United States Department of Agriculture

NRCS

Natural Resources Conservation Service
California State Office
430 G Street, Room 4164
Davis, CA 95616-4164

October 7, 2002

CALIFORNIA TECHNICAL GUIDE
450-VI

TECHNICAL GUIDE NOTICE NO. 54

SUBJECT: Issue New Conservation Standards and Specifications

Purpose: Transmit new revised Conservation Practice Standards, Specifications and Practice Requirement Sheets for Air Management, Code 705, Air Management-Ozone, Code 705F, Pumping Plant for Water Control, Code 533, and Pumping Plant for Water Control, Air Quality-Emission Reductions, Code 533A.

Effective Date: When Contents are Received.

Enclosed are the revised conservation practice standards for Air Management, Code 705, and Pumping Plant for Water Control, Code 533. These standards have been revised to add design criteria for stationary agricultural engines (e.g. irrigation pumps) to comply with applicable air quality regulations. In addition, special considerations have been added for air quality, endangered species and cultural resources.

In addition, conservation practice specifications and practice requirement sheets have been developed for Air Management-Ozone, Code 705F, and Pumping Plant for Water Control, Air Quality-Emission Reductions, Code 533A, to provide more specific guidance on managing agricultural equipment and operations to reduce emission of particulate matter and ozone precursors, such as oxides of nitrogen (NOx).

Filing Instructions

1. Replace the Practice Standards, dated July 2000, with the Practice Standards, Specifications and Practice Requirements Sheets, dated October 2002.

Filing Instructions, Continued

2. Make notation on the Data Tabulation sheet in front of the Field Office Technical Guide indicating an update; also make note in Section IV, Index of Conservation Practices noting the revised date, and the addition of the specifications and practice requirements sheets.

3. Section IV of the FOTG (located on the web at http://www.ca.nrcs.usda.gov/rts/sec4.htm) will be updated to reflect these revised Standards, Specifications and Practice Requirements Sheets.

/s/ *Diane B. Holcomb*

DIANE B. HOLCOMB
State Resource Conservationist

ATTACHMENTS

DIST: ASTC-FO (2 copies)
DC (1 copy)
SCE (2 copies)
SRC (2 copies)
SSS (1 copy)
PMC (1 copy)
PAS (1 copy)

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

AIR MANAGEMENT

(Acre, Feet or No.)
CODE 705 CA INTERIM

DEFINITION

A combination of treatments for managing air, soil, and other resources in a manner that improves or prevents degradation of air quality, or improves air condition.

PURPOSES

To improve or minimize degradation of air quality by reducing dust, smoke, noxious gases, greenhouse gases, and to improve visibility both onsite and offsite in order to protect public health and safety, machinery and structures, and to minimize conveyance problems, chemical drift, and airborne odors.

Other air condition factors such as temperature, movement, and humidity should be evaluated.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all cropland and other lands that contribute airborne particulates (dust, smoke, chemicals) and objectionable odors and gases (ammonia, VOC's, oxides of nitrogen or NOx, methane, and CO2) that have a negative impact on air quality and visibility.

This practice also applies to all cropland and other lands where air temperature, air movement, or humidity levels have an adverse affect on the desired flora and fauna and can be economically managed to minimize or reduce the impact or risk of those effects.

This practice applies especially to land in designated non-attainment areas identified by the US EPA or by an Air Pollution Control District.

CRITERIA

Each air quality problem identified on the NRCS "Checklist of Resource Problems or Conditions" will be evaluated and treated, if necessary, to achieve the air resource quality criteria found in Section III of the Field Office Technical Guide.

Reduce or modify agricultural cultural operations that create dust, especially during critical periods.

Where appropriate, use wind erosion control practices to reduce damage from airborne particulates that fill or cover ditches, culverts, roads, drainages, or damage equipment, structures, and crops, and to reduce PM_{10} and $PM_{2.5}$ emissions.

Implement controlled burns consistent with established smoke management regulations and guidelines, including permit requirements, issued by Air Quality Districts.

Provide adequate soil moisture levels at the time of tillage and other cultural practices to reduce dust and increase clod formation. For example, disk fallow fields in the early spring to incorporate winter weeds before seed matures and while there is still soil moisture to produce clods.

Provide crop residues or a cover crop during critical periods to protect exposed fields.

Establish perennial vegetative cover on cropland converted to other uses.

Watering nut orchards before harvest can reduce dust and germinate reseeding annuals so young plants will reduce the amount of soil picked up by sweepers and harvesters.

After land leveling or re-leveling, the field should be irrigated or bedded as soon as possible and not left in a smooth dry condition.

Treat unpaved roads with water, chemicals, soil stabilizers, mulch, or other cover during harvest and other heavy use periods to reduce dust. Wet unpaved farm roads early enough that mud will not stick to tires and be carried onto paved roads.

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To reduce dust, check trucks with dual tires for clods between tires before going from the field onto a paved road.

