M60050.000477
MCAS EL TORO
SSIC # 5090.3

Department of Toxic Substances Control

Edwin F. Lowry, Director
5796 Corporate Avenue
Cypress, California 90630

Winston H. Hickox
Agency Secretary
California Environmental
Protection Agency

Gray Davis
Governor

March 2, 2000

Mr. Dean Gould
BRAC Environmental Coordinator
Marine Corps Air Station El Toro
BRAC Operations Office
1220 Pacific Highway
San Diego, California 92132-5190

REQUEST FOR IDENTIFICATION OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) FOR REMEDIATION OF SOIL AND GROUNDWATER ASSOCIATED WITH OPERATIONAL UNIT (OU) 3B, INSTALLATION RESTORATION PROGRAM (IRP) SITE 16 - CRASH CREW TRAINING PIT NO. 2, MARINE CORPS AIR STATION (MCAS) EL TORO

Dear Mr. Gould:

The Department of Toxic Substances Control (DTSC) received the above request dated January 14, 2000 on January 19, 2000 to identify potential State chemical, location, and action-specific ARARs for a potential Remedial Action at IRP Site 16 as referenced above. The letter included a list of 11 tentative remedial alternatives.

In response, DTSC is enclosing potential State ARARs from the following sources:

- ✓Enclosure 1: State ARARs (General List)
- ✓Enclosure 2: DTSC
- ✓Enclosure 3: California Air Resources Board
- ✓Enclosure 4: Department of Health Services
- ✓Enclosure 5: South Coast Air Quality Management District
- ✓Enclosure 6: MCAS El Toro Master Development Program

Additional responses from the remaining agencies will be forwarded upon receipt by DTSC. The ARAR analysis is an iterative process. As the alternatives are more fully developed in the Feasibility Study, additional ARARs may become apparent.

If you have any questions, please contact me at (714) 484-5395.

Sincerely,

Triss M. Chesney

Triss M. Chesney, P.E.
Remedial Project Manager
Southern California Branch
Office of Military Facilities

Enclosures

cc: Mr. Glenn Kistner
Remedial Project Manager
U. S. Environmental Protection Agency Region IX
Superfund Division (SFD-8-2)
75 Hawthorne Street
San Francisco, California 94105-3901

Ms. Patricia Hannon
Remedial Project Manager
California Regional Water Quality Control Board
Santa Ana Region
3737 Main Street, Suite 500
Riverside, California 92501-3339

Mr. Gregory F. Hurley
Restoration Advisory Board Co-chair
620 Newport Center Drive, Suite 450
Newport Beach, California 92660-8019

Ms. Polin Modanlou
MCAS El Toro Local Redevelopment Authority
10 Civic Center Plaza, 2nd Floor
Santa Ana, California 92703

ENCLOSURE 1

STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Requirement	Citation	Description
Air Resources Act	H&S Code, Div. 26, § 3900 et seq.	Regulates both nonvehicular and vehicular sources of air contaminants in California. Defines relationship of the California Air Resource Board (ARB) and local regional air pollution control districts (APCD). Establishes Ambient Air Quality Standards. Establishes permit procedures.
Mulford Carrett Air	H&S Code, Div. 26, Sec. 39000-44563, CCR Title 17, Part 111	Establishes Ambient Air Quality Standards. Regulates both vehicular and nonvehicular sources of air contaminants in California. Section 93000 also identifies benzene and hexavalent chromium as toxic air contaminants
California Safe Drinking Water Act	H&S Code, Div. 5, Part 1, Chapter 7, Sec. 4010 et seq.	Regulations governing public water systems. Drinking Water Quality standards - Maximum Contaminant Levels (SMCLs). Requirements for water quality analysis and Laboratories.
Porter Cologne Water Quality Control	Water Code, Div.	Establishes authority of the State and Regional Water Boards to protect water quality by regulating waste disposal and by requiring cleanup of hazardous conditions.
Santa Ana Regional Water Quality Control Board		Allowable treated water emissions are determined based on DHS action levels and best available technology (BAT).
Santa Ana Regional Water Quality Control Board	Water Quality Control Plan, Santa Ana River Basin	The objective of this plan is to show how the quality of surface and groundwater in the Santa Ana Region can be controlled to provide maximum benefit.
	Water Quality Objectives	Promulgated criteria setting chemical specific concentration levels for a variety of uses of specific bodies of water. Based on the beneficial uses of specific water bodies.
Central Valley RWQCB Designated Level of Methodology for Waste Classification and Cleanup Level Determination		This guidance document is in the tentative stage of development for use in the classification and subsequent disposal method of both hazardous and non-hazardous wastes.
Hazardous Waste Control Act	H&S Code, Div. 20, Chapter 6.5, §25100 et seq.	Regulations governing hazardous waste control; management and control of hazardous waste facilities; classification of extremely hazardous, and non-hazardous waste.
Environmental Health Standards for the Management of Hazardous Waste	CCR, Title 22, Division 4.5, Chapters 10-44	As administered by the Department of Toxics Substances Control.

STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Requirement	Citation	Description
Criteria for identifying and listing Hazardous Waste	Title 22, Chapter 11, §§ 66261.1- 66261.126	Tests for identifying hazardous characteristics are described in these Sections. If a chemical is either listed or tested and found hazardous, then it must comply with the hazardous waste requirements under Title 22.
Persistent and Bioaccumulative Toxic Substances	Title 22, § 66261.113	Total Threshold Limit Concentrations (TTLC's) and Soluble Threshold Limit Concentrations (STLCs) have been established of selected toxics to be used in establishing whether waste is hazardous. If a chemical is either listed or tested and found hazardous, then it must comply with the hazardous waste requirements under Title 22.
Standards applicable to generators of hazardous waste	22 CCR, Div. 4.5, Chapter 12, §§ 66262.10-66262.70	Establishes standards for generators of hazardous waste in California: Applicability, manifests, pre-transportation, record keeping and reporting.
Standards applicable to transporters	22 CCR, Div. 4.5, Chapter 13, §§ 66263.10-66263.46	Establishes standards for transporters of hazardous waste: General requirements and compliance with manifest system and record keeping.
Standard for owners and operators of hazardous waste transfer, treatment storage and disposal facilities	22 CCR, Div. 4.5, Chapter 14, §§66264.1-66264.801	Establishes criteria and standards for operation of TSD facilities including: general standards, water quality monitoring and response programs, closure and postclosure, use and management of containers, tank systems, surface impoundments, waste piles, land treatment, landfills, incinerators, miscellaneous units, environmental monitoring and response programs for air, soil, and soil-pore gas, corrective action forsolid waste management units.
Interim status standards for owners and operators of hazardous waste transfer treatment, storage and disposal facilities	22 CCR, Div. 4.5, Chapter 14, §§66265.1-66265.714	Establishes criteria and standards for operation of Interim Status TSD facilities including: general standards, water quality monitoring and response programs, closure and and postclosure, use and management of containers, tank systems, surface impoundments, waste piles, land treatment, incinerators, thermal treatment, chemical, physical and biological treatment, environmental monitoring of air and soil-pore gas.
Recyclable hazardous waste	22 CCR, Div. 4.5, Chapter 16, §§66266.1-66266.120	Establishes requirements for the management of recyclable hazardous waste: general (list), generator, transporter, and facility operator, hazardous waste and certain used oils regulated as hazardous waste fuels, used oil, spent lead-acid batteries, elemental mercury
Land disposal restrictions	22 CCR, Div. 4.5, Chapter 18, §§66268.1-66268.124	Establishes applicability standards and prohibition for land disposal: Schedule for land prohibition and establishment of treatment standards, prohibitions on storage, land disposal prohibitions non-RCRA, treatment standards non-RCRA waste categories, incineration requirements of certain hazardous waste.

STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Requirement	Citation	Description
Transportable treatment units	22 CCR, Div. 4.5, Chapter 45, §§67450-67786	Establishes requirements and standards for transportable treatment units
Safe Drinking Water and Toxic Enforcement Act	H&S Code, Div. 20 Chapter 6.6 § 25249.5 et seq.	Prohibition on contaminating drinking water with specific carcinogens and reproductive toxics.
California Integrated Waste Management Board Act of 1989	Assembly Bill 939	The Act gives authority to the California Integrated Waste Management Board to adopt rules and regulations to carry out Division 30 of the Public Resources Code.
	14 CCR, Div. 7	Requirements planning, permiting, design, operation, environmental control, enforcement, closure and reuse of solid waste disposal facilities including solid waste landfills.
Fish and Game Regulations on Pollution	Fish and Game Code, Div. 6, Part 1, Chapter 2, Sec. 5650 et seq.	Codifies the prohibition of water pollution with any substance or material deleterious to fish, plant or bird life.
State Action Levels	DHS Criteria	Criteria setting chemical specific concentration levels. Numerical limits are designed to protect human health from chemical constituents in drinking water. Recommended acceptable limits.
Hazardous Waste Control Act	H&S Code, Sec. 25100-25395, CCR Title 22, Div. 4.5	Environmental standards for Management of Hazardous and Extremely Hazardous Wastes. The HWCA has many elements that are intended to control hazardous wastes form their point of generation through accumulation, transportation, treatment, storage, and ultimate disposal.
CA "Super Fund" Law - Hazardous Substances Account Act/Hazardous Substances Cleanup Bond Act	H&S Code, Div. 20, Chapter 6.8, § 25300 et seq.	Establishes state authority to clean up hazardous substance release and compensate persons injured by exposure to hazardous substances. Created a $100 million Hazardous Substances Cleanup fund to supplement the hazardous Substances Account.
Toxic Pits Cleanup Act	H&S Code, Div. 5, § 6300 et seq.	Regulates the closure of surface impoundments containing hazardous waste.
Occupational Health and Safety Act	Labor Code, Div.5, §6300 et seq.	Regulations to assure safe and healthy working conditions by authorizing the enforcement of standards and procedures.

STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Requirement	Citation	Description
Underground Storage of Hazardous Substances Requirements	H&S Code, Div. 20, Chapter 6.7, § 25280 et seq.	Regulations governing the testing, monitoring and replacing underground storage tanks.
Hazardous Waste Control Act	H&S Code §§251000-25395, CA Title 22, Chapter 2-30	Minimum Standards for Management of Hazardous and Extremely Hazardous Wastes. Regulations governing surface impoundments, waste piles, landfills, and land treatment facilities.
Porter-Cologne Water Quality Act	Water Code §§13000-13806 CCR, Title 23	CCR Title 23, Article 3 provides guidelines for Waste Management Unit Classification and Sitting Article 3 states that new waste management units shall have a 200-foot setback form any known Holocene earthquake fault (55331(d), 5532(d), 5533(d)).
		Class I and II units should not be located where porous soil could impair the ability of natural geologic materials to act as a barrier to vertical fluid movement (253(b)(1),2532(b)(1)).
South Coast Air Quality Management District Rules and Regulations	Regulation IV	Prohibitory Rules
	Rule 401	Visible emission. Limits visible emissions form any point source.
	Rule 402	Nuisance. Prohibits the discharge of any material (including odorous compounds) that causes injury, or annoyance to the property, or business or endangers human public, health, comfort, repose or safety.
	Rule 403	Fugitive Dust. Limits onsite activities so that the concentration of fugitive dust at the property line shall not be visible and the downwind particulate concentration shall not be more than 100 micrograms per cubic meter, averaged over 5 hours, above the upwind particulate concentration.
	Rule 404	Particulate Matter (Concentration). Rule 404 (1) limits particulate emission to a range of 0.010 to 0.196 grain per standard cubic foot averaged over 1 hour for a volumetric gas flow rate of 7000 cu. m/hr or 23 cu.m/hr, respectively.
	Rule 407	Liquid and Gaseous Air Contaminants limits carbon monoxide emissions to 2,000 ppm and sulfur dioxide emission to 500 ppm averaged over 15 minutes.

