgI would be widely dispersed and diluted over target area watersheds. Any available silver in aquatic systems would be complexed by the Chloride ion (Cl⁻), dissolved organic carbon (DOC), and organic material and rendered unavailable (Janes and Playle 1995). Thus, the accumulation of silver in concentrations sufficient to cause toxicity is unlikely, and impacts of AgI on aquatic organisms are not expected to be significant.

Augmented runoff could affect aquatic biota by lengthening the time water is present in ephemeral and intermittent habitats and by prolonging higher flows in perennial streams. Biological productivity would be enhanced by the increased duration of water in temporary aquatic habitats. Prolonged higher flows in perennial streams could benefit aquatic species unless flows were high enough to flush organisms downstream.

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Over time, however, these fluvial events could affect the habitat of streamside vegetation. Special attention must be paid to the Slender-horned Spine Flower, a state- and federally-listed endangered species that occurs in river wash areas. According to Scott Eliason, TIE Coordinator for the USFWS (personal communication, August 31, 1998), this plant inhabits old terraces above stream channels. Jigour and Avery (1997) describe the habitat of the Spineflower as "flood-deposited sandy terraces of floodplains and washes within the riversidian alluvial fan sage scrub natural community." In the target area for the Proposed Action, Big Tujunga Wash comprises one of the largest remaining stands of alluvial scrub habitat in Southern California and therefore provides essential habitat for the survival and recovery of the Slender-Horned Spineflower (USFWS, 1994).

Alluvial fan sage scrub is subject to, and dependent upon, periodic flooding and its resulting scour and deposition. These flood-related surface changes then influence the succession of plant and animal species in the community (Jigour and Avery 1997). The Spineflower is associated with intermediate and mature successional stage alluvial fan scrub which occupies older more stable flood terraces (USFWS, 1994).

Because cloud seeding would be suspended during peak storm events, the proposed action would not contribute to severe flooding. Any increase in stream flows would fall within the range of natural variability. Therefore, the project is not expected to adversely affect the habitat of this species.

The 15 project sites are located on previously graded areas with concrete/asphalt, and fenced access roads for each location. There will be no habitat modifications during project operations and no threatened, endangered, or sensitive species would be affected by the installation of CNGs due to their already developed locations. Hence, no substantial adverse effects are anticipated.

Less than significant impacts with mitigations incorporated are anticipated to any sensitive biological resources located within the project target area or location sites due to the incorporation of suspension criteria.

Mitigation: See Mitigation Measure WATER-1, Criteria 2.

b) Discussion of Effects: The project will not have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game, or the US Fish and Wildlife Service. The CNG's will be located on previously graded sites along the southern slopes of the San Gabriel Mountains. The proposed project sites currently consist exclusively of graded ground and dirt, concrete and/or asphalt areas, and paved (concrete or asphalt) access roads. Therefore, no direct impacts to riparian or other natural biological communities are anticipated to take place.

The targeted watersheds are located within the Angeles National Forest (ANF) and comprise a large portion of the southern slopes of the San Gabriel Mountains. Riparian areas along the canyon bottoms commonly support tree species such as Western Sycamore, California Bay Laurel, Coast Live Oak, Arroyo Willow, and occasionally Fremont Cottonwood. Big-Leaf Maples occur as riparian associates in mid- to high-elevation areas. Mulefat is a widespread willow-like shrub along drainages. A wide range of herbaceous species are typical of riparian/wetland habitats in the target area and commonly include rushes, sages, and several species of Monkey Flower. The riparian areas provide nesting,

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roosting, and forage resources for Nuttall's Woodpecker, Black Phoebe, Warbling Vireo, Black-Headed Grosbeak, and Song Sparrow.

Ecologically valuable riparian and wetland areas within the watersheds may benefit from the additional moisture as these habitats are generally limited in Southern California due to lack of moisture. Because any potential changes in the structure or location of plant communities would be gradual and similar to natural cycles and succession, wildlife species would be only indirectly impacted since they would slowly relocate to appropriate foraging and nesting grounds as the plant communities around them changed. These impacts would be minimal (TRC Mariah, 1998). Therefore, no direct impacts are anticipated

Mitigation: None required.

c) Discussion of Effects: The CNG's will be located on previously graded sites owned by the Los Angeles County Flood Control District within various cities and unincorporated county territory along the southern slopes of the San Gabriel Mountains. The proposed project sites consist exclusively of graded ground and dirt, concrete and/or asphalt areas, and concrete or asphalt access roads. Therefore, no direct impacts to riparian or other natural biological communities are anticipated to take place.

In the targeted watersheds, Coastal Sage Scrub, Oak Woodland, Riparian Woodland, Coniferous Forest, and Wetland are considered sensitive communities. Wetlands are considered sensitive ecological resources for several reasons, including their value to wildlife and their history of human-caused degradation. Wetlands in the project area occur in the vicinity of springs and seeps along the margins of perennial and larger intermittent streams. Ecologically valuable riparian and wetland areas within the watersheds may benefit from the additional moisture as these habitats are generally limited in Southern California due to lack of moisture (TRC Mariah, 1998). Therefore, no direct impacts are anticipated
Mitigation: None required.

d) Discussion of Effects: The CNG's would be located on previously graded property owned by the Los Angeles County Flood Control District within various cities and unincorporated county territory along the southern slopes of the San Gabriel Mountains. The proposed project sites currently consist exclusively of graded ground and dirt, concrete and/or asphalt areas, and concrete or asphalt access roads. Therefore, no direct impacts to natural biological communities are anticipated to take place.

Aquatic habitats in the target areas include intermittent mountain streams, perennial streams and rivers, and five reservoirs (Pacoima, Big Tujunga, Cogswell, San Gabriel, and Morris). Native fish species found in the target area include the Santa Ana Sucker, Arroyo Chub, and Santa Ana Speckled Dace. These fish are considered likely to occur in the San Gabriel, Big Tujunga, and Pacoima drainages. Warm water game fish, including Bluegill and Small Mouth Bass, have been introduced into the reservoirs. Rainbow Trout are stocked in the San Gabriel Reservoir and a population breeds naturally below the Cogswell Dam in the west fork of the San Gabriel River (SAIC 1993). Augmented runoff could affect aquatic biota by lengthening the time water is present in ephemeral and intermittent habitats and by prolonging higher flows in perennial streams. Biological productivity would be enhanced by the increased duration of water in temporary aquatic habitats. Prolonged higher flows in perennial streams could benefit aquatic species (TRC Mariah, 1998). Therefore, no indirect adverse impacts are anticipated.

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Due to the nature of weather modification projects, multiple projects are not conducted within overlapping target areas. Therefore, there is no potential for cumulative impacts associated with direct or indirect project impacts that will hinder wildlife movement.

Mitigation: None required.

e) Discussion of Effects: Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

The project will not conflict with any local policies or ordinances because the work will only take place in areas that have previously been graded and/or developed. As a result, there are no adverse direct, indirect, or cumulative impacts are anticipated.

Mitigation: None required.

f) Discussion of Effects: Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

None of the 15 project sites is part of an adopted Habitat Conservation Plan (HCP), Natural Community Conservation Plan (NCCP) or other approved habitat conservation plan. As a result, there are no adverse direct, indirect, or cumulative impacts.

Mitigation: None required.

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4.5 CULTURAL RESOURCES

-- Would the project:

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a) Cause a substantial adverse change in the significance of a historical resource as defined in § 15064.5?

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b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?

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c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

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d) Disturb any human remains, including those interred outside of formal cemeteries?

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a.) Discussion of Effects: The CNG's would be located on previously graded sites owned by the Los Angeles County Flood Control District within various cities and unincorporated county territory along the southern slopes of the San Gabriel Mountains. The proposed project sites currently are flood control and water conservation facilities which consist of graded dirt,

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large concrete and/or asphalt areas, and concrete or asphalt access roads. Access to the facility is controlled by chain link fencing and locked gates. The 36-inches of excavation needed to secure the remote flare CNGs in place will not exceed the depth of soil previously disturbed by grading and facility construction. Therefore, no direct or indirect impacts to historical resources are expected from installation, operation and maintenance of the project. Since there are no direct or indirect impacts, there are no cumulative impacts.

Mitigation: None required.

b) Discussion of Effects: No archaeological resources are in the project work areas because the sites have previously been graded and developed with concrete and/or asphalt for flood control and water conservation purposes. Equipment installation involves no excavation or very shallow excavation, less than 36-inches in depth. Therefore, no impacts to archaeological resources are anticipated within the project area.

No direct, indirect, or cumulative impacts are anticipated as a result of project operations either at project site locations or within target areas. Project operations will not involve any ground disturbance or similar activities that may lead to the substantial changes in the significance of an existing archaeological resource.

Mitigation: None required.

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c) Discussion of Effects: All CNGs will be located at sites previously graded for flood control and water conservation purposes. Excavation will be limited to a depth of 36 inches below grade, well above the strata in which paleontological resources or unique geological features are found. Therefore, resources will not be infringed upon if they exist. No unique geologic features are noted in the area. Project operations do not involve earth disturbing activities that may disturb existing paleontological resources. There are no adverse direct, indirect, or cumulative impacts.

Mitigation: None required.

d) Discussion of Effects: The proposed project sites have already been graded and developed with the construction of the reservoirs, debris basins and sediment placement sites. It is unlikely that any religious or sacred sites exist within the project sites used for the CNGs. There is no evidence of human remains or known cemeteries at any of the locations. Project operations will not involve earth disturbing activities that may lead to the disturbance of any human remains. Therefore, there are no direct, indirect, or cumulative impacts.

Mitigation: None required.

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4.6 GEOLOGY AND SOILS

-- Would the project:

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a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

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i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.

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ii) Strong seismic ground shaking?

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iii) Seismic-related ground failure, including liquefaction?

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iv) Landslides?

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b) Result in substantial soil erosion or the loss of topsoil?

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c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?

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d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?

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e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

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a) (i) Discussion of Effects: The land in Los Angeles County has more than 50 active and potentially active earthquake faults in the region. However, there are no active faults directly on the 15 sites and no Alquist-Priolo Earthquake Fault Zone Areas are within a 15-mile radius. Installation of the CNGs will not pose a geologic hazard since they will be staked and wired to the ground and securely fastened to existing facilities such as hand railings. Excavation for remotely operated CNGs would not exceed 36 inches. Therefore, fault rupture within the project area is unlikely. There is a less than significant direct, indirect, or cumulative impact for this project.

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Mitigation: None required.

(ii) Discussion of Effects: Southern California is a high-risk zone for seismic ground shaking. The San Andreas Fault is the closest fault, located close to the northeastern boundary of the San Gabriel watershed but not directly on the sites, and could cause strong ground shaking. Only the CNGs may be affected by earthquakes, possibly causing the equipment to topple. If toppling over of equipment occurs while the equipment is not operating, there will be no release of cloud seeding chemicals. The cloud seeding agent is kept in a sealed tank and is only pressurized during operations as shown in Figures 4 and 5. All activities would be in compliance with the Los Angeles County General Plan and other ordinances adopted by the County related to construction and safety. Therefore, only less than significant direct or indirect impacts are anticipated. Any project impacts associated with fault rupture will only result in localized effects. There is a less than significant direct, indirect, or cumulative impact for this project.