Avoid turning tractors and implements on paved roads during critical periods if soil will be dropped on road, or if the use of paved roads cannot be avoided, clean pavement after tillage operation to reduce dust.

Control speed and access on unpaved roads.

Vegetate or keep surfaces on road shoulders stable to reduce dust.

Modify air temperature, air movement, and humidity to optimize its effect on the desired fauna and flora using windbreaks, wind fans, misters, irrigation, shade, or other cover.

Evaluate alternative waste treatment and waste utilization methods and timing to reduce the amount of odors and gases released from such sources as confined livestock, animal waste, and chemicals, especially in areas near urban and residential areas.

Evaluate fertilizer formulation, timing, and application amount to reduce emissions of ammonia and volatile organic compounds (VOCs) into the air. Incorporation of fertilizer immediately after application will also reduce emissions into the air.

Evaluate the use of newer, cleaner burning, more fuel efficient engines, and electric motors that will reduce emissions of NOx and particulate matter (PM) into the air. Also, evaluate the possibility of utilizing less cultural trips across a field and less horsepower usage for further air emission reductions.

Evaluate and encourage the utilization of latest technology farm equipment that would produce less NOx, VOCs, and PM emissions.

CONSIDERATIONS

Consider all federal, state, and local laws, rules, ordinances, regulations, and zoning or labeling restrictions that affect the control of airborne particles, odors, the use of chemicals, and other air quality factors.

Consider any unusual safety and health factors known to exist in the area such as silica particulates from burning rice straw, asbestos dust from serpentine sediments, dust from areas of soil containing fungus spores for Valley Fever, and seasonal high PM10 levels.

Plan aerial applications of pesticides and nutrients during periods of minimum potential for drift and consider alternatives that reduce or eliminate the hazard.

Dust/Particulate Matter

Evaluate agricultural operations and equipment that create dust, especially during critical air quality periods, in order to reduce or eliminate safety and health hazards and meet local or state requirements.

Smoke

Evaluate agricultural operations that create smoke, especially during critical air quality periods, in order to reduce or eliminate safety and health hazards and meet local, or state requirements.

Odor

Evaluate waste treatments and waste utilization methods to reduce the amount of odors and gases released from such sources as confined livestock, animal manure and other waste, chemicals, etc. especially in areas near urban and residential areas.

Greenhouse Gases

Evaluate agricultural operations, waste treatments and waste utilization methods to reduce the release of greenhouse gases to the atmosphere.

Ammonia Loss Reduction

Evaluate agricultural operations, waste treatments and waste utilization, and fertilizer application methods to reduce the release of ammonia to the atmosphere.

Ozone Precursors

Evaluate agricultural burning, fertilizer application methods, animal waste treatment and waste utilization methods, farm equipment engines and equipment, and stationary engines for opportunities to reduce the release of ozone precursors into the atmosphere.

Water Quantity

Use of water on roads prior to harvest and tillage to reduce dust and to clean clods off of equipment may increase the amount of water used.

Water Quality

This practice should slightly improve water quality by reducing deposition of airborne particles and chemical drift.

Endangered Species Considerations

Determine if installation of this practice with any others proposed will have any effect on any federal or state listed Rare, Threatened or Endangered species or their habitat. NRCS's objective is to benefit these species and others of concern or at least not have any adverse effect on a listed species. If the Environmental Evaluation indicates the action may adversely affect a listed species or result in adverse modification of habitat of listed species which has been determined to be critical habitat, NRCS will advise the land user of the requirements of the Endangered Species Act and recommend alternative conservation treatments that avoid the adverse effects. Further assistance will be provided only if the landowner selects one of the alternative conservation treatments for installation; or at the request of the landowner, NRCS may initiate consultation with the Fish and Wildlife Service, National Marine Fisheries Service and/or California Department of Fish and Game. If the Environmental Evaluation/Assessment indicates the action will not affect a listed species or result in adverse modification of critical habitat, consultation generally will not apply and usually would not be initiated. Document any special considerations for endangered species in the Practice Requirements Worksheet.

Some species are year-round residents in some streams, such as, freshwater shrimp. Other species, such as steelhead and salmon, utilize streams during various seasons. Be aware that during critical periods, such as spawning, eggs in gravels, and rearing of young may preclude activities in the stream that may directly affect the stream habitat during those periods. For example, there should be no disturbance of stream gravel beds that may have eggs in them. That could include any equipment in the stream or even walking in the stream or work upstream that may result in sediment depositing in the gravel beds. Document any special considerations for endangered species in the Practice Requirements Worksheet.

Cultural Resources Considerations

Determine if installation of this practice with any others proposed will have any effect on any cultural resources. NRCS's objective is to avoid any effect to cultural resources and protect them in their original location. GM 420, Part 401, the California Environmental Handbook and the training for the California Environmental Assessment Worksheet specify how the NRCS must account for cultural resources. The Field Office Technical Guide, Section II contains general information, with Web sites for additional information, about cultural resources. The Environmental Handbook is online at www.ca.nrcs.usda.gov/rts/rts.html.