STATE APPLICABLE OR RELEVANT APPROPRIATE REQUIREMENTS

Requirement	Citation	Description
South Coast Air Quality Management District Rules and Regulations (continuation)	Rule 409	Combustion Contaminants. Limits the emission of particulate matter from a combustion source.
	Rule 473	Disposal of Solid and Liquid Wastes. Incineration design to dispose of combustible refuse at burning rates greater than 50 kilograms per hour shall not release particulate matter in excess of 0.23 grams per cubic meter of gas calculated to 12 percent of carbon dioxide.
	Rule 474	Fuel Burning Equipment Oxides of Nitrogen. Limits the concentration of oxides of nitrogen (as NO_x) to a range of 125 to 300 ppm for gaseous fuels depending on the size.
Standards of Performance for New Stationary Sources	Regulation IX	Implements the provisions of Part 60, Chapter I, Title 40, of the CFR under the supervision of SCAQMD Executive Officer.
National Emission Standards for Hazardous Waste Air Pollutants	Regulation IX	Implements the provisions of Part 60, Chapter I, Title 40, of the CFR under the supervision of SCAQMD Executive Officer., if contaminants are listed.
Source Specific Standards	Regulation IX	Rule 1150 - " Executive of Landfill Sites " states that no person shall initiate excavation of an active or inactive landfill without an Excavation Management Plan approved by the SCAQMD. The plan shall provide information regarding the quantity and characteristics of the material to be excavated and transported and shall identify mitigation measures including gas collection and disposal, bailing, encapsulation, covering of the material, and chemical neutralizing.
New Source Review	Regulation XIII	This regulations sets forth the preconstruction review requirements for new or modified stationary sources, to ensure that the operation of such stationery sources does not interfere with the progress in attainment of the national air quality standards, without unnecessarily district.
	Proposed Rule 223	This proposed rule specifies the method to determine the impacts of emissions from new stationary sources and modifications to existing stationary sources. The provisions of this rule shall apply to preconstruction review of sources that emit carcinogenic air contaminants such as benzene.
	Rule 1166	This rule limits the emission of VOCs from soil contaminated with VOCs as a result of leakage from storage or transfer facilities from accidental spills, or other deposition.

STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Requirement	Citation	Description
Hazardous Waste Movement Committee Memorandum of Understanding	An agreement made on November 8, 1983 by the DHS, Caltrans, and the CHP.	An agreement between the Department of Health Services, Transportation (Calstrans), and the California Highway Patrol (CHP) to coordinate with each other for the transportation of large quantities of hazardous wastes excavated from abandoned sites.
State of California Department of Water Resources	Water Well Standards, Bulletin 74-81, 1989 or Draft 1990	This document sets standards to be applied to the construction or destruction of water wells throughout the State of California
California Environmental Quality Act	California Public Resources Code, § 21100 et seq.	Requires either Environmental Impact Reports or Negative Declarations for cleanups, Interim Remedial Measures, and occasionally, parts of some Remedial Investigations and Feasibility Studies. The State leading agency can specify mitigative measures as condition for approval of a project to avoid any potential damage to the environment.

ENCLOSURE 2

POTENTIAL STATE APPLICABLE OR RE[illegible]ANT AND APPROPRIATE REQUIREMENTS
SUBMITTED BY DTSC
FOR OPERABLE UNIT 3, INSTALLATION RESTORATION PROGRAM SITE 16
MARINE CORPS AIR STATION EL TORO

REGULATION	STATUTE	DESCRIPTION	COMMENT
Title 22 (Social Security), Division 4 (Environmental Health), Chapter 15 (Domestic Water Quality and Monitoring Regulations)			
Article 4 (Primary Standards - Inorganic Chemicals), §64431. Maximum Contaminant Levels - Inorganic Chemicals. *22 CCR 64431*	Health and Safety Code Sections 208, 4021.3 and 4023.3	The Maximum Contaminant Levels for the primary drinking water inorganic chemicals shall not be exceeded in the water supplied to the public.	
Article 5.5 (Primary Standards - Organic Chemicals), §64444. Maximum Contaminant Levels - Organic Chemicals. *22 CCR 64444*	Health and Safety Code Sections 208, 4021.3 and 4023.3	The Maximum Contaminant Levels for the primary drinking water organic chemicals shall not be exceeded in the water supplied to the public.	
Article 16 (Secondary Drinking Water Standards), §64449. Secondary Maximum Contaminant Levels and Compliance. *22 CCR 64449*	Health and Safety Code Sections 208, 4021.3 and 4023.3	The Secondary Maximum Contaminant Levels shall not be exceeded in the water supplied to the public, because these constituents may adversely affect the taste, odor or appearance of drinking water.	
Title 22 (Social Security), Division 4.5 (Environmental Health Standards for the Management of Hazardous Waste), Chapter 11 (Identification and Listing of Hazardous Waste)			
Article I (General), §66261.1 to 66261.7. *22 CCR 66261.1 to 66261.7*	Health and Safety Code Sections 208, 25141, 25143.2, 25150, 25158.4, 25159, 25159.5, 25170, 25179.6, 25245, 25250.22, 58004 and 58012	Article I defines the terms "waste" and hazardous waste," identifies those wastes which are excluded from regulation under this division, and establishes special management requirements for hazardous waste which is recycled and establishes rules for classifying and managing contaminated containers.	
Article 2 (Criteria for Identifying the Characteristics of Hazardous Waste), §66261.10. *22 CCR 66261.10*	Health and Safety Code Sections 208, 25141 and 25159	Article 2 sets forth the criteria to identify characteristics of hazardous waste.	
Article 3 (Characteristics of Hazardous Waste), §66261.20 to 66261.24. *22 CCR 66261.20 to 66261.24*	Health and Safety Code Sections 208, 25141, 25159, 58004 and 58012	Article 3 identifies characteristics of hazardous waste.	
Article 4 (Lists of Hazardous Wastes), §66261.31. Hazardous Wastes from Non-specific Sources. *22 CCR 66261.31*	Health and Safety Code Sections 25140, 25141, 25150, 25159, 25159.5 and 25179.6	List of hazardous wastes from non-specific sources.	

CCR: California Code of Regulations

POTENTIAL STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS SUBMITTED BY DTSC

FOR OPERABLE UNIT 3, INSTALLATION RESTORATION PROGRAM SITE 16
MARINE CORPS AIR STATION EL TORO

REGULATION	STATUTE	DESCRIPTION	COMMENT
Title 22 (Social Security), Division 4.5 (Environmental Health Standards for the Management of Hazardous Waste), Chapter 11 (Identification and Listing of Hazardous Waste) continued			
Article 4 (Lists of Hazardous Wastes), §66261.33. Discarded Commercial Chemical Products, Off-Specification Species, Container Residues, and Spill Residues Thereof. *22 CCR 66261.33*	Health and Safety Code Sections 25159, 58004 and 58012	List of materials or items that are hazardous wastes if and when they are discarded or intended to be discarded, including commercial chemical products, off-specification species, container residues and spill residues.	
Article 5 (Categories of Hazardous Waste), §66261.100 to 66261.126. *22 CCR 66261.100 to 66261.126*	Health and Safety Code Sections 208, 25140, 25141, 25150 and 25159	Article 5 identifies categories of hazardous waste including RCRA hazardous waste, non- RCRA hazardous waste, extremely hazardous waste, and special waste, and establishes criteria and management standards for special waste and extremely hazardous waste.	
Appendix VIII. Hazardous Constituents. *22 CCR 66261.126 Appendix VIII*	Health and Safety Code Sections 25140, 25150, 25159, 58004 and 58012	Appendix VIII lists hazardous constituents.	
Appendix X. List of Chemical Names and Common Names for Hazardous Wastes and Hazardous Materials. *22 CCR 66261.126 Appendix X*	Health and Safety Code Sections 208, 25140 and 25141	Appendix X lists chemicals which create a presumption that a waste is a hazardous waste. If a waste consists of or contains a chemical listed in this subdivision, the waste is presumed to be a hazardous waste.	
Title 22 (Social Security), Division 4.5 (Environmental Health Standards for the Management of Hazardous Waste), Chapter 12 (Standards Applicable to Generators of Hazardous Waste)			
Article 1 (Applicability), §66262.10 to 66262.12. *22 CCR 66262.10 to 66262.12*	Health and Safety Code Sections 208, 25150, 25159, 25159.5, 25179.6 and 58012	Chapter 12 establishes standards for generators of hazardous waste located in California.	
Article 2 (The Manifest), §66262.20 to 66262.23. *22 CCR 66262.20 to 66262.23*	Health and Safety Code Sections 208, 25150, 25159 and 25161	Article 2 requires that a generator shall prepare a manifest and specifies the use of the manifest.	
Article 3 (Pre-Transport Requirements), §66262.30 to 66262.35. *22 CCR 66262.30 to 66262.35*	Health and Safety Code Sections 208, 25150, 25159, 25159.5, 25161, 25179.6 and 58012	Article 3 describes packaging requirements and accumulation time for hazardous waste prior to transport.	
Article 4 (Recordkeeping and Reporting), §66262.40 to 66262.47. *22 CCR 66262.40 to 66262.47*	Health and Safety Code Sections 208, 25150, 25159, 25161, 58004 and 58012	Article 4 requires recordkeeping and reporting of transported waste	

CCR: California Code of Regulations

POTENTIAL STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
SUBMITTED BY DTSC
FOR OPERABLE UNIT 3, INSTALLATION RESTORATION PROGRAM SITE 16
MARINE CORPS AIR STATION EL TORO

REGULATION	STATUTE	DESCRIPTION	COMMENT
Title 22 (Social Security), Division 4.5 (Environmental Health Standards for the Management of Hazardous Waste), Chapter 13 (Standards Applicable to Transporters of Hazardous Waste)			
Article 1 (General), §66263.10 to 66263.18. *22 CCR 66263.10 to 66263.18*	Health and Safety Code Sections 208, 25150 and 25159	Article 1 requires registration of a hazardous waste transporter.	
Title 22 (Social Security), Division 4.5 (Environmental Health Standards for the Management of Hazardous Waste), Chapter 14 (Standards for Owners and Operators of Hazardous Waste Transfer, Treatment, Storage, and Disposal Facilities)			
Article 6 (Water Quality Monitoring and Response Programs for Permitted Facilities), §66264.90 to 66264.101. *22 CCR 66264.90 to 66264.101*	Health and Safety Code Sections 208, 25150, and 25159	Article 6 specifies requirements for purposes of detecting, characterizing and responding to releases to groundwater, surface water or the unsaturated zone.	
Article 7 (Closure and Post-Closure), §66264.110 to 66264.120. *22 CCR 66264.110 to 66264.120*	Health and Safety Code Sections 208, 25150, 25159, 25159.5, 25179.6, 25245, 50084 and 58012	Article 7 specifies requirements for closure and post-closure.	

