REGION 9
SAN FRANCISCO, CA 94105

Sent via email only

Michelle C.R. Lastimoza
Administrator
Guam Environmental Protection Agency
17-3304 Mariner Avenue
Tiyan Barrigada, Guam 96913-1617

Re: EPA Approval of Clean Water Act Total Maximum Daily Loads (TMDLs) for Chlordane and Dieldrin in Tumon Bay

Dear Administrator Lastimoza,

I am pleased to approve the subject TMDLs which are consistent with the requirements of the Clean Water Act and supported by robust science and stakeholder engagement. The approved TMDLs describe the applicable water quality standards and sources of chlordane and dieldrin that cause water quality impairments, set appropriate numeric targets, and provide reasonable load and waste load allocations to protect the designated uses in Tumon Bay. The basis of EPA's evaluation is described in the enclosure.

I look forward to our continued partnership to protect water quality and advance human health and wildlife protection. Please call me if you would like to discuss further, or your staff may contact David Guiliano at guiliano.dave@epa.gov (415) 947-4133 for specific questions concerning this approval.

Sincerely,

Digitally signed by
TOMAS TORRES
Date: 2025.08.12
11:05:38 -07'00'

Tomás Torres
Director, Water Division

Enclosure

Cc: Captain Elizabeth DeGrange, Guam EPA
Margaret Aguilar, Guam EPA

Enclosure

EPA Analysis of Total Maximum Daily Loads for Chlordane and Dieldrin in Tumon Bay, Guam

Territory:	Guam
Waterbodies:	Tumon Bay
Pollutant:	Chlordane and Dieldrin
Date EPA Received Complete Submission:	March 18, 2025
EPA Reviewer:	David Guiliano

1. Introduction

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) be developed for those water quality limited segments identified as impaired by the state, territory, or authorized tribe where technology-based and other required controls do not provide for attainment of water quality standards. A TMDL is a determination of the amount of a pollutant from point, nonpoint, and natural background sources that can be present in a waterbody without causing an impairment.

Under section 303(d)(2) of the CWA, the U.S. Environmental Protection Agency (EPA) is charged with reviewing and approving or disapproving TMDLs developed by states, territories, or authorized tribes. EPA's regulations at 40 C.F.R. § 130.7(d)(2) provide that EPA's approval or disapproval of TMDLs shall be based on requirements of the CWA as described in 40 C.F.R. § 130.7(c). EPA's "Guidelines for Reviewing TMDLs under Existing Regulations issued in 1992"[1] summarizes the applicable statutory and regulatory requirements relating to TMDL review and approval or disapproval. In addition to the 2002 EPA guidelines, EPA has issued program memos and other documents that inform its review that are referenced in this decision document.

This document describes EPA's rationale for approving the Tumon Bay TMDLs for chlordane and dieldrin pursuant to CWA 303(d)(2), 33 U.S.C. § 1313(d)(2), and 40 C.F.R. § 130.7.

2. Submittal

The Guam Environmental Protection Agency (Guam EPA) adopted TMDLs for chlordane and dieldrin in Tumon Bay and submitted as one combined TMDL package by letter from Michelle C.

[1] U.S. EPA. 2002. Guidelines for Reviewing TMDLs under Existing Regulations Issued in 1992, May 20, 2002. Office of Water, Washington DC.

R. Lastimoza, Administrator of Guam EPA to Tomás Torres, EPA Region 9 Water Division Director, on March 18, 2025.

Guam's submittal package includes:

(1) Total Daily Maximum Load Technical Report for chlordane and dieldrin in Tumon Bay, Guam River Basin (TMDL Report), January 2024.
(2) Submittal Letter from Guam EPA Administrator Michelle C. R. Lastimoza to Tomás Torres of US EPA, dated March 19, 2025.

EPA finds that Guam's submission of TMDLs for chlordane and dieldrin in Tumon Bay is complete.

3. Identification of the Waterbodies and Pollutants of Concern

Tumon Bay in Guam is identified on Guam's CWA section 303(d) list as impaired aquatic life and (fish) consumption uses from chlordane and dieldrin (Table 1). There are two pollutant-waterbody combinations addressed by the Guam Tumon Bay Chlordane and Dieldrin TMDL package.