PLANS AND SPECIFICATIONS

Plans and specifications are to be prepared for specific field sites based on this standard. Specifications will be listed separately to address dust management, smoke management, odor management, greenhouse gases, ozone, and ammonia loss reduction. Plan narratives or job sheets will address identified air resource problems to meet air quality and condition criteria.

The location of all supporting practices used will be shown on the drawings or conservation plan map.

Specifications will identify all supporting practices. Specifications for each supporting practice will be developed as addendums to this standard. All specifications will be consistent with federal, state, and local regulations.

OPERATION AND MAINTENANCE

The conservation plan should include operation and maintenance items needed to continue treatment of air related problems.

The plan will identify known safety and health hazards and planned measures to prevent bodily injury or damage. Operators should be aware of all safety hazards and follow the plan to avoid bodily injury and unnecessary exposure to air related hazards. Where applicable, identify locations to place warning devices or notices to warn of safety hazards.

REFERENCES

1. Dust/PM:
   - Interim Report, Sources and Sinks of PM10 in the San Joaquin Valley, Flocchini, James,et. al., Air Quality Group, Crocker Nuclear Laboratory, University of California, Davis, California, August 10, 2001.

- Effectiveness Demonstration of Fugitive Dust Control Methods for Public Unpaved Roads and Unpaved Shoulders on Paved Roads, DRI Document No. 685-5200.1F1, Watson, Chow, et. al., Desert Research Institute, Reno, Nevada, December 31, 1996.
- Evaluation of the Emission of PM10 Particulates from Unpaved Roads in the San Joaquin Valley, Flocchini, Cahill, et. al., Air Quality Group, Crocker Nuclear Laboratory, University of California, Davis, California, April, 1994.

2. Smoke:
   - Atmospheric Emissions from Agricultural Burning in California, Jenkins, Turn and Williams, University of California, Davis, California, July, 1991.
   - Atmospheric Pollutant Emission Factors from Open Burning of Agricultural and Forest Biomass by Wind Tunnel Simulations, B.M. Jenkins, University of California, Davis, California, April, 1996.

3. Odor and Ozone:
   - Emissions from Animal Feeding Operations, Draft, Emission Standards Division, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina, August 15, 2001.
   - Statewide Inventory Estimates of Ammonia Emissions from Native Soils and Chemical Fertilizers in California, Potter, Krauter, Klooster, California State University Fresno, Fresno, California, June 30, 2001.
   - The Carl Moyer Memorial Air Quality Standards Attainment Program Guidelines, California Environmental Protection Agency, Air Resources Board, November 16, 2000.

4. Greenhouse Gases:
   - Emission and Reduction of Greenhouse Gases from Agriculture and Food Manufacturing, U.S. Dept of Energy, Office of Energy Efficiency and Renewable Energy, December 1999.

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATION

705F – AIR MANAGEMENT- OZONE

I. SCOPE

The work shall consist of modifying agricultural and management operations to reduce the amount of ozone precursors, volatile organic compounds (VOC) and oxides of nitrogen (NOx), generated by agricultural operations.

Ozone is harmful to both human health and vegetation. Ozone in the lower atmosphere is formed when volatile organic compounds (VOC) and oxides of nitrogen (NOx) react in the presence of sunlight. (VOC + NOx + sunlight → O3 ozone). Reductions in VOCs and/or NOx will reduce the formation of ozone.

Agricultural practices such as burning of agricultural wastes, application of pesticides, and storage and application of livestock manure contribute to VOC levels in the atmosphere. Agricultural practices that contribute to increased levels of NOx are agricultural burning, the use of certain farm equipment, and stationary and mobile agricultural engines.

II. GENERAL

Agricultural operations shall be performed as specified on the Practice Requirements Sheet, with emphasis during critical air periods.

The landowner will be responsible for acquiring and following all necessary local, state, and federal permits.

III. OZONE PRECURSOR MANAGEMENT

A. Volatile Organic Compounds.

1. Agricultural Burning

When removing orchards or vineyards, activities in lieu of burning should be considered. Options include but are not limited to chipping/shredding, use of vegetative matter for biofuels (e.g. used as fuel for electrical generation or used in the manufacture of ethanol), composting, or placement of chips on unpaved roads for dust control.

When pruning orchards or vineyards, activities in lieu of burning should be considered. Options include chipping/shredding, incorporating chips into the soil for soil amendment, placement of chips on unpaved roads to reduce dust, composting, and/or biofuel usage.

In lieu of burning crop residue after harvest, other options include baling/removal, crop residue incorporation into the soil, and use of residue as a biofuel.

If there are no options available except to burn, considerations to minimize adverse effects include: vegetative management, proper timing of ignition, proper preparation prior to ignition, fuel type, following safety precautions, and following all guidance and recommendations on any burn permit.

Acceptable alternative disposal methods to burning of combustible materials such as trays, bags, and sacks should be pursued.

2. Pesticide/Fertilizer Application

In an effort to reduce the emission of VOCs into the atmosphere the following activities can be carried out.