CCR: California Code of Regulations

POTENTIAL STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS SUBMITTED BY DTSC

FOR OPERABLE UNIT 3, INSTALLATION RESTORATION PROGRAM SITE 16
MARINE CORPS AIR STATION EL TORO

REGULATION	STATUTE	DESCRIPTION	COMMENT
	California Civil Code Section 1471	Restrictive covenants will be executed by the transferee and will serve as a legally binding agreement between the transferee, its successor and assigns (the covenantor), and the United States with specific State regulatory agencies identified in the deed as the covenantees (beneficiaries).	For sites to be transferred from a federal entity to a non-federal entity where concentrations of chemicals exceed the cleanup goals for unrestricted use.
	Health and Safety Code, Division 20, Chapter 6.5 (Hazardous Waste Control)		
	Article 9 (Permitting of Facilities), Section 25202.5.	Environmental Restriction Covenant and Agreement regarding environmental use restrictions and restrictive covenants that will serve as a mechanism to implement institutional control use restrictions. The agreement will be executed contemporaneously with the negotiation and execution of the conveyance of the property to the transferee(s) by deed.	For sites to be transferred from a federal entity to a non-federal entity where concentrations of chemicals exceed the cleanup goals for unrestricted use.
	Article 11 (Hazardous Waste Disposal Land Use), Section 25222.1.	Environmental Restriction Covenant and Agreement is irrevocable and shall be recorded by the owner. An agreement for a portion of a property does not preclude designation of the remainder of the property as a hazardous waste or border zone property.	For sites to be transferred from a federal entity to a non-federal entity where concentrations of chemicals exceed the cleanup goals for unrestricted use.
	Article 11 (Hazardous Waste Disposal Land Use), Section 25232.	Variances to the land and land use require written approval.	For sites to be transferred from a federal entity to a non-federal entity where concentrations of chemicals exceed the cleanup goals for unrestricted use.
	Article 11 (Hazardous Waste Disposal Land Use), Section 25233.	Information required for variances.	For sites to be transferred from a federal entity to a non-federal entity where concentrations of chemicals exceed the cleanup goals for unrestricted use.
	Article 11 (Hazardous Waste Disposal Land Use), Section 25234.	Removal of land use restrictions.	For sites to be transferred from a federal entity to a non-federal entity where concentrations of chemicals exceed the cleanup goals for unrestricted use.
	Health and Safety Code, Division 20, Chapter 6.8 (Hazardous Substance Account)		
	Article 5 (Uses of the State Account), Section 25355.5.	This section specifies the use of funds from the Hazardous Substance Account or the Hazard Substance Cleanup Fund for removal or remedial actions.	For sites to be transferred from a federal entity to a non-federal entity where concentrations of chemicals exceed the cleanup goals for unrestricted use.

CCR: California Code of Regulations

ENCLOSURE 3

ston H. Hickox
ncy Secretary

Air Resources Board

Alan C. Lloyd, Ph.D.
Chairman
2020 L Street • P.O. Box 2815 • Sacramento, California 95812 • www.arb.ca.gov

Gray Davis
Governor

MEMORANDUM

TO: Triss Chesney, P.E.
Remedial Project Manager
Southern California Operations
Office of Military Facilities
Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, California 90630

FROM: Lynton Baker Lynn Baker
Staff Air Pollution Specialist
Program Assistance Section
Stationary Source Division

DATE: February 14, 2000

SUBJECT: APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR INSTALLATION RESTORATION OF SITE 16 - EL TORO MARINE CORPS AIR STATION

This memorandum is in response to your request for potential California "Applicable or Relevant and Appropriate Requirements" (ARARs) for the installation restoration of Site 16 at the El Toro Marine Corps Air Station. State law as codified in the Health and Safety Code (Division 26, section 40000) provides to local and regional authorities the primary responsibility for control of air pollution from sources other than emissions from motor vehicles. Air pollution control districts and air quality management districts are required to adopt and enforce rules and regulations to achieve and maintain the state and federal ambient air quality standards in all areas affected by emission sources under their jurisdiction, and to enforce all applicable provisions of state and federal law (Health and Safety Code section 40001).

Rules and regulations of the South Coast Air Quality Management District (SCAQMD) should be included in the consideration of action specific ARARs for Site 16. If you have not contacted the SCAQMD, we recommend that you contact Mr. Scott Caso of the district's Stationary Source Compliance Division at (909) 396-2218. SCAQMD rules that may apply include:

201 Permit to Construct
202 Permit to Operate
402 Nuisance
1166 Volatile Organic Compound Emissions from Decontamination of Soil
1401 New Source Review of Carcinogenic Air Contaminants

In addition, the California Ambient Air Quality Standards (CAAQS, list enclosed) may apply as chemical specific ARARs. This is to ensure that activities undertaken to remediate Site 16 do not cause ambient air concentrations above the health protection levels of the CAAQS. If soil removal is necessary, the CAAQS for particulate matter (PM10) and lead should be considered.

If you have questions, please call me at (916) 327-5619.

Enclosure

cc: Mr. Scott Caso (w/o Enclosure)
South Coast Air Quality Management District
21865 E. Copley Dr.
Diamond Bar, CA 91765

Mr. Ted Kowalczyk (w/o Enclosure)
South Coast Air Quality Management District
21865 E. Copley Dr.
Diamond Bar, CA 91765

Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [1]		Federal Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)	1 Hour	0.09 ppm (180 µg/m³)	Ultraviolet Photometry	0.12 ppm (235 µg/m³)[8]	Same as Primary Standard	Ethylene Chemiluminescence
	8 Hour	—		0.08 ppm (157 µg/m³)		
Respirable Particulate Matter (PM_{10})	Annual Geometric Mean	30 µg/m³	Size Selective Inlet Sampler ARB Method P (8/22/85)	—	Same as Primary Standard	Inertial Separation and Gravimetic Analysis
	24 Hour	50 µg/m³		150 µg/m³		
	Annual Arithmetic Mean	—		50 µg/m³		
Fine Particulate Matter ($PM_{2.5}$)	24 Hour	No Separate State Standard		65 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetic Analysis
	Annual Arithmetic Mean			15 µg/m³		
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10 mg/m³)	Non-dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m³)	None	Non-dispersive Infrared Photometry (NDIR)
	1 Hour	20 ppm (23 mg/m³)		35 ppm (40 mg/m³)		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m³)		—		
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	—	Gas Phase Chemiluminescence	0.053 ppm (100 µg/m³)	Same as Primary Standard	Gas Phase Chemiluminescence
	1 Hour	0.25 ppm (470 µg/m³)		—		
Lead	30 days average	1.5 µg/m³	AIHL Method 54 (12/74) Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m³	Same as Primary Standard	
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	—	Fluorescence	0.030 ppm (80 µg/m³)	—	Pararosoaniline
	24 Hour	0.04 ppm (105 µg/m³)		0.14 ppm (365 µg/m³)	—	
	3 Hour	—		—	0.5 ppm (1300 µg/m³)	
	1 Hour	0.25 ppm (655 µg/m³)		—	—	
Visibility Reducing Particles	8 Hour (10 am to 6 pm, PST)	In sufficient amount to produce an extinction coefficient of 0.23 per kilometer—visibility of ten miles or more (0.07—30 miles or more for Lake Tahoe) due to particles when the relative humidity is less than 70 percent. Method: ARB Method V (8/18/89).		No Federal Standards		
Sulfates	24 Hour	25 µg/m³	Turbidimetric Barium Sulfate-AIHL Method 61 (2/76)			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m³)	Cadmium Hydroxide STRactan			

See footnotes on next page...

1. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter—PM10, and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded.

   National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when 99 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact U.S. EPA for further clarification and current federal policies.

3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 mm of mercury. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 mm of mercury (1,013.2 millibar); ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4. Any equivalent procedure which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

7. Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.

8. New federal 8-hour ozone and fine particulate matter standards were promulgated by U.S. EPA on July 18, 1997. The federal 1-hour ozone standard continues to apply in areas that violated the standard. Contact U.S. EPA for further clarification and current federal policies.

ENCLOSURE 4

State of California | Department of Health Services

Memorandum

Date: February 8, 2000

To: Ms. Triss Chesney
Department of Toxic Substances Control (DTSC), Region 4
Office of Military Facilities
5796 Corporate Avenue
Cypress, California 90630

From: Environmental Management Branch
P.O. Box 942732
601 North 7th Street, MS 396
Sacramento, California 94234-7320
(916) 445-0498

Subject: Request for Applicable or Relevant and Appropriate Requirements (ARARs) for Operational Unit (OU) 3B Marine Corps Air Station (MCAS) El Toro

This is in response to your February 3, 2000, request for Applicable or Relevant and Appropriate Requirements (ARARs) for Operational Unit (OU) 3B.

As an Agreement State with the Nuclear Regulatory Commission (NRC), California licenses and monitors compliance of byproduct materials use as defined by the Atomic Energy Act of 1954. In addition, the Department of Health Services (DHS) controls the uses of naturally occurring radioactive materials (e.g. radium-226). DHS regulatory authority does not include the licensing and compliance monitoring of facilities under exclusive federal jurisdiction. This is the NCR's responsibility. DHS becomes involved when a federal facility (e.g. a military base) is going to close and revert to State control. We are currently providing radiological consultation for closing military bases in California in preparation for the bases being transferred into State, local or private ownership.

Listed below are the regulations, statutes and guidance that pertain to radioactive materials found on military bases in California.

1. Title 10, Code of Federal Regulations (CFR), Sections 20.1001-2402 and Appendices A through F, as incorporated by reference to Title 17, California Code of Regulations (CCR), Section 30253. A significant change in the regulations, as adopted by California, is that the federal term "licensee" is replaced by "user" as defined in Title 17, CCR, Section 30100.

2. Title 10, Code of Federal Regulations (CFR), Sections 20.1402 and 20.1404, Radiological Criteria for License Termination; Final Rule. As an Agreement State, California must adopt regulations, as least as stringent as these no later than 3 years from the effective date of the NRC regulations. These regulations establish

an upper dose limit of 25 millirem per year Total Effective Dose Equivalent (TEDE) for sites/facilities released for unrestricted use.