Table 1. Section 303(d) Listed Waterbodies Addressed in the Tumon Bay TMDL for Chlordane and Dieldrin

Waterbody ID	Waterbody Name	Pollutants	CWA 303(d) List Status
GUG-001C	Tumon Bay	Chlordane	Impaired
GUG-001C	Tumon Bay	Dieldrin	Impaired

EPA finds that Guam appropriately identified the of listed and impaired waterbodies addressed by these TMDLs.

4. Water Quality Standards

TMDL submittals must include a description of the applicable state/territory/tribal water quality standards, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion (WQC), and the state/territory/tribe antidegradation policy.[2] TMDLs shall be established at levels necessary to attain and maintain applicable narrative and numeric water quality standards.[3]

The TMDLs identify the appropriate water quality standards including numeric water quality criteria and beneficial uses (Table 2). The TMDLs address impairments of the Aquatic life, and human health, consumption of organisms only beneficial uses in Tumon Bay. Guam Water Quality Standards contain numeric criteria for chlordane and dieldrin for protection of aquatic life and human health uses. The TMDLs are designed to meet the most stringent numeric water

[2] EPA 2002 p. 2; 40 C.F.R. §130.7(c)(1)
[3] 40 C.F.R. § 130.7(c)(1)

quality criteria, in this case, Human Health criteria for consumption of organisms and therefore are designed to meet all WQC.

Table 2. Numeric Water Quality Criteria (WQC) for Priority Toxic Pollutants [4]

A			B		C		D	
#	COMPOUND	CAS Number	FRESHWATER		SALTWATER		HUMAN HEALTH For Consumption of:	
			CMCd	CCCd	CMCd	CCCd	Water & Organisms	Organism Only
			(ug/1) B1	(ug/1) B2	(ug/1) C1	(ug/1) C2	(ug/1) D1	(ug/1) D2
107	Chlordane	57749	2.4 f	0.0043f	0.09 f	0.004 f	0.0021 a, b	0.0022 a, b
111	Dieldrin	60571	0.24 m	0.056 m	0.71 f	0.0019 f	0.00014 a,b	0.00014 a,b

FOOTNOTES:

a. *These criteria have been revised to reflect the U.S. E.P.A. ql*or RID, as contained in the Integrated Risk Information System ("IRIS") as of October 1, 1996. The fish tissue bioconcentration factor ("BCF") from the 1980 documents was retained in each case.*

b. *These criteria are based upon carcinogenicity of 10 (-6) risk.*

f. *These aquatic life criteria for these compounds were issued by the U.S. E.P.A. in 1980 utilizing the 1980 Guidelines for criteria development. The acute values shown are final acute values ("FAV"), which by the 1980 Guidelines are instantaneous values as contrasted with a CMC which is a short-term average.*

m. *This criterion has been recalculated pursuant to the 1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water, Office of Water, EPA-820-B-96-001, September, 1996. See also Great Lakes Water Quality Initiative Criteria Documents for the Protection of Aquatic Life in Ambient Water, Office of Water, EPA-80-B-95-004, March, 1995.*

5. Numeric Targets

Numeric targets represent acceptable levels of pollutants that will result in the desired water quality conditions. The TMDL sets numeric targets equal to the most stringent WQC for both chlordane and dieldrin.

The numeric targets “were set equal to the lowest value from [the water quality criteria] for each pollutant” associated with the WQC for consumption of organisms (Table 4).

[4] Guam Environmental Protection Agency (Guam EPA). Water Quality Standards -2015. “Numerical Criteria for Priority Toxic Pollutants.” Chapter 5, p. 83, 86, and 78.

Table 4. Tumon Bay TMDL Numeric Targets [5]

Pollutant	TMDL Numeric Target (µg/L)
Chlordane	0.0022
Dieldrin	0.00014

The TMDLs also identify supplemental criteria and screening values, as shown in Table 5.