Mitigation: None Required.

(iii) Discussion of Effects: The CNGs will be located on dams, debris basins, and a sediment placement site owned by the Los Angeles County Flood Control District along the southern slopes of the San Gabriel Mountains. By design, these dams and debris basins are strategically located at the mouth of canyons all along the San Gabriel Mountain Range in areas often prone to liquefaction. These large engineered structures are designed to withstand the hydrostatic forces associated with the retention and distribution of rainfall induced runoff. The proposed equipment is small and relatively light-weight and will be secured to a structure designed to safely withstand liquefaction. Therefore, there is a less than significant direct, indirect, or cumulative impact for this project.

Mitigation: None required.

(iv) Discussion of Effects: Landslides often accompany earthquakes, floods, storm surges, hurricanes, wildfires, or volcanic activity (USGS Fact Sheet 2005-3156, 2005). The suspension criteria established for the cloud seeding program prevent potential landslides within the target areas by preventing initiation or halting cloud seeding operations when appropriate.

EARTHQUAKES

CNG locations and target watersheds could be disturbed by an earthquake depending on the intensity and distance from the epicenter. During storm season, if a 5.0 (Richter Scale) earthquake occurs within 50 miles, or alternatively a 4.0 earthquake occurs within 25 miles of any CNG installation site or target watershed, cloud seeding operations will be suspended until an evaluation of the situation is completed. Manually operated cloud seeding equipment already in operation will be turned off within an hour. Remotely operated equipment will be turned off within 10 minutes. If these potential landslide conditions persist in the target areas, cloud seeding in the affected area may be suspended for the remainder of the storm season. LACDPW geology, geo-technical, and sedimentation personnel will analyze the impact on sediment transport and decide when cloud seeding may be resumed. With mitigation incorporated, a less than significant direct, indirect, or cumulative impact will occur on this item (refer to Mitigation Measure Water-1, Criteria 5).

FLOODS

CNG locations and target watersheds could be affected by potential floods, possibly causing subsequent landslides during the storm season. Seeding will be suspended whenever the

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NWS issues a flash flood warning affecting any of the target areas. Manually operated cloud seeding equipment already in operation will be turned off within an hour. Remotely operated equipment will be turned off within 10 minutes. Cloud seeding operations will be halted until the warning has expired. With mitigation incorporated, a less than significant direct, indirect, or cumulative impact will occur on this item (refer to Mitigation Measure Water-1, Criteria 3). CNG locations and target watersheds could be affected by a design event, referred to as Capital Flood events. This is the design standard used to design debris basins within the County. A Capital Flood event, a 50-year rainfall event on a saturated watershed, produces different amounts of runoff depending on the region. This design rainfall event ranges from 9.0 inches in the valleys to 16.0 inches in the mountains over a 24-hour period (LACDPW, Hydrology Manual, 2006). In accordance with the suspension criteria, seeding will be suspended if any storm is forecast to produce over 5.0 inches of rainfall over a 24-hour period within any of the installation or target areas. The suspension criteria storm is 44% to 69% less rainfall than that associated with the defined Capital Flood for the region. Thus, with mitigation incorporated, a less than significant direct, indirect, or cumulative impact will occur on this (refer to Mitigation Measure Water-1, Criteria 2).

Similarly, flood control and water conservation facilities such as the debris basins where the CNGs will be located, are generally designed to accommodate a Design Debris Event (DDE). A DDE is defined as the quantity of sediment produced by a saturated watershed significantly recovered from a burn (after four years) resulting from a 50-year, 24-hour rainfall. Since the suspension criteria storm is 44% to 69% less the 50-year rainfall, by which the flood control structures downstream were designed, a less than significant direct, indirect, or cumulative impact with mitigation is anticipated. Thus, with mitigation incorporated, a less than significant direct, indirect, or cumulative impact will occur on this (refer to Mitigation Measure Water-1, Criteria 2).

STORM SURGE, HURRICANE AND VOLCANIC ACTIVITY

Storm surge, hurricanes, and volcanic activity are not anticipated in the region, thus no impact is anticipated on these items.

WILDFIRES AND BURNED AREAS

CNG locations and target watersheds could be affected by wildfires which destroy existing vegetation and create burned areas. Recently burned regions are prone to landslides. In accordance with the project suspension criteria, areas that have been burned prior to, or during a storm season, will not be seeded for the remainder of the storm season for that year. The suspension will continue until sufficient natural re-vegetation occurs, thus a less than significant direct, indirect, or cumulative impact with mitigation in place is anticipated for this item.

To ensure that the project does not contribute to personal, property, or environmental injury, guidelines for suspension have been developed. Suspension of seeding could be necessary due to hazardous weather, lack of runoff storage capacity, precipitation related problems, or other special circumstances. In addition, to prevent undue erosion, slides, mud flows, and/or downstream flooding, seeding would be temporarily suspended over areas that have recently burned or exhibit unstable soils due to seismic events. As such, with mitigation incorporated, a less than significant direct, indirect, or cumulative impact will occur on this (refer to Mitigation Measure Water-1, Criteria 4).

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Mitigation: The potential substantial adverse effects which will be mitigated by Mitigation Measure Water-1 are:

- Erosion caused by excessive storm runoff: Criteria 2 and 4
- Flooding caused by excessive storm runoff: Criteria 2 and 3
- Landslides caused by excessive storm runoff: Criteria 2 and 5

b) Discussion of Effects:

CNG locations and target watersheds could be disturbed by erosion depending on the design of the facility, the vegetative cover, and intensity of the storm event. Sediment production within a watershed is often referred to as erosion. Sediment production from a watershed is a function of several variables. The most evident of these include vegetative cover and rainfall intensity. Fire greatly increases the amount of runoff and erosion from a mountain watershed (LACDPW, Sedimentation Manual, 2006). Aspects of the cloud seeding program that pertain to erosion are discussed in the following:

VEGETATIVE COVER

The targeted watersheds are located within the Angeles National Forest (ANF) and comprise a large portion of the southern slopes of the San Gabriel Mountains. Riparian areas along the canyon bottoms commonly support tree species such as Western Sycamore, California Bay Laurel, Coast Live Oak, Arroyo Willow, and occasionally Fremont Cottonwood. Big-Leaf Maples occur as riparian associates in mid- to high-elevation areas. Mulefat is a widespread willow like shrub along drainages. A wide range of herbaceous species are typical of riparian/wetland habitats in the target area and commonly include rushes, sages, and several species of Monkey Flower. Ecologically valuable riparian and wetland areas within the watersheds may benefit from the additional moisture as these habitats are generally limited in Southern California due to lack of moisture (TRC Mariah, 1998). The increased rainfall in the region is anticipated to help the targeted watershed's vegetative growth, thus there are no direct, indirect, or cumulative impact for this item.

RAINFALL INTENSITY

CNG locations and target watersheds could be affected by high rainfall intensities. Intensity is the amount of rain per unit of time. The peak intensity produces the largest rainfall runoff rate. A Capital Flood event, which is runoff from the 50-year, 24-hour storm, could cause subsequent landslides due to high rainfall intensities. The peak intensity associated with a the Capital Flood ranges from 1.67 to 2.97 inches of rain within a 1-hour period from the foothills to the San Gabriel Mountains (LACDPW, Hydrology Manual, 2006). In accordance with the suspension criteria, seeding may be suspended if any storm is forecast to produce over 1 inch of rainfall within a 1-hour period within the target areas. The suspension criteria intensity is 40% to 66% less than the rainfall associated with the defined Capital Flood maximum intensity rate for the region. Thus, with mitigation incorporated, a less than significant direct, indirect, or cumulative impact will occur on this item (refer to Mitigation Measure Water-1, Criteria 2).

WILDFIRES AND BURNED AREA

CNG locations and target watersheds could be affected by wildfires which destroy existing vegetation and create burned areas. Recently burned areas are prone to erosion. In accordance with the suspension criteria, areas that have been burned prior to, or during a storm season, will not be seeded for the remainder of the storm season for that year. The suspension will continue until sufficient natural re-vegetation occurs, thus with mitigation

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incorporated, a less than significant direct, indirect, or cumulative impact will occur on this item (refer to Mitigation Measure Water-1, Criteria 4).

DESIGN OF PROJECT SITES

Flood control and water conservation facilities, such as the debris basins where the CNGs will be located, are generally designed to accommodate a Design Debris Event (DDE). A DDE is defined as the quantity of sediment produced by a saturated watershed significantly recovered from a burn (after four years) as a result of a 50-year, 24-hour rainfall. Since the suspension criteria storm is 44% to 69% less than the 50-year storm, by which the flood control structures downstream were designed, a less than significant direct, indirect, or cumulative impact with mitigation in place is anticipated for this item (refer to Mitigation Measure Water-1, Criteria 2).

To ensure that the project would not contribute to personal, property, or environmental injury, guidelines for suspension have been developed. Suspension of seeding could be necessary due to hazardous weather, lack of runoff storage capacity, precipitation related problems, or other special circumstances. In addition, to prevent undue erosion, slides, mud flows, and/or downstream flooding, seeding would be temporarily suspended over areas that have recently burned, or exhibit unstable soils due to seismic events. With the utilization of the suspension criteria outlined within Mitigation Measure Water-1, Criteria Nos. 2 and 4, potential cumulative impacts associated with erosion shall also be avoided. As such, with mitigation incorporated, a less than significant direct, indirect, or cumulative impact will occur on this item (refer to Mitigation Measure Water-1, Criteria 2 and 4).

Mitigation: See Mitigation Measure WATER-1, Criteria Nos. 2 and 4.

c) Discussion of Effects: As detailed within items a) and b), the project would not be located on a geologic unit or soil that is unstable, or that would become unstable due to the project. As previously discussed, the potential for landslide, lateral spreading, subsidence, liquefaction or collapse within the offsite target watershed is considered less than significant impact with suspension criteria mitigation in place.

Mitigation: See Mitigation Measure WATER-1, Criteria 2.

d) Discussion of Effects: The 1994 Uniform Building Code Test Standard 18-1-B is a test that was developed in Orange County, California in the mid-1960s. It was introduced in the 1973 Uniform Building Code as UBC Test Standard 29-2. It was re-designated as UBC Test Standard 18-1 in the 1994 code. This standard was adopted by the American Society for Testing and Materials (ASTM) in 1988 and titled Soil Expansion Potential ASTM D-4829. Section 1803.2 of the 1994 Uniform Building Code directs expansive soil tendency be graded by this method. The UBC mandates that “special [foundation] design consideration” be employed if the Expansion Index is 20, or greater (Missouri University of Science and Technology, 2004).