When applying a pesticide to a crop, utilize a pesticide formulation that has a lower VOC emission. The lower the VOC emission factor (EF) the less VOC that is released into the atmosphere. As a guide, the VOC emission factors listed in Table 1 can be utilized.

Utilization of Integrated Pest Management (IPM) can include certain reductions in the amount of pesticides used. Implementing IPM practices will utilize the least amount of pesticides while controlling pests.

Utilizing organic cropping practices will provide the greatest reduction of pesticide applications and provide the largest reduction in VOC volatilization when compared to previous higher pesticide application cultural practices.

Proper timing of pesticide applications to increase efficacy may also reduce additional pesticide applications.

Utilize lower pesticide application rates. Utilization of pest control advisors and adoption of new technologies (e.g. new application equipment, new application methods, and new capture systems) can reduce VOC emissions.

TABLE 1. VOC Emission Factors for Various Pesticide Formulations

FORMULATION CATEGORY 1/	SYMBOL	DEFAULT VOC EF (%)
Pressurized Gases	PG	100.0
Pressurized Liquids	PL	100.0
Solution/Liquids	SL	99.9
Emulsified Concentrates	EC	98.7
Aqueous Concentrates	AC	97.3
Flowable Concentrates	FC	95.8
Pressurized Dusts	PD	64.0
Dust/Powders	DP	59.7
Granular/Flakes	GF	20.3
Aqueous Suspensions	AS	9.4
Wettable Powder	WP	9.2
Pellets/Tablets	PT	8.2
Microencapsulated	ME	6.9
Dry Flowables	DF	5.8
Soluble Powders	SP	5.3
Oils	OI	3.9

1/ California Department of Pesticide Regulations (DPR), "Reducing Volatile Organic Compound Emissions from Agricultural and Commercial Structural Use of Pesticides," February 3, 1998 Workshop.

3. Livestock Waste Management

In an effort to reduce the emission of VOCs into the atmosphere the following alternatives can be evaluated and appropriate practices can be implemented.

a. VOCs will be emitted during and following land application of animal manure. The magnitude of these emissions depends upon: 1. The method of application, and 2. The time of direct exposure of the applied manure to the atmosphere. Proper amounts and rates of manure should be applied based upon crop and soil nutrient levels required.

- Solid manure can be applied to soil surfaces. Incorporation of the manure shall be performed immediately after application.
- Liquid manure and slurry can either be applied to the soil surface or injected into the soil. Reducing the surface area of manure exposed to the atmosphere during and after spreading will reduce the VOC emissions. Manure injected directly into the soil and band spreading of the manure will reduce emissions. Incorporation of the manure shall be performed immediately, or as soon as possible after application.

b. Proper corral management can reduce the emission of VOCs. Techniques that facilitate faster drying of the manure such as proper corral grading for drainage and more frequent removal of manure from the corrals with field disposal are beneficial.

c. Animal waste stockpiles can be a source of VOC emissions. Elimination of manure stockpiles, reducing the duration of time the manure is held in stockpiles, and covering the stockpiles will reduce emissions.

d. Proper composting of manure can reduce VOC emission. Use of a sufficiently high initial carbon to nitrogen ratio in the compost material (eg: adding straw) will minimize emissions. Compost piles must be either aerated continuously or turned periodically (typically daily) to ensure a predominantly aerobic condition to minimize emissions.

e. Artificial aeration of animal waste lagoons can reduce emission of VOCs. The entire lagoon must be managed in an aerobic state. High utility cost must be evaluated since this practice is energy intensive. In addition, the kinds and amounts of emissions produced by the engine/pump used for aeration should be considered.

f. Anaerobic management of a waste lagoon will require a cover over the lagoon to reduce VOC emissions. Various types of covers can be utilized for capture of atmospheric emissions. Permanent self-supporting covers and covers supported by the manure surface (i.e. floating covers) can be utlilized. These covers must be sealed to prevent emissions to the

atmosphere. Collected gases can be sent to a combustion device such as a flare, or can be utilized as a fuel for powering an electric generator. Care must be taken to restrict VOC emissions when the cover is removed and during land application of the stabilized manure to reduce emissions.

g. An anaerobic digester can be utilized for emission reductions. This closed reactor (tank) is heated and mixed to optimize production of methane from the anaerobic digestion process. VOC emissions are not released to the atmosphere from this process. Proper composting or land application of the stabilized manure must occur after the digestion process has been completed.

B. Oxides of Nitrogen (NOx)

a. Agricultural Burning

Practices that eliminate or reduce burning should be utilized when removing orchards or vineyards, when handling agricultural prunings, and when handling agricultural crop residues. Options for handling these residues include chipping/shredding, soil incorporation, composting, use for biofuels, and use for dust reduction on unpaved roads.

If there is not a non-burning alternative practical, considerations to minimize adverse atmospheric emissions must be taken. Appropriate alternatives can include: proper vegetative management (stacking and drying), proper timing of the burn, proper preparation prior to ignition, and consideration on the fuel type. Safety precautions and all guidance requirements on burning permits must be followed.

b. Farm Equipment

In order to reduce NOx emissions from farm equipment engines, the following activities can be carried out.