Table 5. Guam WQC and Screening Values for Groundwater, Sediment, and Fish Tissue [6]

Pollutant	Groundwater (µg/L)	Sediment* (mg/kg)	Fish Tissue Screening Value – Recreational Fishers (µg/kg)	Fish Tissue Screening Value – Subsistence Fishers (µg/kg)
Chlordane	2	29	114	14
Dieldrin	0.056**	30	2.5	0.307

* Sediment criteria is based on "unlithified material in the vadose zone that is situated above the capillary fringe of the shallowest saturated unit" (Brewer, 2013). While not directly related to the soils sampled, the application of this criteria has been deemed the most applicable.

** Guam WQS do not have a groundwater level for this parameter. This value is based on the freshwater chronic concentration for priority toxic pollutants (Appendix A, column B2 of Guam's WQS [GEPA, 2015]).

EPA concludes the targets are established at levels necessary to indicate attainment of applicable water quality criteria because they are equal to the lowest criteria within the standards for each pollutant. EPA finds that Guam's numeric targets are reasonable and appropriate and finds the territory provided adequate basis for the targets. EPA notes that while the supplemental criteria will inform TMDL implementation they do not change the underlying numeric targets.

6. Source Analysis

The TMDL contains a source analysis to identify the major sources of chlordane and dieldrin in the watershed. Chlordane was banned by EPA in 1988, and dieldrin was partially banned in 1974 and subsequently banned for all uses in 1987 therefore current sources are most likely due to legacy use.

The TMDL states:

> *Chlordane and dieldrin are both chlorinated cyclodienes that were used as insecticides…Both chemicals were also used as a termiticide; however, it is unclear if the chemicals were applied for this use in agricultural areas or in more developed areas associated with construction activities.*
>
> *…It is possible that these chemicals were historically applied in the watershed and are continuing to slowly leech into the aquifer due to their persistent characteristics and*

[5] Guam EPA. TMDL Report. January 2024. p. 11, Table 4-2.
[6] Guam EPA. TMDL Report. January 2024. p. 11, Table 4-3.

affinity to bind with sediment; however, data to support this potential source are not available. [7]

"At this time no active sources of chlordane or dieldrin loading from point or nonpoint sources have been identified. It is likely that loading from the coastal springs to Tumon Bay is due to historical contamination of the groundwater. Provided that there are no active sources of the pollutants within the watershed, contamination within the aquifer will undergo natural attenuation, resulting in decreasing loading over time until the legacy contamination is exhausted." [8]

Section 6.1 of the TMDLs further describes the mechanisms that transport chlordane and dieldrin from the source's location to Tumon Bay, usually from the surface, through groundwater/aquifers, ultimately reaching the bay itself. The TMDL report cites a study[9] that indicated that transport from the source to the aquifer and through to the bay, could potentially happen in as little as 7 to 18 days. The report also identified sources unlikely to be transported through the aquifer such as direct discharge to a storm drain or stream that reaches the bay. Table 6 summarizes the TMDL's findings on non-sources, potential point and nonpoint sources.

Table 6. Potential Sources by TMDL Pollutant [10]

	Pollutant	
Pollutant Source	**Chlordane**	**Dieldrin**
Point sources		
Sewage Treatment Plants (GWA)		
Stormwater permits	•	•
Minor NPDES: construction general permit	•	•
Nonpoint sources		
Agriculture	•	•
Stormwater runoff (non-permitted)	•	•
Military	•	•
Landfills and Dumps	•	•
Legacy sediment	•	•
Ocean Natural Background		
Atmospheric Deposition		

The TMDL also identifies each category of discharge, including individual discharges, and their potential to contribute chlordane and dieldrin to Tumon Bay. Most sources in the table above had some potential as sources of chlordane and dieldrin to Tumon Bay. Sources with the most

[7] Guam EPA. TMDL Report. January 2024. p. 28.
[8] Guam EPA. TMDL Report. "8.2.1 Chlordane and Dieldrin" January 2024. p. 38.
[9] Moran, D.C. and J. Jenson. 2004. Dye Trace of Groundwater Flow from Guam International Airport and Harmon Sink to Agaña Bay and Tumon Bay, Guam. Water and Environmental Research Institute (WERI) of the Western Pacific University of Guam, Technical Report No. 97. September 2004.
[10] Guam EPA. TMDL Report. "Potential Sources by TMDL Pollutant." January 2024. p. 21-22, Table 6-1.

potential include agriculture, military activities and/or military areas, and potentially stormwater in urbanized areas with impervious surfaces from historical use of chlordane and dieldrin on commercial and/or hotel properties. The source analysis concludes that chlordane and dieldrin are not likely to be contributed to Tumon Bay from sewage treatment plants, ocean natural background, or atmospheric deposition. [11]

EPA finds the source analysis adequately identifies the potential sources of point source facilities and nonpoint source pollution.