The project sites, sitting at the foothills of the San Gabriel Mountains, are located on alluvial soil deposits. These soils are not considered to be expansive, and the proposed project will be located in areas that have previously been graded and re-compacted by construction of the existing debris basins and other facilities. No major ground disturbance would be required to install the CNGs, and any excavations, if required, will be shallow. Therefore, there are no adverse direct, indirect, or cumulative impacts for this item.

Mitigation: None required.

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e) Discussion of Effects: The project does not require the use of septic tanks or alternative wastewater disposal systems, nor will the project impact any existing septic tanks or alternative wastewater disposal systems on the project site or within the surrounding area. Therefore, there are no adverse direct, indirect, or cumulative impacts for this item.
Mitigation: None required.

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4.7 HAZARDS AND HAZARDOUS MATERIALS

-- Would the project:

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a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

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b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

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c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

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d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

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e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?

f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?

g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

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a) Discussion of Effects: The project relies on the use of propane as an ignition source, which will be kept in a large capacity propane tank (250-500 gallons) supplied by a third-party propane company. The propane tanks have locking mechanisms to prevent tampering. Propane tanks will be located 15 to 20 feet away from the CNGs and would be refilled once or twice per storm season (October through May). Only manually generated CNGs will have propane tanks and only one tank will be placed at each manual site. Propane will be transported, stored, and utilized pursuant to all applicable federal, state, and local ordinances and design standards. Propane is widely used in a variety of applications for residential, commercial, and industrial use. The project will also use silver iodide as the seeding agent. Silver iodide will be stored either in a flare similar to the type used for emergency roadside flares, or in a solution chamber inside a manually operated CNG, which would be ignited using the propane tank as the fuel source. Remotely operated flares will be connected to one or two horizontal masts, each of which holding 10 to 20 flares. Flares will only be burned in place as a storm convection band passes over the sites. Flares will be replaced as necessary throughout the season. Manually operated CNGs burn solution at a rate of 0.24 gal/hr. This burn rate allows approximately 30 hours of operation before the CNG solution tank requires refilling. Silver iodide is commonly used in photography and as an antiseptic, and is not considered a hazardous material.

The seeding solution is comprised of approximately 96% acetone, which is considered a hazardous material under the California Hazardous Waste Control Law (HWCL), California Code of Regulations (CCR) Title 22, Chapter 11, Appendix X. Approximately 8 gallons of seeding solution is stored within a sealed tank inside each manually operated unit. Tanks are locked to prohibit tampering. The project sites are all located on private property controlled by the LACFCD. The properties are gated and locked. The acetone, as part of the seeding solution, is burned and released to the atmosphere in the form of combustion byproducts. Please refer to the Air Quality section of this document for an analysis of potential impacts relating to combustion emissions. The other components of the seeding solution, silver iodide and sodium iodide are not listed as hazardous chemicals by the EPA. The seeding solution shall not be disposed of by dumping, and transportation of the acetone used within the seeding solution shall be conducted in compliance with all applicable laws and regulations pertaining to hazardous materials. There will be no significant hazard to the public or the environment as a result of the use, disposal, or transport of acetone. Therefore, only less than significant impacts are anticipated. There are no direct, indirect, or cumulative impacts anticipated as a result of the use of the acetone-based seeding solution.

The cloud seeding flares proposed for this program are manufactured by Ice Crystal Engineering, Inc. of Davenport, North Dakota. The flare consists of 150 grams of glaciogenic pyrotechnic composition glued into a phenolic paper tube with the igniter held into the end and sealed with a plastic cap. The electronic igniter is activated using the voltage supplied from the ground unit to the firing box. When activated, the flare burns for 3.5 to 4 minutes. The flare contains Ammonium Perchlorate, Zinc Powder, Aluminum Powder, Silver Iodide, Copper Iodide and Ammonium Iodide. Burning a seeding flare releases approximately 15 grams of microscopic particles of silver-copper iodide. The flares will be burned within tubes designed to capture sparks and combustion related by-product. Combustion by-products will be disposed of in compliance with all applicable laws and regulations. There will be no direct, indirect, or cumulatively significant hazard to the public or the environment as a result of the use, disposal, or transport of the cloud seeding flares used for this project.

During storm season (October 15th through April 15th), LACDPW Flood Maintenance Division (FMD) personnel patrol the debris basins on a daily basis. At the reservoirs, dam

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tenders monitor the facility continuously. These personnel will check the cloud seeding equipment for tampering or vandalism on a daily basis. Additionally, part-time technicians hired by the cloud seeding consultant will inspect, re-supply, and maintain the seeding equipment during the 2009-2010 storm season on an as needed basis. Generally, repair of malfunctioning equipment will occur within 24 hours. The project potential to create a direct, indirect, or cumulatively significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials is less than significant.

Mitigation: None required.

b) Discussion of Effects: All sites depicted in Figure 2 are located on LACFCD property. All are fenced with controlled access using locked gates. No trespassing signs are present. These measures prohibit public access by potential hikers and prevent unauthorized entry into the areas used for flood control and water conservation purposes. In all cases, the manual generators will be secured in place by a chain attached to an existing facility or an "I-bolt" concreted in place. Propane and cloud seeding equipment tanks will be locked. This will mitigate tampering by unauthorized personnel. Additionally, a second chain link fence will be installed around the remote generator installations with slats inserted into the chain links. During storm season (October 15th through April 15th), LACDPW Flood Maintenance Division (FMD) personnel patrol the debris basins on a daily basis. At the reservoirs, dam tenders monitor the facility continuously. These personnel will check the cloud seeding equipment for tampering or vandalism on a daily basis. Additionally, part-time technicians, hired by the cloud seeding consultant will inspect, re-supply, and maintain the seeding equipment during the 2009-2010 storm season on an as needed basis. Generally, repair of malfunctioning equipment will occur within 24 hours.

The LACDPW has a Hazard Communication Program (HCP) which assures that all chemicals are handled safely. The program requires that all hazardous materials be labeled and accompanied by Material Safety Data Sheets (MSDSs). In accordance with the LACDPW's HCP, all manually operated CNGs will be labeled for any hazardous chemicals and accompanied by an MSDS.

Additionally, the LACDPW has a Hazardous Waste Reporting Policy, which requires that a Hazardous Waste Report be generated whenever an accidental hazardous waste discharge is discovered. The report must be filed with the Executive Officer-Clerk of the County of Los Angeles Board of Supervisors Office and the Department of Health Services, Hazardous Material Control Program. The program requires filing of the report within 72 hours of when a "designated government employee" has knowledge of, or discovers, an illegal discharge of hazardous waste in the course of the employee's official duties. If Department personnel discover an accidental chemical spill pertaining to cloud seeding operations, a Hazardous Waste Report will be generated in accordance with Department Policy, and the consultant shall be immediately contacted for clean-up purposes. All chemical spills shall be contained by LACDPW personnel immediately upon discovery and shall be cleaned up by the contractor within 24-hours.

Propane will be stored in a 250-500 gallon, stainless steel, single-walled tank located 15 to 20 feet from the generator. Only one tank will be placed at each manually operated site. Propane tanks will comply with all applicable federal, state, and local standards, including earthquake protection. Propane is widely used in a variety of applications for residential, commercial, and industrial use. In the case of an accidental release or leak, propane will be quickly volatilized into the atmosphere as a gas. Project sites will be situated well away from

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populated areas in debris basins of the County of Los Angeles. Silver iodide is not considered a hazardous material.

The seeding solution is comprised of mostly acetone (approximately 96%) and acetone is considered a hazardous material under the HWCL. Approximately 8 gallons of seeding solution is stored within each manually operated unit. The seeding solution is kept within the unit itself, as shown in Figures 4 and 5, and is well protected from direct physical harm. Extreme force would be required in order to rupture the seeding mixture tank. Considering the remote nature of the project sites, combined with the tamper resistant measures surrounding the flood control facilities, possible events that could rupture the seeding mixture tank are considered very unlikely.

Therefore, the hazard to the public or the environment, through reasonably foreseeable upset and/or accidental conditions, is less than significant.

Mitigation: None required.

c) Discussion of Effects: There are no existing or proposed schools in direct proximity of the project sites. There is one high school within 0.25-mile of one of the project sites (Site # 13, Figure 2). However, the small quantities of acetone used and the isolated nature of the site dictate that the potential for harm as a result of the utilization of acetone is extremely remote. The school site is located within a quarter mile from the project site and the facility is gated and locked. The units themselves are also locked to prevent tampering. Therefore, there are no adverse direct, indirect, or cumulative impacts for this item.

Mitigation: None required.

d) Discussion of Effects: The proposed project sites are not listed on ENVIROSTOR, the Department of Toxic Substances Control (DTSC) hazardous materials site database compiled pursuant to Government Code § 65962.5. Therefore, the project would not create a hazard to the public or environment and there are no direct, indirect, or cumulative impacts for this item.

Mitigation: None required.

e) Discussion of Effects: The project sites are not located within airport land use plans and are not within 2 miles of public airports or public use airports. Therefore, there are no direct, indirect, or cumulative impacts.

Mitigation: None required.

f) Discussion of Effects: The project sites are not located within the vicinity of private airstrips. Therefore, there are no direct, indirect, or cumulative impacts.

Mitigation: None required.

g) Discussion of Effects: Project sites are situated well away from populated areas in debris basins of the County of Los Angeles. The sites are not within any emergency evacuation plan or adopted emergency evacuation plan route or corridor. The project will comply with the requirements of the County of Los Angeles Fire Department and all County requirements for fire and other emergency access. Because the project is required to

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comply with all applicable County codes, any impacts will be reduced to levels below significance. There are no direct, indirect, or cumulative impacts.

Mitigation: None required.

h) Discussion of Effects: The project requires only minimal human involvement and will not increase any risk to life or property from wildland fires. Furthermore, the sites are not located in wildlands. Therefore, there are no direct, indirect, or cumulative impacts.

Mitigation: None required.

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4.8 HYDROLOGY AND WATER QUALITY

-- Would the project:

Potentially Significant Impact Less Than Significant with Mitigation Incorporated Less Than Significant Impact

No Impact

a) Violate any other water quality standards or waste discharge requirements?

b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on-or off-site?

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d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on-or off-site?

e) Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

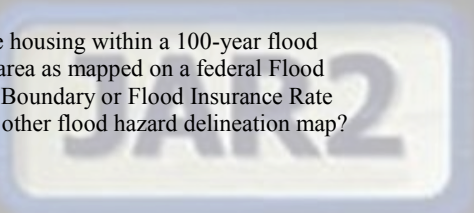
f) Otherwise substantially degrade water quality?

g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

h) Place within a 100-year flood hazard area, structures that would impede or redirect flood flows?

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i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?

j) Expose people or structures to inundation by seiche, tsunami or mud flow?