3. California's Safe Drinking Water and Toxic Enforcement Act (1986), Health and Safety Code 25249.5 et seq. (Proposition 65) and its implementing regulations: prohibits a discharge or release of carcinogens, including radionuclides, unless the resulting exposure poses no significant lifetime risk, which is defined as one excess cancer per 100,000 people (or 10^{-5} risk). If an individual's exposure exceeds this level, "clear and reasonable warning" must be given.

4. *Guidance for Cleanup of Radioactivity on Closing Military Bases for Unrestricted Public Use of Property* (attached). This document presents guidance to assist interested parties in the evaluation of levels of environmental radioactivity on closing military bases and resulting radiation exposures to the general population. It provides direction on managing potential risks of cancer from radionuclides in the environment for purposes of site cleanup and decontamination associated with the cleanup of closing military bases so that the property can be utilized by the public.

5. Relevant guidance documents published by the Nuclear Regulatory Commission (NRC) (e.g. NUREG/CR - 5849).

If you have questions about DHS' ARARs or their applications to this base, please contact me at (916) 324-1379.

Darice Bailey, Chief
Waste Management Section

Attachment

Cc: Ms. Deirdre Dement
PO Box 942732
601 N. 7th Street MS 396
Sacramento, CA 94234-7320

April 5, 1994

GUIDANCE FOR CLEANUP OF RADIOACTIVITY ON CLOSING MILITARY BASES FOR UNRESTRICTED PUBLIC USE OF PROPERTY

Environmental Management Branch
Division of Drinking Water and Environmental Management

Radiological Health Branch
Division of Food, Drug and Radiation Safety

California Department of Health Services
601 North 7th Street
P.O. Box 942732
Sacramento, CA 94234-7320

1. INTRODUCTION

1.1. This document presents guidance to assist interested parties in the evaluation of levels of environmental radioactivity on closing military bases and resulting radiation exposures to the general population. It provides direction on managing potential risks of cancer from radionuclides in the environment for purposes of site cleanup and decontamination associated with the cleanup of closing military bases so that the property can be utilized by the public. Reducing radiation exposure levels and minimizing cancer risks to the levels set forth in this discussion will be protective against other adverse health effects of radiation (*e.g.*, reproductive and developmental effects) that would be associated with environmental radioactive contamination.

1.2 The Department of Health Services (DHS) views it appropriate to maintain consistency with existing health-based standards whenever those standards exist. Hence, DHS believes that its drinking water standards for radionuclides are appropriate cleanup levels for water, as are the radon action level for indoor air, and the federal Environmental Protection Agency's (EPA's) standards for cleanup of residual radium in soil.

2. CLEANUP OF RADIOACTIVE SITES—BASIC PRINCIPLES

2.1. Documentation of the history of use, storage and disposal of radioactive material on the site should be complete.

2.1.1. A site characterization document for the site should identify all past and current use, storage and disposal of radioactive material.

2.1.1.1. The site characterization for radioactive material should begin with a review of the general and specific licenses from the US Nuclear Regulatory Commission (US NRC) and Department of Defense (DOD) permits for radioactive material on the site, and reports required pursuant to those licenses and permits.

2.1.1.2. The site characterization should include reviews of written histories and documents, and oral histories or interviews with current and past employees—including current and past base radiation safety officers—and others who would have historical insights into past activities using radioactive material.

2.1.1.3. The various military service branches within DOD have organizations that need to be contacted for consultation about characterization of the site, and for documentation of the historic use, storage, and disposal of radioactive material at the base in question. These include:

- The Air Force's Radioisotope Committee and Armstrong Laboratory at Brooks Air Force Base in Texas.
- The Army's Environmental Hygiene Agency at the Aberdeen Proving Ground, Maryland.
- The Army Corps of Engineers in Omaha, Nebraska.
- The Navy's Radiological Affairs Support Office in Yorktown, Virginia.

2.2. Cleanup of discrete radioactive items.

2.2.1. With the exception of standard commercial smoke detectors installed in buildings, all discrete items that are radioactive and known to be present should be removed. This includes, but is not limited to, (a) radioactive sources, (b) gauges, dials, knobs and other material painted with or containing radium or other radionuclides, (c) radionuclides in electronic equipment and instrumentation, and (d) materials containing depleted uranium. Examples of sources of radioactivity on military bases are presented in Table 2-1.

2.2.2. If radioactive items cannot be removed, unrestricted public use would not be an option for the property in question. The nature of restrictions to be placed on the property, as well as the future use of the site, would require deliberations by concerned parties.

2.3. Cleanup of diffuse radioactive contamination.

2.3.1. Radioactive contamination on the property that is diffuse should be removed to levels that would minimize the cancer risk to the exposed population, consistent with the guidance that follows in this document.

2.3.2. If diffuse radioactive contamination cannot be removed to levels that would minimize the cancer risk to the exposed population, unrestricted public use would not be an option for the property in question.

Table 2-1. Examples of sources of radioactivity on military bases.

The Department of the Army's Corps of Engineers distributed to its regional commands a memorandum (dated December 8, 1993) addressing awareness of radioactive materials used at DOD facilities. That memorandum pointed out that the DOD has issued over 2800 different types of instruments and articles containing radioactive materials, and that radioactive contamination may exist in materials in base supply warehouses, or in shops used for the manufacture, repair or maintenance of such articles. The memorandum also points out that "during the 1940s, 1950s, and 1960s, on-base burial, sometimes in radioactive waste disposal cells and often in on-base landfills, was a reasonable and acceptable disposal technique." That memo plus other information from DOD point out a number of sources of radioactivity that may be found on military bases:

a. Radium dials, gauges, and illuminators were used extensively in military applications, and represent the most common and the greatest radioactive health and environmental hazard found on bases. Examples include luminous dials on a variety of components used in navigation and communication, and on watch dials, weapons sights, and compasses. To illustrate this point, about half a million deck markers (each with about 20 microcuries of radium-226 or strontium-90) were made for and used by the Navy in 1952. The decommissioning of the Battleships Iowa, Missouri, and New Jersey resulted in the removal of about 1,200 radium-226 components from each vessel. As another example, the equipment utilized for mobile ground control approach (GCA) radar systems contained extensive amounts of radium-226 in readily accessible components such as knobs, dials, and gauges. Some of this GCA equipment had a component that contained up to 5,000 microcuries of radium-226.

b. Depleted uranium used in armor and armor piercing ordnance, as well as in shipping containers for use in sealed source radiography.

c. Tritium as a source of illumination, especially for exit signs.

d. Thorium as a component in lenses to enhance the optical quality, and in magnesium-thorium metal used for machinery, aircraft and rocket parts, plus welding rods used in thick metal welding.

e. Hospital and research facilities used tritium and carbon-14 in liquid scintillation counting. Liquid scintillation counting fluids contain xylene or toluene which are hazardous wastes.

f. Washdown areas for contaminated equipment (*e.g.*, aircraft and ships) used in association with or in monitoring above-ground nuclear weapons tests.

g. Calibration sources for radiation survey instruments.

h. Hospital sources used in diagnostic techniques and for radiation therapy procedures, plus sources used in research facilities.

i. Sources used in radiography.

j. Gauges used to measure the level, thickness, or the density of an object of interest.

k. Sources known as commodities which are used extensively as components for weapons systems and within navigation and communication equipment.

l. Low-level radioactive waste from reactor and primary plant maintenance and repair, weapons processing, and associated with some of the sources mentioned above.

3. CHEMICAL CARCINOGEN EXPOSURES—REGULATORY PERSPECTIVE

3.1. Carcinogenic chemical substances that are released into the environment are regulated for the protection of public health to strict standards in non-occupational settings. Regulatory levels are established to limit the cancer risk. Cancer risk is expressed in terms of "excess" cancer cases, that is, those that exceed the cancer cases that would normally occur in a given population (i.e., about 25 to 30%).

3.1.1. The lower end of the range (one excess case of cancer in a population of 1,000,000 people exposed for a 70-year lifetime, the so-called "10^{-6}" risk) is the usual regulatory goal, though costs and technical feasibility may lead to the higher end of the range (one excess case of cancer in an exposed population of 10,000 people exposed for a 70-year lifetime (the "10^{-4}" risk).

3.1.1.1. Human exposures to chemical carcinogens that would result in lifetime cancer risks below the 10^{-6} risk are often referred to as posing a *"de minimis"* risk, and are usually do not receive much regulatory attention, although public health agencies often seek to reduce exposures that result in risks of this magnitude, as well.

3.1.1.2. Human exposures to chemical carcinogens that would result in lifetime cancer risks greater than one excess case of cancer in an population of 100,000 people (the 10^{-5} risk), if allowed by regulatory agencies, could be required to be accompanied by warnings or notices to the exposed population. For example, see California Health and Safety Code §25249.5, *et seq.* or §44300, *et seq.*

3.1.1.3. Risks of 10^{-4} may be allowed by federal and state regulatory agencies if there is an offsetting public health benefit (*e.g.*, the cancer risk from exposure to byproducts of drinking water chlorination); or if the costs of cleanup to a lower risk level are considered excessive, when compared to the benefit.

3.1.1.4. Human exposures to chemical carcinogens that would result in cancer risks to the general population (non-occupational exposures) greater than the 10^{-4} risk level are generally not allowed by federal and state regulatory agencies.

3.2. The US EPA's*Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final* (October 1988), has as a step in the evaluation process, a determination as to "[w]hether the remediation goals for all carcinogens of concern . . . provides protection within the risk range of 10^{-4} to 10^{-7}." (page 4-15). The lower end of this range is a lifetime cancer risk of one excess case of cancer per 10,000,000 people.

In *Risk Assessment Guidance for Superfund: Volume I—Human Health Evaluation Manual (Part B, Development of Risk-based Preliminary Remediation Goals), Interim* (December 1991), the US EPA states that "action is generally warranted at a site when the cumulative carcinogenic risk is greater than 10^{-4}. . . ," and that preliminary remediation goals are "not needed for any chemicals in a medium with a cumulative cancer risk of less than 10^{-6}." When the cancer risk for a medium is "within the range of 10^{-6} to 10^{-4}, a decision about whether or not to take action is a site-specific determination." (page 15).

3.3. The DOD's Base Realignment and Closure (BRAC) Cleanup Plan Guidebook (Fall, 1993) identifies "areas of contamination below action levels" for carcinogens (page 4-52) as areas that "risk estimates completed for contamination do not do the following:"

- Exceed 10^{-6} for any carcinogenic hazardous substance or petroleum constituent detected in any medium.
- Exceed 10^{-6} for all carcinogenic hazardous substances and petroleum constituents, taken together, in any exposure pathway.
- Exceed 10^{-4} for all carcinogenic hazardous substances and petroleum constituents accumulated across all pathways.