Use of latest technology farm equipment will produce fewer NOx, PM, and VOC emissions.

Replacement of older engines with newer cleaner burning, more fuel-efficient engines, or retrofitting old engines with emissions filters and catalysts reduces emissions. On stationary engines such as irrigation pumps, evaluate the feasibility of participating in a replacement/retrofit program with a local air district, state air board, or federal agency.

Utilization of cleaner burning fuels and certain fuel additives will reduce NOx emissions into the atmosphere. Fuels such as natural gas, compressed natural gas, biodiesel, electric, and reformulated low sulfur diesel fuel can be utilized.

Utilization of various conservation tillage practices can reduce the number of required tillage passes across a field. Reducing the number of trips across the field also has the advantage of producing less PM-10 emitted into the air as well as less fuel usage. Economic benefit of conservation or reduced tillage to the grower can also be achieved with less time required, less fuel required, and less basic horsepower required to cultivate an acre of ground.

Utilize the least engine horsepower required to get the job done. Alternative conservation practices and alternative equipment usage may also make it possible to reduce fuels usage.

IV. TEMPERATURE MODIFICATION

The use of wind fans, misters, irrigation, and other measures to modify air temperature shall be performed when specified on the Practice Requirements sheet.

V. HUMIDITY MODIFICATION

The use of misters, irrigation, and other measures to modify humidity shall be performed when specified on the Practice Requirements sheet.

VI. AIR MOVEMENT MODIFICATION

The use of windbreaks, herbaceous wind barriers, and other measures to modify wind movement shall be performed when specified on the Practice Requirements sheet.

VII. OTHER REQUIREMENTS

The owner, operator, contractor, and other persons shall conduct all work and operations in accordance with proper safety codes for the type of equipment and operations being performed with due regard to the safety of all persons and their property.

Workers shall be provided with protective breathing equipment to minimize exposure to air related hazards.

Other conservation practices might be appropriate to use in conjunction with this practice such as: residue management, nutrient management, composting, pest management, and waste management system.

The work shall be performed in compliance with all federal, state, and local laws, rules, and regulations affecting the control of airborne gases and particulate emissions.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
CALIFORNIA

PRACTICE REQUIREMENTS
FOR
705F – AIR MANAGEMENT - OZONE

For: Business Name_____

Job Location_____

County_____ RCD_____ Farm/Tract No._____

Referral No._____Prepared By_____ Date_____

IT SHALL BE THE RESPONSIBILITY OF THE OWNER TO OBTAIN ALL NECESSARY PERMITS AND/OR RIGHTS, AND TO COMPLY WITH ALL ORDINANCES AND LAWS PERTAINING TO THIS INSTALLATION.

Installation shall be in accordance with the following drawings, specifications and special requirements. NO CHANGES ARE TO BE MADE IN THE DRAWINGS OR SPECIFICATIONS WITHOUT PRIOR APPROVAL OF THE NRCS CONSERVATIONIST OR TECHNICIAN.

1. Drawings, No._____, _____, _____
2. Practice Specifications____705F___, _____, _____
3. Burning Specifications_____

_____

_____

4. Tillage Operations and Restrictions_____

_____

_____

5. Fertilizer Application (Type, Timing, and Rate):_____

_____

6. Manure Management (Lagoon, Land Application and Corral Management):_____

_____

_____

_____

_____

7. Pesticide Application (Type, Timing and Rate):_____

_____

_____

8. Farm Equipment (Type, Hours of Use, NOx Emissions)_____

_____

_____

_____

9. Other/Special Requirements:_____

_____

_____

PRACTICE APPROVAL:

Job Classification (as applicable, Reference: Section 501 National Engineering Manual):

Show the limiting elements for this job.

Limiting elements:	Units
_____	_____
_____	_____

Approved by: /s/_____ Date:_____

LANDOWNER'S/OPERATOR'S ACKNOWLEDGEMENT:

The landowner/operator acknowledges that:

a. He/she has received a copy of the drawings and specifications, and that he/she has an understanding of the contents, and the requirements.

b. He/she has obtained all the necessary permits.

c. No changes will be made in the installation of the job without prior concurrence of the NRCS conservationist or technician.

d. Maintenance of the installed work is necessary for proper performance during the project life.

Accepted by: /s/_____ Date:_____

PRACTICE COMPLETION:

I have made an on site inspection of the site (or I am accepting owner/contractor documentation), and have determined that the job as installed does conform to the drawings and practice specifications.

Completion Certification by:

/s/_____ Date _____

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

PUMPING PLANT FOR WATER CONTROL

(No.)
CODE 533

DEFINITION

A pumping facility installed to transfer water for a conservation need, including removing excess surface or ground water; filling ponds, ditches or wetlands; or pumping from wells, ponds, streams, and other sources.