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a) Discussion of Effects: The project does not pose a significant threat of creating discharge, wastewater, runoff, or stormwater flows that will violate any applicable water quality standards. Most runoff pollution occurs when discarded pollutants accumulate on impervious surfaces until they are dissolved by, or otherwise combined with, water flow to create polluted runoff. While the project is anticipated to increase precipitation 10 to 15 percent in any given season, and will therefore increase water flow, the project will not have any significant impact on potential pollutant sources. The worst water quality impacts due to runoff water generally occur during water flow events that are preceded by long dry periods with no precipitation. During these periods, pollutants accumulate to their highest levels on impervious surfaces until they are removed by the next rainfall event. The project will only increase flow volume and flow events, the characterization and concentration of available pollutants will not change. The impacts from polluted runoff may be reduced due to the increased flow volume acting to dilute the available pollutant sources during more frequent runoff events.

The project will result in very small levels of silver iodide reaching the surface waters during seeded precipitation events. Silver iodide is currently not listed as a 303(d) pollutant of concern by the Los Angeles regional Water Quality Control Board (LARWQCB, 2003). The levels of AgI that will be emitted by the project and remain in the environment are extremely small. Silver iodide is highly insoluble in water. Accumulations in the soil, vegetation, and surface runoff will not be measurable above natural background levels. The impacts to water quality are less than significant.

A recent study (Williams and Denholm, 2009) concerned with a winter research cloud seeding program in Australia considered the risk of an adverse ecotoxicological impact for this project to be negligibly small for the following reasons:

- Although silver ions from soluble silver salts have been shown to be toxic to aquatic species, this is not the case for insoluble silver iodide.
- Where silver toxicity studies have been attempted using insoluble silver salts, researchers have had to resort to indirect methods to achieve the desired concentration of silver ion.
- The majority of studies into acute chronic effects of silver ions have used soluble silver nitrate.
- A number of studies have shown that the toxicity of silver ions in water is significantly ameliorated by the presence in water of chloride ions, carbonate ions, sulfide ions and dissolved organic carbon. In addition, silver is strongly absorbed onto particulate matter in water. Findings from recent studies point to the fact that silver ion concentrations in natural waters are negligibly small.

The California Department of Water Resources summarized the findings of the USBR environmental documents and findings from other cloud seeding review studies (DWR, 2009). According to the USBR, the small amounts of silver iodide used in cloud seeding are minimal. They are often 100 times less than industry emissions into the atmosphere in many parts of the country. They are also lower than the exposure limits people get from tooth fillings. Watershed concentrations would be extremely low because only small amounts of seeding agent are used. Accumulations in the soil, vegetation, and surface runoff have not been large enough to measure above natural background levels. The DWR supports these findings and asserts that utilization of cloud seeding activities can be conducted without significant adverse impacts to the natural and human environment.

Therefore, project direct, indirect, or cumulative impacts to water quality or related to waste discharge are less than significant.

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For additional details on silver iodide, refer to Section 4.3 Air Quality.

Mitigation: None required.

b) Discussion of Effects: The project will result in a net increase in groundwater recharge through natural percolation as well as through the utilization of LACDPW recharge basins. Therefore, there are no adverse direct, indirect, or cumulative impacts are anticipated related to groundwater recharge or aquifer/water table level.

Mitigation: None required.

c) Discussion of Effects: The project will not directly alter any water body. Physical alterations to each of the sites as a result of installation of equipment would be minimal and confined to already graded areas. Within the target area, the project will result in increased flow which will not affect water courses. Project suspension criteria will be followed to avoid seeding storm events that are forecast to produce 5-inches of rainfall within a 24-hour period. A 5-inch 24-hour storm is defined as a 2-5 year frequency event within the target areas (LACDPW, Hydrology Manual, 2006). A 2- to 5-year frequency storm is considered a threshold point where channel forming discharges occur within the existing streambeds. Storms below the threshold typically produce rainfall and accompanying runoff discharges that remain confined to established natural stream beds (Sedimentation Engineering, ASCE, 2007). Increased runoff will not create siltation problems. As such, with mitigation incorporated, a less than significant direct, indirect, or cumulative impact will occur on this item (refer to Mitigation Measure Water-1, Criteria 2).

Mitigation: The project suspension criteria shall be implemented as mitigation measures against potential impacts associated with the physical alteration of existing watercourses. Suspending project operations for events that are forecast to produce 5-inches (or greater) of rainfall within a 24-hour period will prevent excessive runoff from substantially altering the existing drainage pattern of the site or area. Refer to Mitigation Measure WATER-1 Criteria No. 2.

d) Discussion of Effects: Installation of both the manually operated and remotely controlled CNGs at existing flood control and water conservation facilities will not alter the existing drainage pattern of the site or surrounding area. Thus, no significant direct, indirect, or cumulative impacts will occur to the existing drainage pattern of the site or surrounding area. In the target area, the suspension criteria will mitigate potential flooding impacts to less than significant. The impacts include stream or river course alterations and substantially increasing the rate or amount of surface runoff in a manner which would result in flooding on- or off-site. Within the target area, a Capital Flood could cause subsequent flooding. A Capital Flood, based on a 50-year, 24-hour storm event, ranges from 9.0 to 16.0 inches of rain within a 24-hour period in the project areas (LACDPW, Hydrology Manual, 2006). In accordance with the project suspension criteria, seeding will be suspended if any storm is forecast to produce over 5.0 inches of rainfall within a 24-hour period within the project area. The suspension criteria are 44% to 69% less rainfall than a storm associated with the defined Capital Flood for the region. Thus, with mitigation incorporated, a less than significant direct, indirect, or cumulative impact will occur on this item (refer to Mitigation Measure Water-1, Criteria 2).

Similarly, flood control and water conservation facilities, such as the debris basins where the CNGs will be located, are located at the base of the mountains and are generally designed to accommodate a Design Debris Event (DDE). A DDE is defined as the quantity of

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sediment produced by a saturated watershed significantly recovered from a burn (after four years) as a result of a 50-year, 24-hour rainfall event. Since the suspension criteria storm is 44% to 69% less the 50-year storm, by which the flood control structures downstream were designed, with mitigation incorporated, a less than significant direct, indirect, or cumulative impact will occur on this item (refer to Mitigation Measure Water-1, Criteria 2).

Higher rainfall intensity produces larger runoff rates. The 50-year, 24-hour rainfall event peak intensity ranges from 1.67 to 2.97 inches of rain within a 1-hour period from the valleys to the San Gabriel Mountain region respectively (LACDPW, Hydrology Manual, 2006). In accordance with the suspension criteria set up for the project, seeding may be suspended if any storm is forecast to produce over 1 inch of rainfall within a 1-hour period within any of the installation or target areas. The suspension criteria storm intensity is 40% to 66% below the defined 50-year, 24-hour rainfall, maximum intensity rate for the region. Thus, with mitigation incorporated, a less than significant direct, indirect, or cumulative impact will occur on this item (refer to Mitigation Measure Water-1, Criteria 2).

Mitigation: The project suspension criteria, as outlined within the Description of Project section of this document, shall be implemented herein as mitigation for potential impacts associated with increased flow velocities and volumes. Suspending project operations for events that are forecast to produce 5 inches (or greater) of rainfall within a 24-hour period, or over 1 inch of rainfall within a 1-hour period will prevent excessive runoff from flooding on- or off-site. With this mitigation incorporated, a less than significant direct, indirect, or cumulative impact will occur on this item. Refer to Mitigation Measure WATER-1, Criteria 2.

e) Discussion of Effects: The CNG installation at existing flood control and water conservation sites will not result in creation or addition of any runoff. The minimal amount of earthwork involved with the installation of remote operated units will be disposed of immediately and, even if a precipitation event occurred during the installation process, the amount of soils disturbed would not create a significant impact on water quality. No other components of project construction have the potential to impact water quality, regardless of runoff potential. Within the target area, the project will increase runoff and other surface water flow that will lead to increased utilization of stormwater drainage systems. However, project suspension criteria are lower than the design storm intensity and volume, which prevents stormwater flows from exceeding the existing downstream stormwater drainage systems capacities. The process of suspending activities will involve continually monitoring criteria conditions described in Table 5. Once suspension criteria have been met, LACDPW's Storm Operations Director, in coordination with NAWC, would direct cloud seeding operations to halt. NAWC operational personnel will be able to turn on or off manually operated cloud seeding equipment within 1-hour. Remotely operated cloud seeding generators will be able to be halted within 10 minutes. LACDPW will consider all relevant circumstances prior to rendering decisions regarding restricting or suspending cloud seeding operations. Cloud seeding locations with rainfall less than the suspension criteria thresholds will continue to be operated until the targeted storm has passed.

Seeding events will be utilized to increase precipitation during small to moderate storm systems that will not create enough stormwater flow to threaten existing drainage systems. Therefore, a less than significant impact will occur with respect to potential impact related to stormwater flows exceeding the existing stormwater drainage system capacity downstream. The project will create up to a 15 percent estimated increase in precipitation within the target

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area. This increase will in turn result in increased water flow within the target area. However, the project itself will not create, or contribute to, pollution sources that could combine with the increased water flow to create runoff water that violates existing water quality standards. Most runoff pollution occurs when discarded pollutants accumulate on impervious surfaces until they are dissolved by, or otherwise combined with, water flow to create polluted runoff. While the project is anticipated to increase precipitation up to 15 percent in any given season, and will therefore increase water flow, the project will not have any significant impact on potential pollutant sources. The worst water quality impacts due to runoff water generally occur during water flow events that are preceded by long dry periods with no precipitation. During these periods, pollutants accumulate to their highest levels on impervious surfaces until they are removed by the next water flow event. The project will only increase flow volume and flow events, the characterization and concentration of available pollutants will not change. If anything, impacts from polluted runoff may be reduced due to the increased flow volume acting to dilute the available pollutant sources during more frequent water flow events.

Burned regions offer one potential pollutant source that could combine with the increased flow to create runoff pollution within the target area. Burned areas produce large amounts of ash. Ash covered canyons can lead to high levels of turbidity within runoff waters. Impacts to runoff water quality due to turbidity will be minimized through implementation of the project's suspension criteria (refer to the Project Description and Table 5). Under the suspension criteria, seeding activities can be suspended over areas that have been impacted by fires or any other event that results in unstable surface soil conditions. Therefore with mitigation incorporated, a less than significant direct, indirect, or cumulative impact will occur on this item.

The project will not utilize delivery areas, loading docks, or any other areas where materials are stored, transferred, or utilized in a manner that would create the potential for introduction of pollutants to the environment. The project will not involve equipment or vehicles that will require on-site refueling other than the propane tanks. The propane tanks will be refueled by the licensed propane distributor, as needed, and the refueling process is not expected to contribute to any potential pollution source. The tanks and connections will be inspected by the NAWC technician each time the units are utilized and any required repairs will be conducted immediately. Therefore, project facilities will not directly, indirectly, or cumulatively impact water quality.