3.3.1. The DOD BRAC Cleanup Plan Guidebook states: "At present, sites exhibiting a cancer risk of 10^{-4} or greater are considered unacceptable, and require action to protect human health. Sites with cancer risks below 10^{-6} are considered acceptable, and are likely candidates for NFA [no further action]. Sites exhibiting risks between these two values require the exercise of considerable professional judgment on a site-by-site basis. . . . The classification of the carcinogens, and the likelihood of the exposure assumptions and the future land use scenarios should be considered in site-specific interpretations of the risk estimate. The result will facilitate the identification of site-specific solutions and actions that are appropriate for each site to protect human health and the environment. However, consistency across a given installation is desirable and a general consistent installation-wide approach to cost/benefit analysis of remedial alternatives will facilitate application of risk management policies." (page 4-71).

3.3.2. The DOD continues: "Examples [of sites that require special consideration] are sites . . . where a proven human (class A) carcinogen is present, resulting in lower acceptable risk estimates." (page 4-71).

3.3.2.1. The US EPA has designated all radionuclides to be Class A carcinogens, "based on their property of emitting ionizing radiation and on the extensive weight of epidemiological evidence of radiation-induced cancer in humans." (US EPA, *Risk Assessment Guidance for*

Superfund: Volume I—Human Health Evaluation Manual (Part B, Development of Risk-based Preliminary Remediation Goals), Interim, December 1991, page 33.)

4. RADIATION EXPOSURES—CANCER RISK AND EXPOSURE LIMITS

4.1. Radiation standards are established or recommended by a number of agencies, including the US EPA, the NRC, the National Academy of Sciences/National Research Council (NAS/NRC), the National Council for Radiation Protection and Measurements (NCRP), the International Council for Radiological Protection (ICRP), and the California Department of Health Services (DHS). These groups utilize a linear dose/effect relationship for the estimate of radiation effects, extrapolating to low exposures from the high exposures that are associated with human radiogenic cancer.

4.1.1. Lifetime cancer risk from radiation exposure is estimated in the NAS/NRC's *Health Effects of Exposure to Low Levels of Ionizing Radiation*, BEIR V (Table 4.4, Page 176, NAS/NRC, 1990) to be 520 and 600 excess cancer deaths per 100,000 for males and females, respectively, for a continuous exposure of 1 milligrays per year (100 millirads per year). From these values, an estimated lifetime risk of 6×10^{-5} per mrad/yr results. Hence, 0.016 mrad/yr would yield a lifetime cancer risk of 1×10^{-6}, and 1.6 mrad/yr would yield a lifetime cancer risk of 1×10^{-4}.

4.1.2. The NRC, in its 1990 Below Regulatory Concern Policy Statement, based on reports by the United Nations Scientific Committee on the Effects of Atomic Radiation and ICRP, cited an annual cancer risk of 5×10^{-7} per mrem/yr, or a lifetime (70-yr) risk of 3.5×10^{-5}. From this risk, an exposure of 0.028 mrem/yr would result in a lifetime cancer risk of 1×10^{-6}, and 2.8 mrem/yr would result in a lifetime cancer risk of 1×10^{-4}. The estimates of cancer risk per exposure are helpful for purposes of this guidance. In 1993, NRC abandoned its Below Regulatory Concern Policy Statements.

4.1.3. The NCRP, in *Limitation of Exposure to Ionizing Radiation*, (Table 7.1, Report No. 116, 1993) presents estimates of 5×10^{-2} excess fatal cancers per sievert (100 rem) and 1×10^{-2} excess non-fatal cancers per sievert, based on NCRP and ICRP reports. These can be summed to equal 6×10^{-2} per sievert, or 6×10^{-2} per 100 rem, or, with a linear assumption, 6×10^{-7} per mrem. From this, an annual exposure of 1 mrem each year for 70 yr would result in a lifetime risk of 4.2×10^{-5} excess cases of cancer. From this, an annual exposure of 0.024 mrem would result in a lifetime cancer risk of 1×10^{-6}, and 2.4 mrem would result in a lifetime cancer risk of 1×10^{-4}.

4.2. Based upon the doses and risk estimates presented above, lifetime cancer risks can be approximated for various lifetime annual radiation exposures, as presented in Table 4-1.

4.2.1. The current radiation standard for workers is 5,000 mrem/yr .

4.2.2. Current federal and state standards for members of the general public include 100 mrem/yr for members from all radiation sources, 25 mrem/yr from nuclear power operations or radioactive waste, 10 mrem/yr from airborne radionuclide emissions, 4 mrem/yr from radionuclides in drinking water.

Table 4-1. Lifetime (70-year) cancer risks and corresponding annual radiation exposures. For purposes of conversion among risk levels, the exposure/risk relationship is assumed to be linear.

Lifetime cancer risk	Annual radiation exposure (mrem/yr)
10^{-2}	200
10^{-3}	20
10^{-4}	2
10^{-5}	0.2
10^{-6}	0.02

4.2.2.1. Current standards are for federal operations (*i.e.*, Department of Energy facilities), or for permitted operations that are regulated by federal or state agencies (*i.e.*, US NRC, US EPA, or the California DHS).

4.2.2.1.1. As described by the NRC in 1992, its criteria for acceptable levels of radioactive contamination associated with cleanup are inconsistent and not binding on NRC licensees.

4.4.2.2. Standards related to the cleanup of radioactive contamination and restoration of sites are under development by the US NRC and the US EPA. The NRC's proposed regulations are to be available in spring of 1994, and EPA's, later in 1994.

4.4.2.3. Existing California law (California Health and Safety Code §25249.5, *et seq.*) requires warnings for exposure to radionuclides and may limit discharges of radioactivity to sources of drinking water if lifetime cancer risks exceed 10^{-5}.

5. BENEFITS OF A COMMON APPROACH TO REGULATING ENVIRONMENTAL CARCINOGENICITY

5.1. A uniform, risk-based approach to dealing with radioactive materials and with chemical carcinogens would enable regulators and the public to ensure that environmental cleanup is targeting the exposures that pose the greatest carcinogenic risk.

5.2. A uniform approach would enable radioactive materials on closing military bases to be addressed in the same manner as chemical carcinogens (see Section 3.2, above).

5.2.1. Such an approach allows comparisons of sites based on cancer risk, no matter whether concerns are radiation-related, chemical-related, or both.

5.2.2. Such an approach provides a basis prioritization of sites based on cancer risk, for purposes of resource utilization.

5.2.3. Such an approach provides for consistency in dealing with carcinogenic substances, since the focus is on the risk, and not the source of the risk (e.g., radiation vs. chemical).

5.2.4. In determining the overall health risk to the public from environmental exposures, the total cancer risk from radioactive and non-radioactive materials should be considered in the evaluative process.

5.3. Currently, the regulation of radiation exposures to minimize cancer risk, when compared with the regulation of exposures to carcinogenic chemical contaminants and expressed in terms of permitted lifetime risk, is generally less restrictive (see Table 5-1).

5.4. The establishment of standards to limit radiation exposures to the same cancer risk level used in the regulation of chemical exposures would require that the standards be between 0.02 millirem per year and 2 millirems per year.

5.4.1. These limits would be applied to environmental contamination that results in radioactivity ingested or inhaled by a person and from external irradiation from that contamination (*e.g.*, air, water, and ingested soil, and external exposures from contaminated soil).

5.4.2. Exposures would be in excess of background levels of radioactivity in water, soil, and air, as discussed in below.

Table 5-1. Comparison of lifetime cancer risks and annual radiation exposures, with notes on selected standards.[1]

Chemical standard	LIFETIME CANCER RISK or ANNUAL RADIATION EXPOSURE	Radiation standard
	10,000 mrem/yr	
	10^{-1}	Workplace limit (5,000 mrem/yr)
Cancer risk at occupational limit—vinyl bromide	**1,000 mrem/yr**	
Cancer risk at occupational limit—p-toluidine	**10^{-2}**	
	100 mrem/yr	NRC/DOE limit—all sources (100 mrem/yr) EPA action level for radon in indoor air (4 pCi/l)
Cancer risk at occupational limit for several chemicals (acrylamide, amitrole, carbon tetrachloride, chloroform, o-toluidine)	**10^{-3}**	EPA limit—Nuclear Power Operations (25 mrem/ NRC limit—Radioactive Waste (25 mrem/yr)
	10 mrem/yr	EPA limit—Air (10 mrem/yr) EPA limit—Drinking Water (4 mrem/yr)
Upper limit—public (non-occupational) exposures to chemical carcinogens (e.g. trihalomethanes as byproducts of drinking water disinfection)	**10^{-4}**	
	1 mrem/yr	NCRP Negligible individual dose (1 mrem/yr)
California Proposition 65 standard[2]; Air "Toxic Hot Spots" notification requirement	**10^{-5}**	
	0.1 mrem/yr	
"De minimis" level for exposures to chemical carcinogens--usually not regulated below this level (e.g., California Recommended Public Health Levels for drinking water)	**10^{-6}**	
	0.01 mrem/yr	
	10^{-7}	

[1]Lifetime cancer risk for radiation exposures is estimated to be 4.2×10^{-5} excess cases of cancer for an annual exposure of 1 mrem each year for 70 years. For chemical carcinogens, cancer risk is estimated by methods utilized by the US EPA and other federal regulatory agencies, and by State of California regulatory agencies. The methods are generally consistent, though for certain chemicals, the specific risk may differ among different federal and state agencies. Radiation standards from US EPA, *Issues Paper on Radiation Site Cleanup Regulations*, EPA 402-R-93-084, September 1993. Cancer risks from occupational exposures are taken from the US Occupational Safety and Health Administration's Final Rule on Air Contaminants 29 CFR Part 1910, Section 15, "Substances for which limits are based on avoidance of cancer," *Federal Register* 54: 2668 (1989).

[2]Includes radionuclides.

6. BACKGROUND RADIATION CONSIDERATIONS

6.1. Radiation from natural sources in the environment results in external and internal radiation exposures to people. This is usually around 300 mrem/yr. Long-lived fission products deposited as world-wide fallout from historic above-ground testing of nuclear weapons also contribute to the global environmental radioactivity burden and to ambient background radiation.

6.2. Recommended cleanup levels are exclusive of location-specific ambient background radioactivity. For purposes of this document, "ambient" includes radioactivity from global fallout associated with above-ground nuclear weapons testing, and radioactivity from natural origins within (1) building materials such as bricks and aggregate, and (2) fertilizers.

6.3. Resulting cancer risks are those that result from radiation exposures in excess of background exposures.

6.4. Cleanup of a particular radionuclide need not be to levels below its background concentration for a given site or medium.

6.5. Determination of background radiation levels is an important part of the site characterization process, when embarking on a cleanup of a radionuclide contaminated site.

7. DETERMINATION OF RADIONUCLIDE CONCENTRATION LIMITS AND EXTERNAL RADIATION EXPOSURES

7.1. The following default assumptions should be used in determining exposures to radionuclide contaminated soil, water, or air, unless scientifically more appropriate values can be justified:

7.1.1. Drinking water consumption: 2 liters per day.

7.1.2. Air inhalation: 20 cubic meters per day.

7.1.3. Soil ingestion: 0.1 gram per day.

7.1.4. Lifespan: 70 years (25,500 days).

7.1.5. Residence time on soil: 70 years.

7.2. In determining radiation exposures, the dosimetric monitoring, documentation and calculations should be clearly shown and references should be appropriately identified. Any method or methods that are utilized in the determination of radiation exposure and dose calculation should follow the hierarchy of methods set forth in Section 8.