PURPOSES

To provide a dependable water source or disposal facility for water management on wetlands or to provide a water supply for such purposes as irrigation, recreation, livestock, or wildlife.

CONDITIONS WHERE PRACTICE APPLIES

Wherever water must be pumped to accomplish a conservation objective. It is especially applicable for maintaining critical water levels in existing swamps, marshes, or open water and for providing water sources for newly constructed wetlands and ponds.

CRITERIA

The efficiency of units, type of power, quality of building, automation, and accessories installed shall be in keeping with the value and importance of the system, shall accomplish the conservation and environmental objectives.

Pump requirements

The capabilities, range of operating lifts, and general class and efficiency of equipment shall be determined from appropriate technical studies. The size and number of pumps and their performance requirements shall be determined on the basis of the conservation requirements of the system. The total head shall be determined for critical operating conditions, taking into account all hydraulic losses. Automatic controls shall be included in the plans as required.

Power units

The power units shall be selected on the basis of costs, operating conditions, conservation needs, and objectives, including need for automation. The power unit shall be matched to the pump and be capable of operating the pump effectively within the range of operating conditions. The horsepower requirements, pump efficiency, and total head on the pump shall be computed.

Pump engines shall meet current NOx standards for stationary agricultural engines to comply with applicable air quality regulations.

Suction and discharge pipes

The size of suction and discharge pipes shall be based on studies of efficiencies and effects on costs and operations. The arrangement and length of discharge pipe shall be based on the need for recovery of head through symphonic action, and for delivery of water in keeping with conservation and environmental objectives. Gates, valves, pipe connections, discharge bays, and other protective works shall be installed, as needed, for satisfactory plant operation.

Building and accessories

The design of the plant and associated housing, if required, shall consider the need for protecting equipment from the elements, malicious damage, and fire and the need for equipment maintenance and repairs. The appearance of the plant shall be in keeping with its surrounding environment and its importance or value

The foundations shall be designed to safely support the loads imposed. Sheet piling or other measures shall be used, as required, to prevent piping beneath the foundation.

Pumps may be mounted in the open, on piling, or in well or pit.

Suction bays (or sumps) shall be designed to conform to the hydraulic characteristics established by the pump manufacturer.

The discharge bay or connection with distribution system shall be ample to meet hydraulic and structural requirements. Provisions for repair or removal of pumps and engines shall be provided. Trash racks shall be provided, as needed, to exclude debris and trash from the pump.

All structural features and equipment shall provide adequate safety features to protect workers and public against injury.

CONSIDERATIONS

Water Quantity

1. Effects of the pumping plant on upstream and downstream quantity.

Water Quality

1. Sediment production caused by erosion during construction.
2. Possible effects on surface and ground water of spilled fuels and lubricants used to operate and maintain the facility.

Air Quality

The installation and operation of the pumping plant will utilize reduced emission technologies to minimize negative impacts to air quality.

Endangered Species Considerations

Determine if installation of this practice with any others proposed will have any effect on any federal or state listed Rare, Threatened or Endangered species or their habitat. NRCS's objective is to benefit these species and others of concern or at least not have any adverse effect on a listed species. If the Environmental Evaluation indicates the action may adversely affect a listed species or result in adverse modification of habitat of listed species which has been determined to be critical habitat, NRCS will advise the land user of the requirements of the Endangered Species Act and recommend alternative conservation treatments that avoid the adverse effects. Further assistance will be provided only if the landowner selects one of the alternative conservation treatments for installation; or at the request of the landowners, NRCS may initiate consultation with the Fish and Wildlife Service, National Marine Fisheries Service and/or California Department of Fish and Game. If the Environmental Evaluation/Assessment indicates the action will not affect a listed species or result in adverse modification of critical habitat, consultation generally will not apply and usually would not be initiated. Document any special considerations for endangered species in the Practice Requirements Worksheet.

Some species are year-round residents in some streams, such as, freshwater shrimp. Other species, such as steelhead and salmon, utilize streams during various seasons. Be aware that during critical periods, such as spawning, eggs in gravels, and rearing of young may preclude activities in the stream that may directly affect the stream habitat during those periods. For example, there should be no disturbance of stream gravel beds that may have eggs in them. That could include any equipment in the stream or even walking in the stream or work upstream that may result in sediment depositing in the gravel beds. Document any special considerations for endangered species in the Practice Requirements Worksheet.

Cultural Resources Considerations

Determine if installation of this practice with any others proposed will have any effect on any cultural resources. NRCS's objective is to avoid any effect to cultural resources and protect them in their original location. GM 420, Part 401, the California Environmental Handbook and the training for the California Environmental Assessment Worksheet specify how the NRCS must account for cultural resources. The Field Office Technical Guide, Section II contains general information, with Web sites for additional information, about cultural resources. The Environmental Handbook is online at www.ca.nrcs.usda.gov/rts/rts.html.

PLANS AND SPECIFICATIONS

Plans and specifications for constructing pumping plants for water control shall be in keeping with this standard and shall describe the requirements for properly installing the practice to achieve its intended purpose.