The project will not directly discharge any stormwater. However, it will create increased precipitation which will create more stormwater within the target area. The increased stormwater will not have any detrimental effect on future beneficial uses.

Mitigation: The project suspension criteria shall be implemented as mitigation to minimize the potential for impacts associated with the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff. Suspending project operations for events that are forecast to produce 5-inches (or greater) of rainfall within a 24-hour period, or over 1 inch of rainfall within a 1-hour period, will prevent excessive storm runoff from exceeding downstream flood control facility capacities on- or off-site. Additionally, suspending cloud seeding operations in the event that reservoir storage is at a level where additional inflow to the reservoir from upcoming storms will result in water releases greater than the capacity of the downstream water conservation facilities will prevent excessive storm runoff from exceeding downstream facility capacities. The project will not add pollutants to the runoff water. Thus, with mitigation incorporated, a less

than significant direct, indirect, or cumulative impact will occur on this item (refer to Mitigation Measure Water-1, Criteria 1 and 2).

f) Discussion of Effects: The project will not add to any pollution source, or potential pollution source, that will lead to any substantial degradation of water quality. Water quality concerns relating to runoff are further discussed in sub-section e) above. The project will not have direct, indirect, or cumulative pollution impacts.

Mitigation: None required.

g) Discussion of Effects: The project does not involve the creation or construction of any structure that will involve human occupancy, including houses. Therefore, the project will not threaten human life due to the placement of housing within 100-year flood hazard area. Increases in runoff will be limited based on project suspension criteria that will prevent seeding in rain events much smaller than those that would create 100-year runoff. No direct, indirect, or cumulative impacts will occur due to cloud seeding.

Mitigation: None required.

h) Discussion of Effects: The project does not include any structure that will divert or alter the current diversion pattern of stormwater flow. Therefore, no impacts will occur due to altered diversion of storm flow within 100-year flood hazard areas. No direct, indirect, or cumulative impacts will occur regarding this item.

Mitigation: None required.

i) Discussion of Effects: The project will result in increased surface flow within the target area. However, risk from flooding events is not expected to create a potential significant impact due to implementation of project suspension criteria (refer to Mitigation measure Water-1, Criteria 2). One of the main objectives of the suspension criteria is to minimize the potential of cloud seeding activities to combine with naturally occurring precipitation or surface flow to create harmful flooding events. The suspension criteria specifically dictate seeding activity suspension when high levels of precipitation are predicted, where flood control measures are nearing their safe operating capacity. The criteria suspend operations where any other event or set of conditions exist that may combine with cloud seeding activities to create potentially unsafe conditions for human life, property, or the environment. Since the LACDPW manages flood control measures within the target area, the LACDPW representative will closely monitor and accurately evaluate the potential for flooding to occur, especially with respect to flood control capacity. With mitigation incorporated, a less than significant direct, indirect, or cumulative impact will occur on this item (refer to Mitigation Measure Water-1, Criteria 2).

Mitigation: The project suspension criteria shall be implemented as mitigation for potential impacts associated with loss of life or property due to flooding. With mitigation incorporated, a less than significant direct, indirect, or cumulative impact will occur on this item (refer to Mitigation Measure Water-1, Criteria 2).

j) Discussion of Effects: The project will not expose people or property to threat from seiche or tsunami. Nor will the project increase the chances of seiche- or tsunami-related impacts. Implementation of the project could affect impacts related to mud flows or other mass wasting events. Precipitation is one key factor leading to mass wasting events, and the

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project will lead to an increase in precipitation by approximately 10 to 15 percent within the target area. Besides rainfall, other factors such as fire, large development projects, and other vegetation removal activities are considered key factors for mass wasting. The project will not create, increase, or otherwise affect any vegetation removing activity, whether planned (such as grading for future development) or accidental (such as fire).

The project could increase the chances of mud flows when other key factors are present. The project's suspension criteria include measures to suspend seeding where other potential key factors of mass wasting exist. For instance, cloud seeding will not take place where fires have removed the vegetation cover that protects topsoil (refer to Mitigation Measure Water-1, Criteria No. 4). Seeding could also be suspended where large development projects have created large areas of exposed soils that could create the potential of mass wasting.

Seeding will be suspended during naturally occurring high precipitation events. These suspension criteria eliminate the potential of creating mass wasting events caused solely or primarily from large amounts of precipitation. With mitigation incorporated, a less than significant direct, indirect, or cumulative impact will occur on this item (refer to Mitigation Measure Water-1, Criteria 2).

Mitigation: The project suspension criteria shall be implemented herein as mitigation for potential impacts associated with mud flows or other mass wasting event. With mitigation incorporated, a less than significant direct, indirect, or cumulative impact will occur on this item (refer to Mitigation Measure Water 1, Criteria Nos. 2 and 4).

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4.9 LAND USE AND PLANNING

-- Would the project:

**Potentially
Significant
Impact
Less Than
Significant
with
Mitigation
Incorporated
Less Than
Significant
Impact
No
Impact**

a) Physically divide an established community?

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-
-
-

b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?

-
-
-
-

c) Conflict with any applicable habitat conservation plan or natural community conservation plan?

-
-
-
-

a) Discussion of Effects: The project sites are located in flood control facility areas that are already developed, owned, and operated by the LACFCD. This project will not physically divide an established community or impede any surrounding operations. There are no direct, indirect, or cumulative impacts.

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Mitigation: None required.

b) Discussion of Effects: The project is consistent with all applicable land use designations, including those for the County of Los Angeles General Plan, and does not interfere with any policies for environmental protection since the project sites are located on previously graded locations. The project is considered to be an accessory land use to the existing land uses on each site. All 15 sites are currently occupied by flood control facilities including dams and debris basins. Because no CNGs would be located in wilderness areas and no prolonged changes in weather over wilderness areas would occur, the project is compatible with all land use designation and management policies. As such, there are no direct, indirect, or cumulative impacts.

Mitigation: None required.

c) Discussion of Effects: The project does not conflict with any applicable habitat conservation plan or natural community conservation plan. Therefore, there are no direct, indirect, or cumulative impacts.

Mitigation: None required.

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4.10 MINERAL RESOURCES

-- Would the project:

**Potentially
Significant
Impact
Less Than
Significant
with
Mitigation
Incorporated
Less Than
Significant
Impact
No
Impact**

a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

-
-
-

b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?

-
-
-

a) Discussion of Effects: There are no known mineral resources at any of the project sites. Therefore, there are no direct, indirect, or cumulative impacts.

Mitigation: None required.

b) Discussion of Effects: There are no known mineral resources at any of the project sites. Therefore, there are no direct, indirect, or cumulative impacts.

Mitigation: None required.

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4.11 NOISE

-- Would the project result in:

**Potentially
Significant
Impact
Less Than
Significant
with
Mitigation
Incorporated
Less Than
Significant
Impact
No
Impact**

a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

-
-
-

b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

-
-
-

c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

-
-
-

d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

-
-
-

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or

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public use airport, would the project expose people residing or working in the project area to excessive noise levels?

f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

a) Discussion of Effects: Installation of the CNGs could slightly increase noise levels temporarily in the vicinity of the project sites. All construction activities would take place between the hours of 7 a.m. and 7 p.m. and would be minimal and limited to shallow excavation or rebar installation. Based on the CNG installation described in the Program Report (Griffith, 2009) and the small equipment involved, any noise increase would be intermittent and minor. Furthermore, since installation is expected to last a maximum of 2 days per site, noise increase would be limited to that period. The project will remain within established noise limits at each site. The project will not contribute to significant increases in traffic volumes at any time and will, therefore, not lead to significant levels of traffic-generated noise. Therefore, only less than significant direct, indirect, or cumulative impacts are anticipated.

Mitigation: None required.

b) Discussion of Effects: Based on the CNG installation described in the Program Report (Griffith, 2009) and the small equipment involved, installation of the CNGs will not generate groundborne vibrations. Therefore, there are no direct, indirect, or cumulative impacts.

Mitigation: None required.

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c) Discussion of Effects: Operation of the project is not anticipated to increase the ambient noise levels above the levels existing without the project. Therefore, there are no direct, indirect, or cumulative impacts.

Mitigation: None required.

d) Discussion of Effects: Installation activities would minimally impact ambient noise levels temporarily in the vicinity of the project sites. Normal activities associated with the project operations would not increase ambient noise levels. Therefore, there are less than significant direct, indirect, or cumulative impacts.

Mitigation: None required.

e) Discussion of Effects: The project sites are not located within a 2-mile radius of a public airport or a public use airport, and there are no people residing or working in the project areas that will be exposed to excessive noise levels. Therefore, there are less than significant direct, indirect, or cumulative impacts.

Mitigation: None required.

f) Discussion of Effects: None of the 15 project sites are located within the vicinity of a private airstrip. Therefore, there are no direct, indirect, or cumulative impacts.

Mitigation: None required.

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4.12 POPULATION AND HOUSING

-- Would the project:

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a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

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b) Displace substantial numbers of existing housing necessitating the construction of replacement housing elsewhere?

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c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?

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a) Discussion of Effects: The project does not involve the creation of structures for human inhabitation. Therefore, there are no direct, indirect, or cumulative impacts.

Mitigation: None required.

b) Discussion of Effects: The project sites are located on developed, uninhabited land used by the LACDPW as dam/debris basins. Therefore, there are no direct, indirect, or cumulative impacts.

Mitigation: None required.

c) Discussion of Effects: The project involves the installation of CNGs in areas currently uninhabited. Therefore, there are no direct, indirect, or cumulative impacts.

Mitigation: None required.

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4.13 PUBLIC SERVICES

--Would the project:

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a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

i) Fire protection?

ii) Police protection?

iii) Schools?

iv) Parks?

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v) Other public facilities?

a) (i) Discussion of Effects: The sites are in areas already served by the County of Los Angeles Fire Department. The project does not require the construction of any new governmental facilities or the alteration of any existing governmental facilities or cause a decline in the levels of service, which could cause the need to construct new facilities. There are no direct, indirect, or cumulative impacts.

Mitigation: None required.

(ii) Discussion of Effects: The sites are in areas already served by the County of Los Angeles Sherriff's Department. The project would not require the construction of any new facilities or alteration to existing facilities or cause a decline in levels of service, which could cause the need to construct new facilities. There are no direct, indirect, or cumulative impacts.

Mitigation: None required.

(iii) Discussion of Effects: No school fees would be levied as the project would not involve the construction of any occupied buildings. There are no direct, indirect, or cumulative impacts.

Mitigation: None required.

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(iv) Discussion of Effects: The project sites are located in developed areas, currently served by the County of Los Angeles. The project will not impact any parks or recreation areas. There are no direct, indirect, or cumulative impacts.

Mitigation: None required.

(v) Discussion of Effects: The project sites are located in developed areas, currently served by the County of Los Angeles. The project will not require the construction of any new public facilities or alteration of any existing public facilities or cause a decline in the levels of service, which could cause the need to construct new facilities. There are no direct, indirect, or cumulative impacts.