7.3. Dose calculations and risk should be based on the tissue or organ of concern—that is, the tissue or organ that received the greatest committed dose equivalent per unit of radioactivity intake. Where there is no specific target tissue or organ, the total body should be the tissue or organ of concern, and the total effective dose equivalent should be used.

8. METHODS OF ANALYSIS FOR RADIONUCLIDES IN ENVIRONMENTAL MEDIA AND EXTERNAL RADIATION EXPOSURES

8.1. "Method of analysis" or "methods of analysis" refer to the method or methods of detection of radiation exposure or detection and calculation of radiation exposure or of a radionuclide in a particular environmental medium, including but not limited to, water, air, soil, or food.

8.1.1. Included herein are methods and procedures concerning the number of samples and the frequency and site of sampling that are appropriate for the monitoring of radioactivity in environmental media or external radiation exposures.

8.1.2. The calculations of dose, dose equivalence, or other expressions of absorption of deposited energy associated with the interaction of ionizing radiation with biological cells, tissues, organs, etc., are also considered to be within the realm of 'method of analysis."

8.2. In performing an analysis to determine external radiation exposures of a contaminated site, or background external radiation exposures, generally accepted standards and practice, including, but not limited to, radiation monitoring, location and frequency of sampling, equipment, collection of data, statistical analysis, interpretation of results, modeling and dose calculations should be observed.

8.3 In performing an analysis to determine the concentration of a given radionuclide in a given environmental medium, or the background concentration of that radionuclide in that medium, generally accepted standards and practice, including, but not limited to, location and frequency of sampling, sample collection, numbers of samples , sample storage, and preparation, radiochemical analysis, statistical analysis, interpretation of results, modeling and dose calculations should be observed.

8.4. Complete written documentation should be maintained for all procedures, including but not limited to, frequency and location of sampling, types of dosimeters and instrumentation used, sample collection, sample handling and chain of custody, storage, and preparation, analyses, and dose calculations.

8.5. The following is the hierarchy that is to be utilized in establishing the method or methods of analysis to be used for the evaluation of environmental radioactivity, for purposes of describing radioactive contamination and for establishing background radiation levels.

8.5.1. If the California DHS has adopted or employs a method of analysis for external radiation exposures or for a radionuclide in a specific medium, that method is the appropriate method of analysis. If more than one method of analysis has been adopted or is employed by DHS, each may be used as a method of analysis.

8.5.1.1 The DHS's Radiologic Health Branch's Policy Memorandum "Clearance Inspection and Survey", Policy No. IPM-88-2, effective September 15, 1991, identifies the procedure to verify that a facility in which licensed materials were used has been decontaminated to acceptable levels and to assure that the facility will not present a radiation hazard to future occupants.

8.5.2. If DHS has not adopted or does not employ a method of analysis, a method of analysis for external radiation exposures or for a radionuclide in a specific medium adopted or employed by another state or local agency (*e.g.*, the Department of Toxic Substances Control, the Air Resources Board, a local air pollution control district, the State Water Resources Control Board or a Regional Water Quality Control Board) is the appropriate method of analysis. If more than one method of analysis has been adopted or is employed by another state or local agency, each may be used as a method of analysis.

8.5.3. If no state or local agency has adopted or employs a method of analysis, a method of analysis for external radiation exposures or for a radionuclide in a specific medium adopted or employed by a federal regulatory agency (*e.g.*, the US EPA, or the US NRC) is the appropriate method of analysis. If more than one method of analysis has been adopted or is employed by a federal regulatory agency, each may be utilized as a method of analysis.

8.5.3.1. The DOD BRAC Cleanup Guide (page 4-55) directs BRAC Cleanup Teams to review data in accordance with the outline given in section 5 of the US EPA guidance document *Guidance for Data Usability in Risk Assessment.*

8.5.3.2. The document *Residual Radioactive Contamination from Decommissioning, Technical Basis for Translating Contamination Levels to Annual Total Effective Dose Equivalent, Final Report,* by W. E. Kennedy, Jr., and D. L. Strange, NUREG/CR-5512, PNL-7994, Vol. 1, October 1992 (reprinted January 1993), provides generic and site-specific estimates of radiation dose for exaposures to residual radioactivity after facilities decommissioning. It was prepared for the NRC's Office of Regulatory Applications.

8.5.4. If no regulatory agency has adopted or employs a method of analysis, a method of analysis for external radiation exposures or for a radionuclide in a specific medium that is generally accepted by the scientific community—as evidenced by its publication in compilations by professional and scientific associations or societies, in peer-reviewed technical journals published by such associations or societies, or in technical documents prepared for government regulatory agencies—is the appropriate method of analysis. If more than one method of analysis has been generally accepted by the scientific community, each may be utilized as a method of analysis.

9. USE OF DRINKING WATER STANDARDS AS LIMITS OF RADIATION EXPOSURE

9.1. Whenever a source of drinking water is contaminated with a radionuclide, cleanup of an area should be to a concentration resulting in a cancer risk level lower than 10^{-6} to 10^{-4}, except as noted below.

9.1.1. Whenever a source of drinking water is contaminated with a radionuclide for which a specific drinking water maximum contaminant level (MCL) exists, cleanup need not be more restrictive than the MCL for that radionuclide for purposes of protecting public health.

9.1.1.1. California drinking water MCLs exist for the following radionuclides:

- Hydrogen-3 (The California MCL is 20,000 pCi/l)
- Strontium-90 (8 pCi/l)
- Radium-226 and radium-228, combined (5 pCi/l)
- Natural uranium (20 pCi/l—based on chemical toxicity)

9.1.2. Discharges or releases of radioactivity into sources of drinking water may be subject to other regulation and enforcement and should be limited accordingly.

10. USE OF CURRENT ACTION LEVEL FOR RADON IN INDOOR AIR

10.1 The action level of 4 picocuries of radon per liter of air applies to residential indoor air, consistent with State and federal law.

11. USE OF FEDERAL STANDARDS FOR RADIUM IN SOILS

11.1 The Uranium Mill Tailings Radiation Control Act (UMTRCA) and regulations in 40 CFR 192 provide guidance for the cleanup of Department of Energy uranium mill tailing sites for unrestricted use. They state that a site must achieve a concentration of less than 5 pCi of radium per gram above the typical background level for the top 15 centimeters of soil. At depths greater than 15 cm, however, the maximum concentration of radium can be up to 15 pCi/g.

11.1.1. These standards are appropriate for use in situations involving radium contaminated soils, in the absence of other federal guidance. However, they do not apply to soil contaminated by spills or disposal of radium paint, or to radium-containing dials, knobs and gauges that are present in soil.

11.2 Section 11.1 notwithstanding, the NRC and EPA are developing guidance documents for the cleanup of residual radioactivity for property intended for unrestricted use.

12. HEALTH RISKS FROM URANIUM

12.1 In evaluating the human health concerns from uranium exposures, the risks associated with uranium's chemical toxicity (principally to the kidneys) may exceed the risks related to its radioactivity. Hence, each endpoint should be evaluated as cleanup options are being considered.

13. CALCULATIONS OF RADIATION EXPOSURES THAT RESULT FROM SELECTED RADIONUCLIDES IN WATER, AIR AND INGESTED SOIL

13.1. Comparison of concentrations of selected radionuclides in water, air and soil with various cancer risk levels (10^{-6}, 10^{-5}, or 10^{-4} lifetime cancer risk).

13.1.1. Table 13-1.1 presents various intake levels of selected radionuclides and the corresponding lifetime cancer risk from ingested contaminated water. Intakes from water to yield the various lifetime cancer risks are calculated from US EPA's Health Effects Assessment Summary (January 1992). The risk per pCi from US EPA is converted to pCi ingested for a specific cancer risk, divided by (365 days/yr x 70 yr =) 25,550 days, for a daily intake. This value is divided by 2 liters per day to yield corresponding radionuclide concentrations in ingested water.

Table 13-1.1. Concentrations of specific radionuclides in drinking water that would yield various lifetime cancer risks. The drinking water consumption rate is two liters per day for 70 years.

Radionuclide	Lifetime Cancer Risk: 10^{-6} (pCi/l)	10^{-5} (pCi/l)	10^{-4} (pCi/l)
Hydrogen-3	370	3,700	37,000
Carbon-14	22	220	2,200
Cobalt-60	1.3	13	130
Strontium-90	6	60	600
Iodine-131	0.55	5.5	55
Cesium-137	0.7	7	70
Radium-226	0.16	1.6	16
Uranium-238	1.3	13	130
Plutonium-239	0.085	0.85	8.5

13.1.2. Table 13-1.2 presents various intake levels of selected radionuclides and the corresponding lifetime cancer risk from inhaling contaminated air. Intakes from air to yield the various lifetime cancer risks are calculated from US EPA's Health Effects Assessment Summary (January 1992). The risk per pCi from US EPA is converted to pCi inhaled for a specific cancer risk, divided by (365 days/yr x 70 yr =) 25,550 days, for a daily intake. This value is divided by 20 cubic meters per day to yield corresponding radionuclide concentrations in inhaled air.

Table 13-1.2. Concentrations of specific radionuclides in air that would yield various lifetime cancer risks. The inhalation rate is 20 cubic meters of air per day for 70 years.

Radionuclide	Lifetime Cancer Risk: 10^{-6} (pCi/m^3)	10^{-5} (pCi/m^3)	10^{-4} (pCi/m^3)
Hydrogen-3	26	260	2,600
Carbon-14	320	3,200	32,000
Cobalt-60	0.01	0.1	1
Strontium-90	0.04	0.4	4
Iodine-131	0.08	0.8	8
Cesium-137	0.11	1.1	11
Radium-226	0.00065	0.0065	0.065
Uranium-238	0.00008	0.0008	0.008
Plutonium-239	0.00005	0.0005	0.005

13.1.3. Table 13-1.3 presents various intake levels of selected radionuclides and the corresponding lifetime cancer risk from ingested soil. Intakes from soil to yield the various lifetime cancer risks are calculated from US EPA's Health Effects Assessment Summary (January 1992). The risk per pCi from US EPA is converted to pCi ingested for a specific cancer risk, divided by (365 days/yr x 70 yr =) 25,550 days, for a daily intake. This value is divided by 0.1 gram per day, to yield corresponding radionuclide concentrations in ingested soil.

Table 13-1.3. Concentrations of specific radionuclides in ingested soil that would yield various lifetime cancer risks. The ingestion rate is 0.1 gram of soil ingested per day for 70 years.

