



Los Angeles Regional Water Quality Control Board

October 11, 2019

Mr. Alan Krieger
Deputy Director/Sanitation Services
City of Simi Valley
2929 Tapo Canyon Road
Simi Valley, CA 93065

Mr. Santos Marquez
Hill Canyon Treatment Plant Laboratory
Supervisor
City of Thousand Oaks
9600 Santa Rosa Road
Camarillo, CA 93012

Ms. Lucia McGovern
Deputy Director of Public Works
City of Camarillo/Camarillo Sanitary District
601 Carmen Drive
Camarillo, CA 930101

Dear Ms. McGovern, Mr. Marquez, and Mr. Krieger:

COMPLIANCE DETERMINATION FOR THE GROSS BETA/PHOTON EMITTERS IN THE TENTATIVE WASTE DISCHARGE REQUIREMENTS (WDRs) AND NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT FOR:

- CITY OF SIMI VALLEY, SIMI VALLEY WATER QUALITY CONTROL PLANT (NPDES NO. CA0055221, CI NO. 3021)
- CITY OF THOUSAND OAKS, HILL CANYON WASTEWATER TREATMENT PLANT (NPDES NO. CA0056294, CI NO. 4917)
- CITY OF CAMARILLO, CAMARILLO SANITARY DISTRICT (NPDES NO. CA0053597, CI NO. 1278)

On September 18, 2019, the Los Angeles Regional Water Quality Control Board (Regional Water Board) staff transmitted the tentative WDRs and NPDES permits for the referenced facilities for public comments. Section VII.R of the Limitations and Discharge Requirements of the Tentative WDRs prescribes compliance determination for the Gross Beta/photon Emitters. The method for determining compliance with the effluent limitation for Gross Beta/photon Emitters in the Tentative WDRs does not consider naturally occurring gross beta from Potassium-40, which may lead in some cases to misidentification of samples as exceeding the Gross Beta effluent limitation.

Therefore, the Regional Water Board has revised the Tentative WDRs to clarify the compliance determination for Gross Beta/photon Emitters. Section VII.R of the Limitations and Discharge Requirements shall read as follows:

IRMA MUÑOZ, CHAIR | RENEE PURDY, EXECUTIVE OFFICER

VII.R. Compliance with Gross Beta/photon Emitters

The monthly average effluent limitation for gross beta/photon is equal to 4 millirem/year with a screening level of 50 picoCuries per liter (pCi/L). Due to naturally occurring Potassium-40, the results of the Potassium-40 gross beta activity may be subtracted from the total gross beta activity to determine if the screening level is exceeded. The Potassium-40 beta particle activity must be calculated by multiplying elemental potassium concentrations (in mg/l) by a factor of 0.82 to determine activity from Potassium-40. The Potassium-40 must be analyzed from the same or equivalent sample used for the gross beta analysis.

If the gross beta particle activity minus the naturally occurring Potassium-40 is less than or equal to 50 pCi/L, the facility is in compliance and the value shall be reported as <4 millirem/year. If the gross beta particle activity minus the naturally occurring Potassium-40 beta particle activity exceeds the screening level, the Permittee must have the samples further analyzed for the *individual* nuclides. The calculation for the sum of the fractions is presented below.

The maximum contaminant level (MCL) for gross beta/photon emitters is equal to 4 millirem per year. A millirem is a dose of energy to the body or any internal organ. USEPA regulates 179 man-made nuclides, and each of them has a concentration of radiation measured in pCi/L, which produces the 4 millirem dose. These concentrations are listed on table, *Derived Concentrations of (pCi/L) of Beta and Photon Emitters in Drinking Water*, which shall be used to determine compliance.

Derived Concentrations (pCi/l) of Beta and Photon Emitters in Drinking Water

Yielding a Dose of 4 mrem/yr to the Total Body or to any Critical Organ as defined in NBS Handbook 69