Mitigation: None required.

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4.14 RECREATION

--Would the project:

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a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

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b) Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

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a) Discussion of Effects: The project does not propose any new housing or large employment generator that would cause an increase in the use of neighborhood parks or other recreational facilities. There are no direct, indirect, or cumulative impacts.

Mitigation: None required.

b) Discussion of Effects: The project does not propose any new housing or large employment generator that would require the construction or expansion of neighborhood parks or other recreational facilities. There are no direct, indirect, or cumulative impacts.

Mitigation: None required.

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4.15 TRANSPORTATION/TRAFFIC

-- Would the project:

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No
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a) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?

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b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?

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c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?

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d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

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e) Result in inadequate emergency access?

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f) Result in inadequate parking capacity?

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g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?

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a) Discussion of Effects: There are existing fenced access roads to each project site that restrict public access to each of the debris basins. The project will create a negligible increase in vehicle trips per day during the installation and activation of the CNGs during rain events. Based on the CNG installation described in the Program Report (Griffith, 2009), a single vehicle is anticipated to be used for project installation and operation purposes. Each installation requires one trip, and operation at manual sites may require 15 trips per year. Fewer trips will be required for remotely operated sites. Therefore, there are less than significant direct, indirect, or cumulative impacts.
Mitigation: None required.



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b) Discussion of Effects: Traffic to the project sites will be negligible because vehicle trips will mainly occur during installation activities, servicing/maintenance trips in the winter, and rain events in order to activate the manually-operated CNGs. Based on the CNG installation described in the Program Report (Griffith, 2009), a single vehicle is anticipated to be used for project installation and operation purposes. Each installation requires one trip, and operation at manual sites may require 15 trips per year. Remotely-operated sites will not be visited during rain events. Therefore, there are no direct, indirect, or cumulative impact to the level of service standard established by the County.

Mitigation: None required.

c) Discussion of Effects: The project would not create a substantial safety risk or interfere with air traffic patterns because the roads to the project sites already exist, and the number of vehicle trips would be minimal. There are no direct, indirect, or cumulative impacts.

Mitigation: None required.

d) Discussion of Effects: The project will not substantially increase hazards due to a design feature or incompatible uses because road construction or relocation of existing stoplights will not be required. Each of the 15 sites has an existing locked access road and minimal traffic limited only to permitted access. Installation of the CNGs would not prevent or limit road access. There are no direct, indirect, or cumulative impacts.

Mitigation: None required.

e) Discussion of Effects: The project sites are located in developed areas currently served by the County of Los Angeles Fire Department, Sheriff Department, and other local agencies. The project would not create inadequate emergency access. Project suspension criteria will be followed to avoid seeding storm events that are forecast to produce 5-inches (or greater) of rainfall within a 24-hour period. A 5-inch in 24-hour storm is defined as a 2-5 year frequency event within the target areas (LACDPW, Hydrology Manual, 2006). Storms which typically occur every 2-5 years do not result in inadequate emergency access. With mitigation incorporated, a less than significant direct, indirect, or cumulative impact will occur on this item (refer to Mitigation Measure Water-1, Criteria 2 and 6).

Mitigation: The project suspension criteria shall be implemented as mitigation to potentially inadequate emergency access. Suspending project operations for events that are forecast to produce 5-inches (or greater) of rainfall within a 24-hour period will prevent excessive storm runoff from potentially affecting access to locations both on- and off-site by emergency personnel. Additionally, suspending cloud seeding operations in the event of special conditions, such as search and rescue operations in the mountains, will prevent inadequate access by emergency personnel. With mitigation incorporated, a less than significant direct, indirect, or cumulative impact will occur on this item (refer to Mitigation Measure Water-1, Criteria 2 and 6).

f) Discussion of Effects: Access to the 15 project sites is through fenced roads that only allow permitted access. Therefore, inadequate parking capacity will not pose any inconvenience.

There are no direct, indirect, or cumulative impacts

Mitigation: None required.

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g) Discussion of Effects: The project does not conflict with any transportation policies, plans or programs. There are no direct, indirect, or cumulative impacts
Mitigation: None required.

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4.16 UTILITIES AND SERVICE SYSTEMS

-- Would the project:

Potentially Significant Impact Less Than Significant with Mitigation Incorporated Less Than Significant Impact No Impact

a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?

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b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

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c) Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

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d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed? In making this determination, the City shall consider whether the project is subject to the water supply assessment requirements of Water Code Section 10910, et. Seq. (SB 610), and the requirements of Government Code Section

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664737 (SB 221).

e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?

g) Comply with federal, state, and local statutes and regulations related to solid waste?

a) Discussion of Effects: The project will not generate wastewater of any kind. There are no direct, indirect, or cumulative impacts

Mitigation: None required.

b) Discussion of Effects: The project will not generate wastewater of any kind. There are no direct, indirect, or cumulative impacts

Mitigation: None required.

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c) Discussion of Effects: The project will not require the construction of new stormwater drainage facilities or expansion of existing facilities. There are no direct, indirect, or cumulative impacts.

Mitigation: None required.

d) Discussion of Effects: The project will not require a water supply. There are no direct, indirect, or cumulative impacts.

Mitigation: None required.

e) Discussion of Effects: The project will not generate wastewater. There are no direct, indirect, or cumulative impacts.

Mitigation: None required.

f) Discussion of Effects: Solid waste generated by the project will consist exclusively of the bases of spent flares (non-hazardous) which are generated at a rate of approximately 42 pounds total per season for the remotely operated flare sites. There is ample capacity in the County's three landfills to accept this minimal amount of waste. As such, there are no direct, indirect, or cumulative impacts.

Mitigation: None required.

g) Discussion of Effects: The project will comply with all federal, state, and local statutes and regulations regarding solid waste. Therefore, there are no direct, indirect, or cumulative impacts.

Mitigation: None required.

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4.17 MANDATORY FINDINGS OF SIGNIFICANCE

Potentially Significant Impact
Less Than Significant with Mitigation Incorporated
Less Than Significant Impact
No Impact

a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

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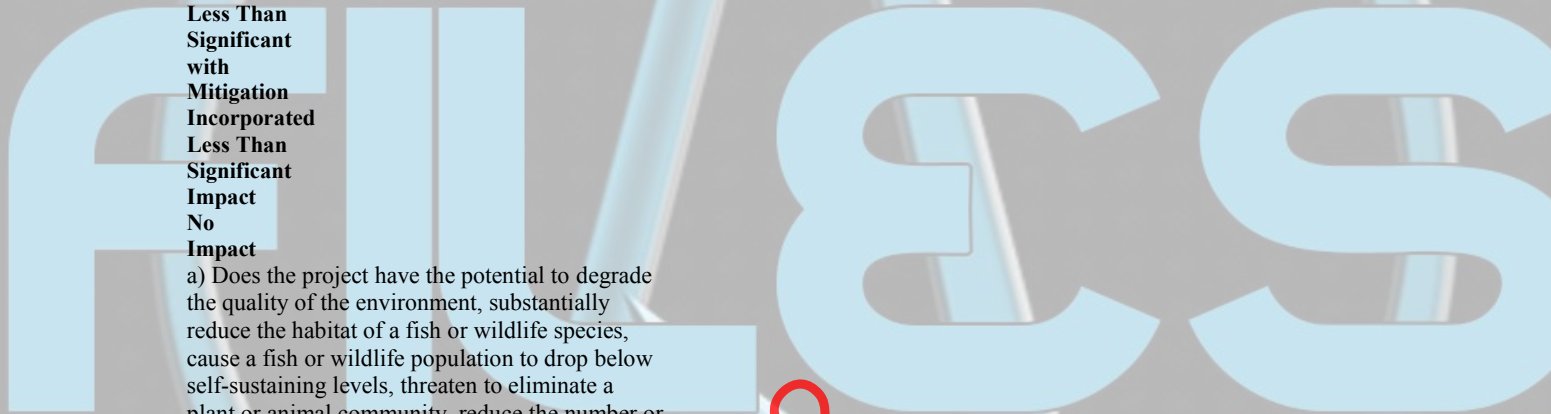
b) Does the project have the potential to achieve short-term environmental goals to the disadvantage of long-term environmental goals?

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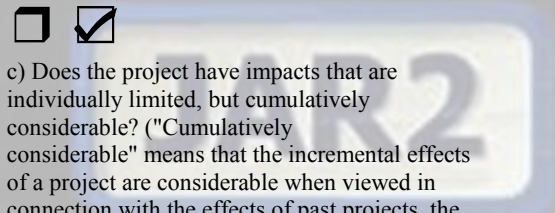
c) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?

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d) Does the project have environmental effects which will cause substantial adverse effects on



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human beings, either directly or indirectly?

a) Discussion of Effects: The project will not degrade the quality of the environment, substantially reduce the habitat of any wildlife species, or have any significant direct impact to wildlife individuals or populations. As detailed within Section 4.3 – Air Quality, the project emits a less than significant amount of green house gases. Project sites were chosen specifically to avoid conflict with potential resources, including biological resources and habitat. All of the 15 sites are located on properties that have been previously graded, are currently fenced, and are often located adjacent to current industrial land uses such as storage yards, debris basins, utility sheds/structures, and telecommunications equipment. Therefore, there are less than significant direct, indirect, or cumulative impacts.

Mitigation: None required.

b) Discussion of Effects: The project will not create any short-term environmental gains at the expense of long-term environmental goals. All beneficial environmental effects derived from the project will not hinder future environmental gain, regardless of the extent of future cloud seeding activities. All potential direct, indirect, and cumulative adverse environmental effects associated with the project are addressed through implementation of project features such as the suspension criteria, unit design, and specific locating of the cloud dispersion units.

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Therefore, there are no direct, indirect, or cumulative impacts.
Mitigation: None required.

c) Discussion of Effects: Currently, there are no known projects that, when considered in conjunction with the project, could create the potential for adverse cumulative impact. Most of the aspects of the proposed project have a very low potential to combine with other actions to create cumulatively significant impacts. The project has very minimal physical disturbance, operation of the project requires a minimal connection to communal resources and utilities, and it is unique to the point that it is very unlikely that a similar project would be implemented within the same target area.

With mitigation incorporated, a less than significant direct, indirect, or cumulative impact will occur. The cumulative affects which will be mitigated to less than significant by Mitigation Measure Water-1 are:

- Erosion caused by excessive storm runoff: Criteria 2 and 4.
- Flooding caused by excessive storm runoff: Criteria 2 and 3.
- Landslides caused by excessive storm runoff: 2 and 5.
- Inadequate emergency service response caused by excessive storm runoff: 2 and 5.