OPERATION AND MAINTENANCE

An operation and maintenance plan must be prepared by the Designer for use by the owner or other responsible for operating this practice. The plan should provide specific instructions for operating and maintaining the system to insure that it functions properly. It should also provide for periodic inspections and prompt repair or replacement of damage components.

REFERENCES

NRCS National Handbook of Conservation Practices, 533 Practice Standard, October 1977.

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATION

533A - PUMPING PLANT FOR WATER CONTROL, AIR QUALITY - EMISSION REDUCTIONS

I. SCOPE

The work shall consist of replacing or retrofitting older stationary agricultural diesel irrigation pump engines with newer diesel, electric, natural gas, or propane burning engines in order to reduce emissions of particulate matter and ozone precursors such as oxides of nitrogen (NOx). The replaced diesel engine must be of at least 50 horsepower or more. Newer stationary replacement engines and motors must meet current state and federal standards and guidelines for NOx and particulate matter emissions.

II. GENERAL

Stationary agricultural diesel irrigation pump engines are considered a seasonal source of NOx and particulate matter (PM) emissions because these engines operate mostly during the primary crop growing period (spring and summer months). These periods of high utilization coincide with the summer ozone season, underscoring the need to reduce NOx emissions. Replacing old diesel irrigation pump engines with newer lower emitting State-certified diesel engines or with engines that utilize cleaner burning fuels (propane and natural gas) can substantially reduce NOx and PM emissions. Replacement of the older diesel with an electric motor can eliminate these air emissions. The widespread use of these lower-emitting heavy-duty pump engines and motors will provide significant improvements for air quality in California and assist in the attainment of federal and state air quality standards.

III. CRITERA

All NOx reductions must be certifiable by the California Environmental Protection Agency (CalEPA) Air Resources Board (ARB) for the benefit of local Air Districts' State Implementation Plans (SIP), for reductions covered under Title V of the Clean Air Act, and for the benefit of the growers. All projects must produce at least a 15% reduction in NOx emission and no increase in particulate matter emission compared to the older diesel engine being replaced. Applicable standards and emission levels for that engine year and type of application will be utilized. All engine emission standard certification levels must have been approved through ARB certification testing, through US Environmental Protection Agency (EPA) certification testing, or through emission testing at a laboratory approved by US EPA or ARB.

Table I, titled "Title V - Irrigation Pump Emissions Calculations" shall be used to estimate emission reductions in tons NOx per year.

IV. DISPOSAL OF REPLACED ENGINE

All replaced engines will not be allowed to be resold. These engines must be made inoperable by:

1. Growers and their engine dealer must provide written certification in the form of a receipt for the engine disposal from a scrap metal recycling operation, or
2. Growers and their engine dealer must permanently disable the engine by punching a hole through the engine block (minimum size to be determined by the ARB) and certifying that this process has been completed.

V. PERFORMANCE AND MAINTENANCE REPORTS

Records must be retained and updated for six years from the beginning of engine operation with the new reduced emission technology. Annual records must contain, at a minimum, total actual hours operated, or estimated amount of fuel used. The objective of keeping records is to determine engine usage and resulting NOx emissions. The reports shall also include such information as energy usage (e.g. for electric engines) and details regarding maintenance.

REFERENCES

California EPA Air Resources Board. The Carl Moyer Memorial Air Quality Standards Attainment Program Guidelines. November 16, 2000.

Table 1
Title V - Irrigation Pump Emissions Calculations
(tons NOx per year)

NOx = 13 g/bhp-hr (pre-1987 15 to 120 hp)

Hours per year

Hp	200	400	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200
50	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
100	0.2	0.4	0.6	0.7	0.9	1.1	1.3	1.5	1.7	1.9	2.0	2.2	2.4	2.6	2.8	3.0

NOx = 11 g/bhp/hr (pre-1987>120 hp)

Hours per year

Hp	200	400	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200
150	0.2	0.5	0.7	0.9	1.2	1.4	1.7	1.9	2.1	2.4	2.6	2.8	3.1	3.3	3.5	3.8
200	0.3	0.6	0.9	1.3	1.6	1.9	2.2	2.5	2.8	3.2	3.5	3.8	4.1	4.4	4.7	5.0
250	0.4	0.8	1.2	1.6	2.0	2.4	2.8	3.2	3.5	3.9	4.3	4.7	5.1	5.5	5.9	6.3
300	0.5	0.9	1.4	1.9	2.4	2.8	3.3	3.8	4.3	4.7	5.2	5.7	6.1	6.6	7.1	7.6
350	0.6	1.1	1.7	2.2	2.8	3.3	3.9	4.4	5.0	5.5	6.1	6.6	7.2	7.7	8.3	8.8
400	0.6	1.3	1.9	2.5	3.2	3.8	4.4	5.0	5.7	6.3	6.9	7.6	8.2	8.8	9.5	**10.1**
450	0.7	1.4	2.1	2.8	3.5	4.3	5.0	5.7	6.4	7.1	7.8	8.5	9.2	9.9	**10.6**	**11.4**
500	0.8	1.6	2.4	3.2	3.9	4.7	5.5	6.3	7.1	7.9	8.7	9.5	**10.2**	**11.0**	**11.8**	**12.6**