7. Loading Capacity

A loading capacity is defined as "[t]he greatest amount of a pollutant that a water can receive without violating water quality standards."[12] A TMDL must identify the loading capacity of a waterbody for the applicable pollutant.[13] The pollutant loadings may be expressed as either mass-per-time, toxicity, or other appropriate measures. [14]

Loading capacities for nutrient compounds in the Tumon Bay TMDLs are expressed as mass-based loads, consistent with 40 C.F.R. § 130.2(i).

The Tumon Bay TMDLs used a Tidal Prism model to compute a maximum daily loading capacity for chlordane and dieldrin. Those capacities are shown in the Table 7 below:

Table 7. Tumon Bay Loading Capacity, Existing Load, and Required Load Reduction [15]

Parameter	Chlordane	Dieldrin
TMDL Numeric Target (µg/L)	0.0022	0.00014
Loading Capacity	12 g/day	0.77 g/day
Existing Load	15 g/day	3.4 g/day
Required Load Reduction	3 g/day	2.6 g/day
Percent Reduction Needed	20%	77%

EPA finds the TMDLs determination of loading capacity to be reasonable.

8. Wasteload and Load Allocations

A TMDL must include wasteload allocations (WLAs) and load allocations (LAs), which identify the portion of the loading capacity allocated to point sources and nonpoint sources, respectively.[16] TMDLs and associated WLAs and LAs should include a daily time increment. They

[11] Guam EPA. TMDL Report. "8.2.1 Chlordane and Dieldrin" January 2024. p. 21 and 30.
[12] 40 CFR. § 130.2(f)
[13] CWA section 303(d)(1)(c), 33 U.S.C. § 131(d)(1)(c), and 40 C.F.R. § 130.2(e)
[14] 40 C.F.R. § 130.2(i)
[15] Guam EPA. TMDL Report. "Tumon Bay Loading Capacity, Existing Load, and Required Load Reduction." January 2024. p. 37-38, Table 8-1.
[16] 40 C.F.R. §§ 130.2(g)(h) and (i)

may also contain other appropriate temporal expressions that may be useful to implement the relevant water quality standard.[17]

The Tumon Bay TMDLs set all wasteload and load allocations to zero because application of chlordane and dieldrin has been prohibited since late 1980s (Table 8). In addition, the TMDL did not identify any active sources of these pollutant loading from either point or nonpoint sources.[18]

Table 8. Tumon Bay Chlordane and Dieldrin Allocations [19]

Parameter	TMDL	=	WLA	+	LA	+	MOS
Chlordane:	12 g/day	=	0 g/day	+	0 g/day	+	12 g/day
Dieldrin:	0.77 g/day	=	0 g/day	+	0 g/day	+	0.77 g/day

Entities regulated under NPDES permits, including municipalities and facilities, are regarded as point sources of pollutants and are assigned wasteload allocations. The TMDLs assign WLAs to four individually regulated NPDES-permitted facilities shown in Table 9 below.

Table 9. Chlordane and Dieldrin WLAs [20]

NPDES ID	Facility Name	Existing Load	WLA	Percent Reduction Required
GU0020141	Northern District Sewage Treatment Plant	0	No discharge of pollutant[1]	0
GU0020087	Agaña/Hagåtña Sewage Treatment Plant	0	No discharge of pollutant[1]	0
GUS040001	Guam Department of Public Works Municipal Separate Storm Sewer System	0	No discharge of pollutant[1]	0
GUR100000	Sites within the Tumon Bay watershed covered under the Construction General Permit	0	No discharge of pollutant [1, 2]	0

1. Applicable to both discharges of chlordane and discharges of dieldrin. Laboratory results which show that the substance was not detected at a quantifiable level shall be deemed to show compliance with the WLA unless other information indicates that the substance may be present.
2. This WLA will be met through adherence to a site- or project-specific SWPP.