Mitigation: The suspension criteria, as outlined within the Description of Project section of this document, shall be implemented as mitigation for potential cumulatively considerable impacts associated with project implementation. With mitigation incorporated, a less than significant direct, indirect, or cumulative impact will occur. Refer to Mitigation Measure WATER-1, Criteria Nos. 2, 3, and 5.

d) Discussion of Effects: The project is estimated to generate a 10 to 15 percent increase in precipitation within the target area. Potential secondary impacts from this additional precipitation could potentially lead to substantial adverse effects without the suspension criteria. However, the suspension criteria were developed specifically to minimize the potential for cloud seeding activities to create, either directly or indirectly, an adverse effect on human beings, property, or the environment.

With mitigation incorporated, a less than significant direct, indirect, or cumulative impact will occur. The cumulative affects which will be mitigated to less than significant by Mitigation Measure Water-1 are:

- Erosion caused by excessive storm runoff: Criteria 2 and 4.
- Flooding caused by excessive storm runoff: Criteria 2 and 3.
- Landslides caused by excessive storm runoff: 2 and 5.
- Inadequate emergency service response caused by excessive storm runoff: 2 and 5.

Mitigation: The project suspension criteria, as outlined within the Description of Project section of this document, shall be implemented herein as mitigation for potential adverse effects to human beings. With mitigation incorporated, a less than significant direct, indirect, or cumulative impact will occur. Refer to Mitigation Measure WATER-1, Criteria Nos. 2, 3, and 5.

5.0 MITIGATION MEASURES

WATER-1:

To ensure that the project does not contribute to personal, property, or environmental injury, guidelines for suspension have been developed. Suspension of seeding is necessary due to hazardous weather, lack of runoff storage capacity, precipitation related problems, and other special circumstances. In addition, seeding will be temporarily suspended over areas that exhibit unstable soils due to seismic events and over recently burned areas until sufficient natural re-vegetation has occurred. This will prevent undue erosion, slides, mud flows, and/or downstream flooding.

The NAWC Project Meteorologist will recommend whether any restrictions or suspensions may be necessary during each seedable storm event. Using the NAWC Project Meteorologist's input and other information (reservoir levels, ALERT system data, special event schedules, etc.), the LACDPW's Storm Operations Director will decide whether cloud seeding should be conducted, continued, or suspended. LACDPW will consider all relevant circumstances prior to rendering decisions regarding restricting or suspending cloud seeding operations. The Storm Operations Director or his/her designated agent will always be available during seeding operations.

Cloud seeding activities will be suspended within the target watershed, or not initiated, during any storm predicted to produce 5.0 inches of rainfall or greater within a 24-hour period. This suspension criteria is independent of flood warnings or other watches being issued by the National Weather Service (NWS).

NWS issued Flash Flood Warnings for a target watershed will prevent initiation, or trigger an immediate suspension, of cloud seeding activities. Flash Flood Warnings are issued when flash flooding has been reported or is forecast as imminent within certain streams or areas. Weather conditions resulting in the issuance of these flood warnings often occur in the target watersheds. Seeding will only resume when additional meteorological information from the NWS or the NAWC Project Meteorologist indicates that the forecast on which the warning was based has been down-graded. This ensures that the portions of storms forecast to produce peak flows and floods are not seeded. This prevents the project from contributing, or being perceived to contribute, to personal, property, or environmental injury caused by naturally occurring weather phenomena.

The NWS issues other special weather bulletins based on forecasts during periods of hazardous weather phenomena. These include Flash Flood Warnings, Traveler's Advisories, and Winter Storm Warnings, which represent less intense storm events. Seeding will not necessarily be suspended solely on the issuance of these NWS bulletins, since the seeding will be conducted for, and limited to, relatively remote mountain areas. However, if the NWS issues a hazardous weather bulletin, the Project Meteorologist could recommend suspending seeding based on an analysis of weather conditions. Suspension of seeding would also occur during periods of heavy rainfall when the soil approaches the limit of its water-holding capacity and/or inflow to the reservoirs has substantially increased.

Rainfall and inflow would be closely monitored during all seeded storm events to determine if suspension of seeding was appropriate and/or necessary. If the targeted reservoirs were to become full, or nearly full, and capacity for containing excess runoff became questionable, seeding would be suspended for future storm events until sufficient reservoir storage capacity once again became available. Special conditions may also occur within the target areas when any amount of precipitation would be undesirable, including but not limited to, significant construction activities and search and rescue operations. Seeding would not be initiated during these situations. Suspension criteria for the program are outlined in the table below. The

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process of suspending activities will involve continually monitoring criteria conditions described in Section 1.8.2.6 and Table 5 that is repeated below. Once suspension criteria have been met, LACDPW's Storm Operations Director, in coordination with NAWC, would direct cloud seeding operations to halt. NAWC operational personnel will be able to turn off individual manually operated cloud seeding equipment within 1-hour. Remotely operated cloud seeding generators will be stopped within 10 minutes. LACDPW will consider all relevant circumstances prior to rendering decisions regarding restricting or suspending cloud seeding operations. Cloud seeding locations experiencing rainfall below suspension criteria thresholds will continue to be operated until the targeted storm has passed.

Weather Modification Program Suspension Criteria

Suspension Criteria

Description

1. Dam Operations

Cloud seeding operations for upcoming storms will be suspended if reservoir storage is at a level where additional inflow to the reservoir from upcoming storms will result in water releases greater than the capacity of the downstream water conservation facilities. This would result in loss of water to the ocean. Additionally, suspension may occur if dam and reservoir construction efforts are being significantly impaired by increased inflow from cloud seeding activities. Cloud seeding will resume when the probability of water loss to the ocean is reduced or risk to dam maintenance and construction activities are mitigated.

2. Precipitation

Seeding may be suspended if precipitation rates exceed 1.0 inch per hour within the target watersheds. Seeding will be suspended if any storm is forecast to produce over 5.0 inches of rainfall within a 24-hour period in the target areas.

3. Weather Watch

Seeding will be suspended whenever the NWS issues a flash flood warning for the target areas. Seeding may be suspended whenever the NWS issues a Traveler's Advisory, Winter Storm Warning, or Flash Flood Watch. These advisories will be factored with other variables to determine whether seeding is suspended.

4. Fire Damage

Fires within target watersheds will lead to immediate suspension of seeding activities to prevent undue erosion, mud flow hazards, or flooding downstream of a burned area. Seeding suspension will continue until sufficient natural re-vegetation occurs to mitigate excessive erosion and sediment flows during storms.

5. Earthquake Damage

Earthquake damage to the soil structure may occur in target watersheds depending on the intensity and distance from the epicenter of an earthquake. During storm season, cloud seeding operations will be suspended if a 5.0 (Richter Scale) earthquake occurs within 50 miles, or alternatively a 4.0 earthquake occurs within 25 miles of any CNG installation site or target watershed, until an evaluation of the situation is completed. Damage to the soil structure may increase the potential for damaging landslides and mud flows during periods of moderate to heavy rainfall. Cloud seeding in the affected area may be suspended for the remainder of the storm season. LACDPW geology, geo-technical, and sedimentation personnel will analyze the impact to the soil structure and sediment transport to decide when cloud seeding may resume in the affected area.

6. Special Conditions

Seeding may be suspended due to special conditions such as significant construction activities, search and rescue operation, higher than normal public use such as holidays, and special events such as bicycle races or large public gatherings.

7. Los Angeles Basin

Seeding operations will not be conducted if they are predicted to have an impact within the Los Angeles Basin.

8. Special Authority

Seeding activities may be suspended for any circumstances that the LACDPW Operations Director or NAWC's Project Meteorologist deem unsafe. The Operations Director will make the final decision in the event of

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disagreement.

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APPENDIX A
MSI Report for PM2.5 Modeling

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March 6, 2009

Mr. Don A. Griffith North American Weather Consultants Inc. 8180 South Highland Dr., Suite B-2 Sandy, Utah 84093

Subject: LA Generator Pollution Calculations

Dear Mr. Griffith:

Meteorological Solutions Inc. (MSI) conducted dispersion modeling using AERMOD to predict concentrations of PM_{2.5} released from a silver iodide generator or from a silver iodide (AgI) flare site. This letter summarizes the results of the modeling. Several assumptions were made in the conduct of this modeling:

Meteorological data from the Los Angeles Airport (LAX) for the year 2004 and the Burbank Airport (BUR) for the year 2006 were used to simulate dispersion of PM_{2.5}. Stability classes of E and F were removed from the meteorological data set since seeding activities do not occur during stable atmospheric conditions. All meteorological data were obtained from the National Climatic Data Center (NCDC) and are considered reliable and representative of the entire modeling year.

The AgI source and modeling receptors were entered into the model with an elevation of 0 meters above sea level.

We assumed that all of the AgI emissions were immediately converted to PM_{2.5}.

The emissions and source information which were modeled are presented in Table 1 below. A receptor grid was put into the model extending 200 meters beyond a fence line which was no closer than 30.5 meters (~100 feet) away from the release site to simulate expected site access restrictions.

Emission rates for the seeding generator were assumed to be 24 g/hr of AgI for a 24-hour generation period.

Emission rates for the seeding flare were assumed to be 15 g/flare with a maximum of 24 flares burned in a 24-hour period.

Sources were modeled as a point source.

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Table 1

AERMOD Source Input Parameters and Emission Rates

Source
Stack Parameters

PM_{2.5}
(g/sec)
Height
(m)
Diameter
(m)
Velocity
(m/s)
Temp.
(k)

Generator
 1.5
 0.4572
 0.3048
 973
 0.006667
 Flare
 1.5
 0.4572
 0.3048
 1773
 0.004167

Table 2 presents the five highest modeled concentrations using hourly meteorological data from LAX in 2004 excluding atmospheric stability classes E and F; receptor locations (in meters) relative to the release site where the highest modeled concentration occurred are also included in the table.

Table 2
Five Highest Modeled Concentrations and Receptor Locations
for Meteorological Data from LAX in 2004

Source
24-hour PM_{2.5}
(µg/m
³
)
X
1
(meters)
Y
1
(meters)

Generator

4.1
-30.5
-2.3
3.8
-30.5
-7.0
3.8
-30.5
2.3
3.4
-30.5
-11.7
3.3
-30.5
7.0
Flare
2.5
-30.5
-2.3
2.3
-30.5
-7.0
2.3
-30.5
2.3
2.1
-30.5
-11.7
2.0
-30.5
7.0

1

The fence line is no closer than 30.5 meters (~100 feet) away from the source location.

Table 3 presents the five highest modeled concentrations using hourly meteorological data from BUR in 2006 excluding atmospheric stability classes E and F; receptor locations (in meters) relative to the release site where the concentration occurred are also included in the table.

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Table 3

**Five Highest Modeled Concentrations and Receptor Locations
for Meteorological Data from BUR in 2006**

Source

24-hour PM_{2.5}

($\mu\text{g}/\text{m}^3$)

X

1

(meters)

Y

1

(meters)

Generator

10.2

2.3

30.5

9.9

-2.3

30.5

9.0

7.0

30.5

8.5

0.0

35.0

8.4

5.0

35.0

Flare

5.9

2.3

30.5

5.8

-2.3

30.5

5.2

7.0

30.5

4.9

0.0

35.0

4.7

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5.0
35.0

1

The fence line is no closer than 30.5 meters (~100 feet) away from the source location.