Radionuclide	Lifetime Cancer Risk: 10^{-6} (pCi/g of soil)	10^{-5} (pCi/g of soil)	10^{-4} (pCi/g of soil)
Hydrogen-3	7,400	74,000	740,000
Carbon-14	430	4,300	43,000
Cobalt-60	26	260	2,600
Strontium-90	120	1,200	12,000
Iodine-131	11	110	1,100
Cesium-137	14	140	1,400
Radium-226	3.2	32	320
Radium-228	3.9	39	390
Uranium-238	25	250	2,500
Plutonium-239	0.17	1.7	17

14. CALCULATIONS OF EXTERNAL RADIATION EXPOSURES RESULTING FROM RADIONUCLIDES IN SOIL

14.1. Radionuclides in soil, besides presenting an opportunity for human exposure via the pathway of soil ingestion, can also result in human exposures from external radiation, owing to emissions related to their radiologic decay. Table 14-1 presents various concentrations of selected radionuclides and the corresponding lifetime cancer risk from external exposures (10^{-6}, 10^{-5}, or 10^{-4} lifetime cancer risk).

Table 14-1. Lifetime cancer risks from external exposures to radionuclides in soil. Lifetime cancer risks from radionuclides in soil are calculated from US EPA's Health Effects Assessment Summary (January 1992). The annual risk per pCi/g from US EPA is converted to lifetime risk by dividing the annual risk by 70 years.

Radionuclide	Lifetime Cancer Risk: 10^{-6} (pCi/g of soil)	10^{-5} (pCi/g of soil)	10^{-4} (pCi/g of soil)
Hydrogen-3	--	--	--
Carbon-14	--	--	--
Cobalt-60	0.002	0.02	0.2
Strontium-90	--	--	--
Iodine-131	0.01	0.1	1
Cesium-137*	0.007	0.07	0.7
Radium-226*	0.002	0.02	0.2
Radium-228*	0.005	0.05	0.5
Uranium-238*	0.4	4	40
Plutonium-239	840	8,400	84,000

*includes risks from radioactive decay chain products

15. SUMMARY

15.1. For closing military bases, the following should occur:

15.1.1. A complete history of the use, storage, and disposal of radioactive material should be documented. Where information is lacking, the discussion should identify the extent in information gaps.

15.1.2. Known discrete radioactive items should be removed.

15.1.3. Diffuse radioactive contamination should be removed to a level that minimizes the risk of exposure to people.

15.2. Cleanup levels can rely upon appropriate existing standards for water, air, and soil.

15.2.1 Cleanup of radioactivity in water need not be more restrictive than drinking water MCLs for radionuclides.

15.2.2 Radon in indoor air need not be considered of concern at concentrations below the federal and state radon action levels of 4 pCi radon per liter of air.

15.2.3. In the absence of federal regulation, cleanup of radium in soil need not be more restrictive than 5 pCi/g for the top 15 cm of soil, consistent with EPA rules for cleanup of uranium mill tailings.

15.3. For areas that are intended to have unrestricted use upon release to the public, exposures from radionuclide contamination associated with radionuclides other than those identified in 15.2, should not result in a cancer risk in excess of 10^{-6} to 10^{-4}, and should be consistent with the cancer risks resulting from residual chemical carcinogens.

15.3.1. The corresponding limit on the cancer risk for areas that are intended to be unrestricted upon release to the public corresponds to the annual radiation exposures of from about 0.02 to 2 millirems per year.

15.3.2. The annual radiation exposure of from 0.02 to 2 millirems per year for areas that are intended to be unrestricted upon release to the public is in excess of background radiation exposures.

15.3.3. Pursuant to existing California law, exposures that result in cancer risks greater than 10^{-5} may require the property owner to provide warnings to the public.

15.4. The method or methods of analysis for external radiation exposures and for external ambient background radiation exposures should be scientifically appropriate, and consistent with existing regulations or guidelines.

15.5. The method or methods of analysis for a radionuclide in a specific medium and for the ambient background concentration of a radionuclide in that medium should be scientifically appropriate, and consistent with existing regulations or guidelines.

15.6. For exposures from radionuclide contamination associated with radionuclides other than those identified in 15.2, the following applies: If the 10^{-6} to 10^{-4} cancer risk limit corresponds to a radiation exposure that is below background radiation exposures, cleanup should be to the level of non-detection (*i.e.*, to background levels).

15.6.1. If the cancer risk limit corresponds to a radiation exposure that is below background radiation exposures, then an external radiation exposure from radioactive contamination that is greater than background, using appropriate radiation monitoring and statistical methodologies, exceeds the limit. This finding should prompt further cleanup and reevaluation of whether the property is to be released for unrestricted use.

15.6.2. If the cancer risk limit corresponds to a concentration of radionuclide contamination in a given medium that is below the background concentration of that radionuclide in that medium, then a concentration of the radionuclide in a medium that is greater than its background concentration in that medium, using the appropriate method of analysis including appropriate statistical methods, exceeds the limit. This finding should prompt further cleanup and reevaluation of whether the property is to be released for unrestricted use.

16. REFERENCES

California Code of Regulations Title 22 Chapter 3. Safe Drinking Water and Toxic Enforcement Act of 1986, §12000 *et seq*. List of substances subject to the Act and implementing regulations.

California Department of Health Services, Radiologic Health Branch, Policy Memorandum "Clearance Inspection and Survey", Policy No. IPM-88-2, effective September 15, 1991.

California Health and Safety Code §25249.5, *et seq*., the Safe Drinking and Toxic Enforcement Act of 1986 ("Proposition 65").

California Health and Safety Code §44300, *et seq*., Air Toxics "Hot Spots" Information and Assessment Act of 1987.

Department of the Army, Corps of Engineers, Memorandum to Regional Commands Re: Awareness of Radioactive Materials Used at Department of Defense Facilities, December 8, 1993.

Department of Defense, Base Realignment and Closure (BRAC) Cleanup Plan (BCP) Guidebook, Fall 1993.

National Academy of Sciences/National Research Council, *Health Effects of Exposure to Low Levels of Ionizing Radiation*, BEIR V, NAS/NRC, 1990.

National Council on Radiation Protection and Measurements, *Limitation of Exposure to Ionizing Radiation*, NCRP Report No. 116, NCRP, 1993.

US Environmental Protection Agency, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final* , EPA 540-G-80-804, October 1988.

US Environmental Protection Agency, *Risk Assessment Guidance for Superfund: Volume I—Human Health Evaluation Manual (Part B, Development of Risk-based Preliminary Remediation Goals) , Interim,* (December 1991), EPA/540/R-52/003, December 1991.

US Environmental Protection Agency, Health Effects Assessment Summary, Table 4A, Radionuclide Carcinogenicity—Slope Factors (in Units of Picocuries), January 1992.

US Environmental Protection Agency, *Issues Paper on Radiation Site Cleanup Regulations,* EPA 402- -93-084, September 1993.

US Occupational Safety and Health Administration, Final Rule on Air Contaminants, 29 CFR Part 1910, Section 15, "Substances for which limits are based on avoidance of cancer," *Federal Register* 54: 2668, 1989.

US Nuclear Regulatory Commission, Below Regulatory Concern Policy Statement, 1990 (Withdrawn by NRC in 1993).

US Nuclear Regulatory Commission, A Summary of NRC's Interim Radiological Cleanup Criteria and Current Dose Bases, Decommissioning and Regulatory Issues Branch, November, 1992.

US Nuclear Regulatory Commission, *Residual Radioactive Contamination from Decommissioning, Technical Basis for Translating Contamination Levels to Annual Total Effective Dose Equivalent, Final Report,* by W. E. Kennedy, Jr., and D. L. Strange, NUREG/CR-5512, PNL-7994, Vol. 1, October 1992 (reprinted January 1993).

ENCLOSURE 5

South Coast
Air Quality Management District
21865 E. Copley Drive, Diamond Bar, CA 91765-4182
(909) 396-2000 · http://www.aqmd.gov

February 4, 2000

Department of Toxic Substances Control
Office of Military Facilities
5796 Corporate Avenue
Cypress, Ca 90630

Attn: Triss M. Chesney, P.E.
Remedial Project Manager

The AQMD appreciates your request for input into compiling Applicable or Relevant and Appropriate Requirements (ARAR's) for the Remediation of soil and groundwater associated with Operational Unit (OU) 3B, Installation Restoration Program (IRP) Site 16 - Crash Crew Training Pit No. 2, Marine Corps Air Station (MCAS) El Toro, CA. as stated in your letter dated February 3, 2000.

The following AQMD Rules and Regulations should be incorporated in the ARAR's.

Regulation IV - Prohibitions

Rule 401 - Visible Emissions
This rule limits any visible emissions from any single source to less than Ringlemann No. 1 or 20 percent opacity for 3 minutes in any hour (Ref. Health and Safety Code 41701).

Rule 402 - Nuisance
This rule prohibits the discharge of any air contaminant or other material (including odorous compounds) that causes injury or annoyance to the public, endangers the comfort, repose, health or safety of the public or causes damage to business or property. In general, a notice of violation may be issued upon receipt of six verified complaints or for any property damage or personal injury (Ref. Health and Safety Code 41700).

Rule 403 - Fugitive Dust

This rule limits on site activities so that the concentrations of fugitive dust at the property line shall not be visible. In addition, PM10 levels shall not exceed 50 micrograms per cubic meter as determined by the difference between upwind and downwind samples collected on high volume particulate matter samplers. These requirements do not apply if the wind gusts exceed 25 miles per hour. The rule also requires every reasonable precaution to minimize fugitive dust and the prevention and cleanup of any material accidently deposited on paved streets. This rule shall not apply during life-threatening situations or during a declared disaster or state of emergency.

Clean Air is Every Body's Business

Rule 404 - Particulate Matter
This rule limits equipment from discharging particulate emissions in excess of 0.01 to 0.196 grain per cubic foot based on a given volumetric (dry standard cubic feet per minute) exhaust gas flow rate averaged over one hour or one cycle of operation. It excludes steam generators or gas turbines.

Rule 405 - Solid Particulate Matter
This rule limits equipment from discharging particulate emissions in excess of 0.99 to 30 pounds per hour based on a given process weight.

Rule 407 - Liquid and Gaseous Air Contaminants
This rule limits equipment from discharging carbon monoxide emissions in excess of 2000 ppm and sulfur dioxide emissions of 500 ppm or greater averaged over 15 minutes. It excludes stationary internal combustion engines, propulsion of mobile equipment or emergency venting.

Rule 408 - Circumvention
This rule prohibits a person from building, erecting, installing or using any equipment, the use of which reduces or conceals an emission which would otherwise constitute a violation of these rules or Chapter 3 (starting with 41700) of Part 4, of Division 26 of the Health and Safety Code.

Rule 409 - Fuel Combustion Contaminants
This rule limits the emissions of particulate matter from the exhaust of a combustion source (such as a gas turbine) to 0.23 grams per cubic meter (0.1 grains per standard cubic foot) at 12 percent CO2 averaged over 15 minutes. It excludes internal combustion engines.

Rules 431.1, 431.2, 431.3 - Sulfur Content of Gaseous, Liquid or Fossil Fuels
These rules limit sulfur compounds from combustion of gaseous fuels not to exceed 40 ppm, 0.05 percent by weight for liquid fuels and 0.56 pounds of sulfur per million BTU for solid fossil fuels.