NOx= 8.7 g/bhp-hr (1988 to 1995)

Hours per year

Hp	200	400	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200
50	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.6	0.6	0.7	0.7	0.8	0.9	0.9	1.0
100	0.1	0.2	0.4	0.5	0.6	0.7	0.9	1.0	1.1	1.2	1.4	1.5	1.6	1.7	1.9	2.0
150	0.2	0.4	0.6	0.7	0.9	1.1	1.3	1.5	1.7	1.9	2.1	2.2	2.4	2.6	2.8	3.0
200	0.2	0.5	0.7	1.0	1.2	1.5	1.7	2.0	2.2	2.5	2.7	3.0	3.2	3.5	3.7	4.0
250	0.3	0.6	0.9	1.2	1.6	1.9	2.2	2.5	2.8	3.1	3.4	3.7	4.1	4.4	4.7	5.0
300	0.4	0.7	1.1	1.5	1.9	2.2	2.6	3.0	3.4	3.7	4.1	4.5	4.9	5.2	5.6	6.0
350	0.4	0.9	1.3	1.7	2.2	2.6	3.1	3.5	3.9	4.4	4.8	5.2	5.7	6.1	6.5	7.0
400	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0
450	0.6	1.1	1.7	2.2	2.8	3.4	3.9	4.5	5.1	5.6	6.2	6.7	7.3	7.9	8.4	9.0
500	.6	1.2	1.9	2.5	3.1	3.7	4.4	5.0	5.6	6.2	6.9	7.5	8.1	8.7	9.4	**10.**

NOx= 6.9 g/bhp-hr (1996 or later)

Hours per year

Hp	200	400	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200
50	0.0	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.8
100	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6
150	0.1	0.3	0.4	0.6	0.7	0.9	1.0	1.2	1.3	1.5	1.6	1.8	1.9	2.1	2.2	2.4
200	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.2
250	0.2	0.5	0.7	1.0	1.2	1.5	1.7	2.0	2.2	2.5	2.7	3.0	3.2	3.5	3.7	4.0
300	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3..9	4.2	4.5	4.7
350	0.3	0.7	1.0	1.4	1.7	2.1	2.4	2.8	3.1	3.5	3.8	4.2	4.5	4.8	5.2	5.5
400	0.4	0.8	1.2	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4	4.7	5.1	5.5	5.9	6.3
450	0.4	0.9	1.3	1.8	2.2	2.7	3.1	3.6	4.0	4.5	4.9	5.3	5.8	6.2	6.7	7.1
500	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	4.9	5.4	5.9	6.4	6.9	7.4	7.9

U.S DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
CALIFORNIA

PRACTICE REQUIREMENTS
FOR
533A - PUMPING PLANT FOR WATER CONTROL
AIR QUALITY - EMISSION REDUCTIONS

For: Business Name_____

Job Location_____

County_____ RCD_____ Farm/Tract No._____

Referral No._____ Prepared By_____ Date_____

IT SHALL BE THE RESPONSIBILITY OF THE OWNER TO OBTAIN ALL NECESSARY PERMITS AND/OR RIGHTS, AND TO COMPLY WITH ALL ORDINANCES AND LAWS PERTAINING TO THIS INSTALLATION.

Installation shall be in accordance with the following drawings, specifications and special requirements. NO CHANGES ARE TO BE MADE IN THE DRAWINGS OR SPECIFICATIONS WITHOUT PRIOR APPROVAL OF THE NRCS TECHNICIAN.

1. Drawings, No._____ _____ _____

2. Practice Specifications_____,_____,_____

3. Special Requirements:_____

_____

_____

_____

_____

_____

_____

4. Special Maintenance Requirements: _____

_____

_____

PRACTICE APPROVAL:

Job Classification: (Ref: Section 501 NEM)

Show the limiting elements for this job. This job is classified as, Class _____

Limiting elements:	Units
Flow_____ _____	_____(gpm)
_____ _____	_____
_____	_____
_____	_____

Design Approved by: _____ Date: _____

LANDOWNER'S/OPERATOR'S ACKNOWLEDGEMENT:

The landowner/operator acknowledges that:

a. He/she has received a copy of the construction drawings and specification, and that he/she has an understanding of the contents, and the requirements.

b. He/she has obtained all the necessary permits.

c. No changes will be made in the installation of the job without prior concurrence of the NRCS technician.

d. Maintenance of the installed work is necessary for proper performance during the project life.

Accepted by: _____ Date: _____

PRACTICE COMPLETION:

I have made an on site inspection of the site (or I am accepting owner/contractor documentation), and have determined that the job as installed does conform to the drawings and practice specifications.

Completion Certification by:

/s/_____ Date _____