In summary, the AERMOD dispersion model was used in the analysis of emissions of two cloud seeding methods. The model output represents the maximum concentration predicted at a receptor using meteorological data from LAX and BUR airports. Receptors were no closer than 30.5 meters (~100 feet) from the source. Maximum PM_{2.5} concentrations occurred west of the source when using 2004 data from LAX, while maximum concentrations occurred north of the source when using 2006 data from BUR. The manual silver iodide generator had a maximum 24-hour PM_{2.5} concentration of 10.2 µg/m

³ in 2006 using BUR data. This is below the EPA 24-hour PM_{2.5} standard of 35 µg/m

³ . The remotely operated silver iodide flare site had a maximum 24-hour PM_{2.5} concentration of 5.9 µg/m

³ also in 2006 data using BUR data. This is below the EPA 24-hour PM_{2.5} standard of 35 µg/m

³ . Attachment 1 presents concentration isopleth plots for the two cloud seeding methods using LAX and BUR meteorological data.

If you have any questions concerning this report, please feel free to contact us.

George Wilkerson, President

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ATTACHMENT 1
Concentration Isoleth Plots

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LAX
Concentration Isopleth Plots

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BUR
Concentration Isopleth Plots

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APPENDIX B
Manual Generator, BTU Output

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HEAT OUTPUT OF NAWC MANUALLY-OPERATED CNG

Operating pressure

6-7 psi

Propane supply line

0.25 inch

Nozzle type

1/4JN-SS+SU2-SS

Propane combustion rate

~ 0.75 gal per hour

Acetone combustion rate

0.12 gal per hour (standard)

0.24 gal per hour (LA DPW)

• 1 gal of liquid propane (~ 36.4 cu ft in gas phase) during combustion generates ~91,600 BTU.

NAWC's manual CNG's consume propane at the rate of ~0.75 gal per hour, so the output is ~68,700 BTU per hour.

• The standard CNG configuration is an acetone solution burn rate of 0.12 gal per hour, so the output is ~ 9,945 BTU at that rate.

The LA DPW CNG rate is 0.24 gal per hour, so the output is ~19,890 BTU per hour at that rate.

• So, the standard configuration heat generation rate is ~78,645 BTU per hour, and The LA DPW configuration is ~88, 590 BTU

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APPENDIX C
CNDDDB Species Table

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Appendix C

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**APPENDIX D
DRAFT MND COMMENTS AND
RESPONSES**

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APPENDIX E
REPORTING AND MONITORING PROGRAM

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APPENDIX E

PROGRAM FOR REPORTING AND MONITORING THE IMPLEMENTATION OF ENVIRONMENTAL IMPACT MITIGATION MEASURES

WEATHER MODIFICATION (CLOUD SEEDING) SERVICES

The following program will be used to monitor and implement the mitigation measures discussed in Section XVIII of the Negative Declaration.

1.0 Program Management

1.1

After adoption of environmental mitigation measures by the Board of Supervisors, Public Works shall designate responsibility for monitoring and reporting compliance with each mitigation measure.

1.2

To facilitate implementation and enforcement of this Program, Public Works shall ensure that the obligation to monitor and report compliance with environmental mitigation measures is required by all project-related contracts between the County and consultant, prime construction contractor(s), and any other person or entity who is designated to monitor and/or report compliance under this Program during the preconstruction and construction phases.

1.3

Public Works, as appropriate, shall take all necessary and appropriate measures to ensure that each project-related environmental mitigation measure, which was adopted, is implemented and maintained.

2.0 Preconstruction

2.1

Public Works or consultant for project design is responsible for incorporating mitigation measures into project design and confirming in writing that final construction drawings include all design-related mitigation measures.

2.2

Public Works or consultant for design of project-related off-site improvements is responsible for incorporating mitigation measures and confirming in writing that final construction drawings include all design related mitigation measures.

3.0 Construction

3.1

Public Works or prime construction contractor(s) for project and/or for project-related off-site improvements is responsible for constructing and/or monitoring the construction of mitigation measures incorporated in final construction documents and reporting instances of noncompliance in writing.

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3.2

Public Works or prime construction contractor(s) for project and/or for project-related off-site improvements is responsible for implementation and/or monitoring the implementation of mitigation measures affecting methods and practices of construction (e.g., hours of operation, noise control of machinery) and reporting instances of noncompliance in writing.

3.3

Public Works is responsible for monitoring compliance of prime construction contractor(s) with responsibility set forth in 3.1 above and reporting noncompliance in writing.

4.0 Project Operation

4.1

After completion and final acceptance of the project, Public Works is responsible for monitoring and maintaining compliance with adopted mitigation measures, which affect project operation.

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APPENDIX F
FINAL MND ERRATA

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APPENDIX F
ERRATA SHEET TO COUNTY OF LOS ANGELES
WEATHER MODIFICATION PROJECT
FINAL MITIGATED NEGATIVE DECLARATION
DATED OCTOBER 6, 2009

There are no substantive changes proposed to the MND since the document was circulated publicly in 2009. A lead agency is required to recirculate a negative declaration when the document must be substantially revised after public notice of its availability has previously been given pursuant to Section 15072, but prior to its adoption. The lead agency has determined that there have been no substantial revisions to the MND under 15073.5 (b), which defines a “substantial revision” as (1) A new, avoidable significant effect is identified and mitigation measures or project revisions must be added in order to reduce the effect to insignificance, or (2) The lead agency determines that the proposed mitigation measures or project revisions will not reduce potential effects to less than significance and new measures or revisions must be required. Also, recirculation is not required under 15073.5 (c) (4): New information is added to the negative declaration which merely clarifies, amplifies, or makes insignificant modifications to the negative declaration. The County has determined that none of the proposed changes identified below to the MND are substantial revisions which would require recirculation. Since 2009, SCAQMD has adopted 10,000 MTCO₂e/yr for industrial projects and the 3,000 MTCO₂e/yr for residential and business projects. This adoption of greenhouse gas standards does not create significantly new impacts or significantly increase the previously identified impacts because the project’s emissions are significantly below both of these adopted thresholds. There are no changes to the MND section 4.3 regarding Air Quality. Additionally, circumstances have not changed in the environment where the project will take place such that new significant impacts are anticipated. Similar to current conditions, severe drought conditions existed in 2009. Current brush fire boundary areas have changed since 2009, however the impact is insignificant since the mitigating protocol of avoiding cloud seed activation near fire areas remains the same. Furthermore, there are no anticipated changes in the area of the project which could lead to cumulative impacts where this was not an issue at the time of 2009 circulation.

Therefore, having conducted a review in April, 2015 of the information contained in the Mitigated Negative Declaration dated October 6, 2009 and in the administrative record as well as the requirements under CEQA Guidelines Section 15073.5 regarding recirculation of draft negative declarations, in connection with their adoption of the Mitigated Negative Declaration, Los Angeles County finds that no substantial revisions to the Mitigated Negative Declaration were required following public review; environmental and cumulative effects in the project area remain largely the same and thus, recirculation of the Mitigated Negative Declaration is not required by CEQA.

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The following text changes were made to the original Final MND dated October 6, 2009 and are incorporated as part of the revised Final MND dated June 1, 2015. These changes further substantiate conclusions and/or clarify aspects of the previously circulated document.

Changes to the text are noted with **bold** (for added text) or ~~strikeout~~ type (for deleted text).

Page 3: (Section 1.2 LEAD AGENCY)

County of Los Angeles Department of Public Works

Page 9: (Section 1.8.2 Project Description of the LACFCD Cloud Seeding Program)

The Los Angeles County Department of Public Works (LACDPW), acting in behalf of the LACFCD, will conduct a cloud seeding program targeting watersheds tributary to reservoirs located in the San Gabriel Mountains. Cloud seeding operations will be conducted by North American Weather Consultants, Inc. (NAWC). This professional weather modification company has conducted numerous cloud seeding programs in the western United States and has conducted almost every LACDPW cloud seeding program in the San Gabriel Mountains dating back to 1961.

The following sections discuss a general overview of the program, installation of the manual and remotely operated cloud nuclei generators (CNGs), and operation of the CNGs.

Page 14: (Section 1.8.2.5 Initiation of Cloud Seeding Activities)

The LACDPW will make the final decision to initiate cloud seeding. Upon receiving a recommendation from the NAWC Project Meteorologist to initiate seeding, LACDPW staff will consider a variety of factors before agreeing to the recommendation. These factors include, but are not necessarily limited to:

- Water surface elevations behind LACDPW dams;
- Current inflow into the reservoirs;
- Estimated antecedent soil moisture in the target watersheds;
- Capacity in the channels downstream of the dams;
- Capacity at downstream spreading grounds;
- Forecasts of rainfall amounts from the approaching storm;
- Timing of the approaching storm within the storm season;
- Proximity of seeding sites to burned watersheds;
- Recent earthquakes within the targeted watersheds;
- NWS warnings within the targeted watersheds;
- Current search and rescue operations within the targeted watersheds; and
- Significant construction activities within the watersheds.

The Los Angeles County Flood Control District is the local agency responsible for flood control and stormwater conservation and LACDPW administers all flood control facilities on behalf of LACFCD. LACDPW will consider all circumstances surrounding an approaching storm and will use professional judgment to make a decision of whether or not to initiate cloud seeding activities.

Page 17: (SECTION 1.9 SURROUNDING LAND USES AND SETTING)

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The CNGs will be located in the foothill areas upwind of the target watersheds. Due to the large population within the County of Los Angeles, there are many foothill communities. These communities border the flood and debris control facilities that will be used for the seeding generators.

The targeted watersheds are located within the Angeles National Forest (ANF) and comprise a large portion of the southern slopes of the San Gabriel Mountains. These areas are used for many recreational purposes, including: hiking, camping, fishing, biking, wilderness area, and skiing. The mountains and foothills are the home of many plant and wildlife species that are threatened and endangered. Special care must always be taken to prevent damage to the ecosystems during construction activities.

In order to prevent damage to the ecosystems, all of the CNGs will be located on previously graded sites on property owned by the Los Angeles County Flood Control District **and used by Los Angeles County Department of Public Works** for flood control and water conservation activities. All the locations are currently used in conjunction with maintenance activities and have been developed with concrete and/or asphalt, and are surrounded by protective chain link fence to restrict public access.

Page E-3: (Appendix E-Mitigation Monitoring and Reporting Program [MMRP])

The following program will be used to monitor and implement the mitigation measures discussed in all sections Section XVIII of the Mitigated Negative Declaration. **An MMRP grid has been developed and can be found in Enclosure D- Mitigation Monitoring and Reporting Program document.**

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