Rule 474 - Fuel Burning Equipment-Oxides of Nitrogen
This rule limits the concentration of oxides of nitrogen (as NO2) averaged over 15 minutes, from any non-mobile fuel burning equipment, to a range of 125 to 300 ppm for gaseous fuels and 225 to 400 ppm for solid and liquid fuels depending on equipment size.

Regulation X - National Emission Standards for Hazardous Air Pollutants

This regulation implements the provisions of Part 61, Chapter I, Title 40 of the Code of Federal Regulations (CFR) under the supervision of the AQMD Executive Officer. It specifies emissions testing, monitoring procedures or handling of hazardous pollutants such as beryllium, benzene, mercury, vinyl chloride and asbestos.

Regulation XI - Source Specific Standards

Rule 1150 - Excavation of Landfill Sites
This rule states that no person shall initiate excavation of an active or inactive landfill without an Excavation Management Plan approved by the Executive Officer of AQMD. The Plan shall provide information regarding the quantity and characteristics of the material to be excavated and transported and shall identify mitigation measures including gas collection and disposal, baling, encapsulating, covering the material and chemical neutralizing.

Rule 1166 - Volatile Organic Compound Emissions from Decontamination of Soil
This rule limits the emissions of volatile organic compounds (VOCs) from contaminated soil to less than 50 ppm. For contaminated soil with 50 ppm or greater, an approved mitigation plan, describing removal methods and mitigation measures, must obtained from the District prior to proceeding with the excavation. Uncontrolled spreading of contaminated soil is not permitted.

Regulation XIII - New Source Review

This rule applies to any new or modified equipment which may cause the issuance of any non-attainment air contaminant, ozone depleting compound or ammonia. It requires all equipment to be constructed with BACT (Best Available Control Technology). For non-attainment emission increases, it requires the emission increases to be offset and substantiated with modeling that the equipment will not cause a significant increase in concentrations of non-attainment contaminants.

Regulation XIV - Toxics

Rule 1401 - New Source Review of Carcinogenic Air Contaminants
This regulation specifies limits for cancer risk and excess cancer cases from new stationary sources and modifications to existing stationary sources that emit carcinogenic air contaminants. The rule establishes allowable emission impacts for all such stationary sources requiring new permits pursuant to AQMD Rules 201 or 203. Best Available Control Technology for Toxics (T-BACT) will be required for any system where a lifetime (70 years) maximum individual cancer risk of one in one million or greater is estimated to occur. Limits are calculated using risk factors for specific contaminants.

Best Available Control Technology (BACT) Guidelines document

This document was compiled by SCAQMD. Although a guideline, it set up BACT requirements for various types of equipment or process. BACT is determined on a permit-by-permit basis based on the definition of BACT. In essence, BACT is the most stringent emission limit or control technology that is:

- found in a state implementation plan (SIP), or
- achieved in practice, or
- is technologically feasible and cost effective.

For practical purposes, at this time, nearly all AQMD BACT determinations will be based on achieved in practice BACT because it is generally more stringent than BACT based on SIP, and because state law constrains AQMD from using the third approach.

If you have any questions regarding these regulations, please call Mr. Ted Kowalczyk at (909) 396-2592.

Very truly yours

Ed Merchlenkes for

Larry Bowen
Senior Manager
Toxic and Waste Management Team

LB:EM:TK

ARAR200.doc

ENCLOSURE 6

Opportunity Ahead

MCAS EL TORO LOCAL REDEVELOPMENT AUTHORITY • *Janice M. Mittermeier, Executive Director*
MCAS EL TORO MASTER DEVELOPMENT PROGRAM • *Michael L. Lapin, Manager*

February 17, 2000

Triss M. Chesney, P.E.
Remedial Project Manager
Office of Military Facilities, Southern California Branch
Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, California 90630

Dear Mr. Chesney:

Thank you for the opportunity to provide input on the proposed remediation of soil and groundwater at Marine Corps Air Station El Toro, Operable Unit 3B, Installation Restoration Program Site 16. Our office has prepared a preliminary list of ARARs that we believe may be applicable to the remediation of Site 16, a copy of which is attached.

As you know, identification of ARARs is a complex process that is driven, in large part, by the nature of the remedy selected for implementation. The cleanup of this site is still in the early stages, with only the remedial investigation having been completed thus far. As such, it is important to stress that the attached list is only a preliminary list of potential ARARs. As work progresses, we anticipate providing additional comments concerning ARARs and other aspects of the remedy proposed for Site 16 by the Department of Navy (DON).

Again, we appreciate the opportunity to provide these initial comments, and look forward to working closely with the Department of Toxic Substances Control to ensure that the most appropriate remedy for Site 16 is selected and implemented by DON. If you have any questions, please feel free to call me or Polin Modanlou of my staff at (714) 834-3156.

Sincerely,

Michael L. Lapin, Manager
MCAS El Toro Master Development Program

cc: Glenn Kistner, USEPA
Dean Gould, BRAC
Patricia Hannon, RWQCB
Steve Sharp, LEA

Attachment

PRELIMINARY LIST OF POTENTIALLY APPLICABLE ARARS
MCAS El Toro, Operable Unit 3B, Site 16

I. CHEMICAL-SPECIFIC ARARS

A. Resource Conservation and Recovery Act

1. Definition of RCRA hazardous waste; TCLP, TTLC and STLC regulatory levels: 22 Cal. Code Regs. §§ 66261.21, 66261.22(a), 66261.23, 66261.24(a)(1) and 66261.100.

2. Groundwater and vadose protection standards: 22 Cal. Code Regs. § 66264.94.

B. Cal-EPA Department of Toxic Substances Control

1. Definition of non-RCRA hazardous waste; TTLC and STLC regulatory levels: 22 Cal. Code Regs. §§ 66261, 66261.22(a)(3)-(4), 66261.24(a)(2)-(8), 66261.101, 66261.3(a)(2)(C) and 66261.3(a)(2)(F).

2. State MCL list: 22 Cal Code Regs. §§ 64435 and 64444.5.

3. State SMCL list: 22 Cal. Code Regs § 64473.

4. State action levels

C. State and Regional Water Quality Control Board

1. Groundwater quality protection:

a) Porter-Cologne Water Quality Control Act: Cal. Water Code §§ 13000, 13176, 13263, 13750 and 13751.

b) Comprehensive Water Quality Control Plan for the Santa Ana Basin: Cal. Water Code § 13240.

c) Policies regarding sources of drinking water: SWRCB Resolution No. 88-63 and Regional Board Resolution 89-42.

d) Policies and procedures for investigation, cleanup and abatement of discharges: Cal. Water Code §§ 13304, 13307; SWRCB Resolution 92-49.

e) Policies regarding maintenance of high quality waters in California: Cal. Water Code § 13140; SWRCB Resolution No. 68-16; Clean Water Act regulations, 40 CFR §131.12.

D. Orange County Fire Department

E. Orange County Health Care Agency

II. LOCATION-SPECIFIC ARARS

A. Hazardous Waste Control Act

1. Facilities constructed within floodplain: 22 Cal. Code Regs. § 66264.18(b).

B. Executive Order 11988

1. Protection of floodplains: 40 CFR Part 6.

C. California Endangered Species Act

1. Release of waters of the state: Cal. Fish & Game Code §§ 5650(a), (b) and (f).
2. Take of birds and mammals: Cal. Fish & Game Code § 3005.
3. Protection and conservation of fish and wildlife resources: Cal. Fish & Game Code §§ 1600, 1601 and 1603.
4. Endangered species habitat: Cal. Fish & Game Code §§ 2090 - 2096.
5. Endangered species habitat: Cal. Fish & Game Code § 2080.
6. Aquatic and Wildlife Species/Habitats: Cal. Fish & Game Code § 2014.
7. Rare native plants: Cal. Fish & Game Code §§ 2080 and 1908.
8. Wetlands: Fish and Game Commission Wetlands Policy (adopted 1987 and included in addenda to Cal. Fish & Game Code).

D. California Coastal Act of 1976

1. Coastal zone: Cal. Pub. Res. Code §§ 30000-30900; 14 Cal. Code Regs. §§ 13001 - 13666.4.

III. ACTION-SPECIFIC ARARS

A. Resource Conservation and Recovery Act

1. Determination of waste characteristics: 22 Cal. Code Regs. §§ 66262.10(a); 66262.11.

2. Transportation of hazardous wastes: 22 Cal. Code Regs. §§ 66262.30 - 66264.33.

3. Hazardous waste accumulation: 22 Cal. Code Regs. § 66264.34.

4. Storage of wastes: 22 Cal. Code Regs. §§ 66264.171 through 66264.175.

5. Removal of wastes; decontamination of containers: 22 Cal. Code Regs. § 66264.178.

B. Clean Air Act

1. Discharges to air: 40 U.S.C. § 7410; portions of 40 CFR Part 52.

2. New/modified sources of air pollution: SCAQMD Rule 1303.

C. South Coast Air Quality Management District

1. Nuisance standard that states a person shall not discharge from any source such quantities of air contaminants or other material that cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public: SCAQMD Rule 402.

2. Visible emissions: SCAQMD Rule 401.

3. Fugitive dust: SCAQMD 403.

4. New/modified sources of air pollution: SCAQMD Rule 1401.

5. All new sources of air pollution that may result in a net emission increase of any nonattainment air containment or

any halogenated hydrocarbons is to employ best available control technology (BACT): SCAQMD Rule 1303.

6. Permit to construct and permit to operate: SCAQMD Rules 201 and 203.

7. Volatile organic compound emissions from decontamination of soil: SCAQMD Rule 1166.

D. State Water Resources Control Board and Regional Water Quality Control Board

1. Water Quality Control Plans establishing beneficial uses and numerical and narrative standards to protect both surface water and groundwater quality:

   a) Porter-Cologne Water Quality Control Act: Cal. Water Code §§ 13000, 13176, 13263, 13750 and 13751.

   b) Comprehensive Water Quality Control Plan for the Santa Ana Basin: Water Code §13240.

   c) Policies and procedures for investigation, cleanup and abatement of discharges: Cal. Water Code § 13304, 13307; SWRCB Resolution 92-49.

   d) Policies regarding maintenance of high quality waters in California: Cal. Water Code §13140; SWRCB Resolution No. 68-16; CWA regulations, 40 CFR §131.12.

2. Permitting and testing of underground tanks; requirements for corrective action of discharges from tanks: Cal. Health & Safety Code, Division 20, Chapter 6.67; 23 Cal. Code Regs., Division 3, Chapter 16.

3. Guidance on allowable levels of petroleum hydrocarbons in soil: SWRCB, LUFT manual.

E. California Health and Safety Code

1. Emergency response plans for businesses handling hazardous materials: Cal. Health & Safety Code, Division 20, Chapter 6.95.

2. Regeneration of spent carbon: Cal. Health & Safety Code § 25142.2.