Nuclide	pCi/l	Nuclide	pCi/l	Nuclide	pCi/l	Nuclide	pCi/l	Nuclide	pCi/l	Nuclide	pCi/l
H-3	20,000	Ni-65	300	Nb-95	300	Sb-124	60	Nd-147	200	Os-191	600
Be-7	6,000	Cu-64	900	Nb-97	3,000	Sb-125	300	Nd-149	900	Os-191m	9,000
C-14	2,000	Zn-65	300	Mo-99	600	Te-125m	600	Pm-147	600	Os-193	200
F-18	2,000	Zn-69	6,000	Tc-96	300	Te-127	900	Pm-149	100	Ir-190	600
Na-22	400	Zn-69m	200	Tc-96m	30,000	Te-127m	200	Sm-151	1,000	Ir-192	100
Na-24	600	Ga-72	100	Tc-97	6,000	Te-129	2,000	Sm-153	200	Ir-194	90
Si-31	3,000	Ge-71	6,000	Tc-97m	1,000	Te-129m	90	Eu-152	200	Pt-191	300
P-32	30	As-73	1,000	Tc-99	900	Te-131m	200	Eu-154	60	Pt-193	3,000
S-35 inorg	500	As-74	100	Tc-99m	20,000	Te-132	90	Eu-155	600	Pt-193m	3,000
Cl-36	700	As-76	60	Ru-97	1,000	I-126	3	Gd-153	600	Pt-197	300
Cl-38	1,000	As-77	200	Ru-103	200	I-129	1	Gd-159	200	Pt-197m	3,000
K-42	900	Se-75	900	Ru-105	200	I-131	3	Tb-160	100	Au-196	600
Ca-45	10	Br-82	100	Ru-106	30	I-132	90	Dy-165	1,000	Au-198	100
Ca-47	80	Rb-86	600	Rh-103m	30,000	I-133	10	Dy-166	100	Au-199	600
Sc-46	100	Rb-87	300	Rh-105	300	I-134	100	Ho-166	90	Hg-197	900
Sc-47	300	Sr-85 m	20,000	Pd-103	900	I-135	30	Er-169	300	Hg-197m	600
Sc-48	80	Sr-85	900	Pd-109	300	Cs-131	20,000	Er-171	300	Hg-203	60
V-48	90	Sr-89	20	Ag-105	300	Cs-134	80	Tm-170	100	Tl-200	1,000
Cr-51	6,000	Sr-90	8	Ag-110m	90	Cs-134m	20,000	Tm-171	1,000	Tl-201	900
Mn-52	90	Sr-91	200	Ag-111	100	Cs-135	900	Yb-175	300	Tl-202	300
Mn-54	300	Sr-92	200	Cd-109	600	Cs-136	800	Lu-177	300	Tl-204	300
Mn-56	300	Y-90	60	Cd-115	90	Cs-137	200	Hf-181	200	Pb-203	1,000
Fe-55	2,000	Y-91	90	Cd-115m	90	Ba-131	600	Ta-182	100	Bi-206	100
Fe-59	200	Y-91m	9,000	In-113m	3,000	Ba-140	90	W-181	1,000	Bi-207	200
Co-57	1,000	Y-92	200	In-114m	60	La-140	60	W-185	300	Pa-230	600
Co-58	300	Y-93	90	In-115	300	Ce-141	300	W-187	200	Pa-233	300
Co-58m	9000	Zr-93	2,000	In-115m	1,000	Ce-143	100	Re-186	300	Np-239	300
Co-60	100	Zr-95	200	Sn-113	300	Ce-144	30	Re-187	9,000	Pu-241	300
Ni-59	300	Zr-97	60	Sn-125	60	Pr-142	90	Re-188	200	Bk-249	2,000
Ni-63	50	Nb-93m	1,000	Sb-122	90	Pr-143	100	Os-185	200		

The sum of the fraction method is used because each photon emitter targets a different organ of the body, which results in a different magnitude of risk. The sum of the beta and photon emitters shall not exceed 4 millirem/year (40 CFR 141.66(d)(2)).

Each nuclide has a different concentration that produces 4 millirem dose because different radionuclides have different energy levels. Some nuclides need to be in a higher concentration to give the same 4 millirem dose.

The laboratory shall measure the nuclide concentration in the water and compare this result to the concentration allowed for that particular nuclide (see table below). The comparison results in a fraction. This is shown in the calculation below:

Fraction of the maximum 4 millirem/year exposure limit

$$= \frac{\text{pCi/L found in sample (from laboratory results)}}{\text{pCi/L equivalent from 4 millirem of exposure (from conversion table)}}$$

Each fraction must then be converted to a dose equivalent of 4 millirem/year by multiplying the fraction by 4. The results for each emitter must be summed to determine compliance.

A sample calculation is presented in the table below:

Emitter	X Lab Analysis (pCi/L)	Y Conversion from table (pCi/4millirem)	X/Y Calculate Fraction	4(X/Y) Calculate Total (millirem)
Cs-134	5,023	20,000	0.25115	1.0
Cs-137	30	200	0.150	0.6
Sr-90	4	8	0.5	2.0
I-131	2	3	0.7	2.8
Sum of the Fractions			1.60115	6.4

The system would be considered in violation of the gross beta/photon effluent limitation if the "sum-of-the-fractions" is 6.4 millirem, which means that the sum of the annual dose equivalent to the total body, or to any internal organ, exceeds 4 millirem/year.

If you have any questions, please contact Raul Medina at (213) 620-2160 or Veronica Cuevas at (213) 576-6662.

Sincerely,



Jeong-Hee Lim, Ph.D., P.E., Chief
Municipal Permitting Unit (NPDES)

Mr. Alan Krieger, Mr. Santos Marquez, Ms. Lucia McGovern
Simi Valley WQCP, Hill Canyon WWTP, Camarillo SD

October 11, 2019

cc:

Environmental Protection Agency, Region 9, Permits Branch (WTR-2-3)
NOAA, National Marine Fisheries Service
Department of Interior, U.S. Fish and Wildlife Service
Department of Fish and Game, Region 5
California State Parks and Recreation
State Coastal Conservancy
Ventura County Planning Commission
Ventura County Department of Environmental Health
Ventura County Department of Public Health
Ventura County Department of Public Works, Flood Control and Drainage
Ventura Regional Sanitation District
Ventura Coast Keeper
Heal the Bay
Environment Now
Los Angeles Waterkeeper
Natural Resources Defense Council