Consistent with the wasteload allocations and absence of identified nonpoint sources of chlordane and dieldrin, load allocations are also set to zero. The TMDL further states that:

> *…there are no known active sources of these pollutants within the watershed and the assigned allocations are designed to assure the elimination of loading of chlordane and dieldrin to the aquifer which ultimately discharges to Tumon Bay. Attainment of applicable chlordane and dieldrin WQS is reliant on the throttling of all active sources of loading, prevention of new sources of loading, and the eventual natural attenuation of*

[17] U.S. EPA. 2002

[18] Guam EPA. TMDL Report. "8.2.1 Chlordane and Dieldrin" January 2024. p. 38.

[19] Guam EPA. TMDL Report. January 2024. p. 39, Table 8-2.

[20] Guam EPA. TMDL Report. p. 40, Table 8-3.

legacy contamination within the groundwater aquifer. [21]

EPA finds the TMDLs include reasonable WLA and LA allocations to meet the numeric targets.

9. Margin of Safety (MOS)

A TMDL must include a margin of safety (MOS) to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality.[22] There are two methods for incorporating a MOS in the TMDL analysis: implicitly include the MOS using conservative assumptions, or explicitly designate a numeric portion of the TMDL as the MOS. In these TMDLs, the MOS is set explicitly as a minimum of 10% of an unallocated load. The TMDL further states, "For chlordane and dieldrin, the TMDL goal is to reduce all sources to a "no discharge" condition and the entirety of the load is placed in the MOS order for the TMDL equation to balance."[23]

EPA finds the TMDLs use of an explicit margin of safety is reasonable.

10. Seasonal Variations and Critical Conditions

TMDLs must consider seasonal variation and critical conditions for stream flow, loading, and water quality parameters as part of the analysis of loading capacity.[24]

The TMDLs determined that, "a long term annual average critical condition- as opposed to a seasonal or shorter duration critical condition- is the most reasonable averaging duration to apply to the human health-based impairments identified for Tumon Bay."[25] EPA notes applicable WQC are designed to protect beneficial uses (Human Health) taking into account seasonal variations and critical conditions.

EPA finds the consideration of seasonal variations and critical conditions in the TMDLs to be appropriate.

11. Reasonable Assurances

Where a TMDL includes allocations assigned to point sources, the issuance of NPDES permits provides the reasonable assurance that the wasteload allocations contained in the TMDL will be achieved. This is because 40 C.F.R. § 122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with, "the assumptions and requirements of any available wasteload allocation" in an approved TMDL. When a TMDL is developed for waters impaired by both point and nonpoint sources, if the WLA is based on an assumption that nonpoint source load reductions will occur, reasonable assurance that the nonpoint source reductions will occur must be explained.[26]

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[21] Guam EPA. TMDL Report. January 2024. p. 40.
[22] CWA section 303(d)(1)(C); 40 C.F.R. § 130.7(c)(1); EPA 2002
[23] Guam EPA. TMDL Report. "8.4 Margin of Safety" January 2024. p. 40-41.
[24] 40 C.F.R. § 130.7(c)(1); EPA 2002
[25] Guam EPA. TMDL Report. "8.3 Seasonality and Critical Conditions" January 2024. p. 40.
[26] U.S. EPA. 2002.

For the Tumon Bay TMDLs, both wasteload and load allocations are set to zero, and the TMDLs did not include any active sources of these pollutant loading from either point or nonpoint sources .[27] The absence of new sources combined with the ban of both pollutants provides reasonable assurance. In addition, the TMDL describes a range of monitoring activities, safe disposal programs, stakeholder outreach, educational programs.

EPA finds the TMDLs provide reasonable level of assurance that nonpoint source controls are sufficient to achieve the TMDLs.

12. Public Participation

EPA's regulations at 40 C.F.R. § 130.7(a) require that the TMDL development process, including involving the public, shall be clearly described in the State or Territory's Continuing Planning Process (CPP). Guam EPA provided public notice in the Guam Daily Post, Guam EPA's website and made the documents available at Guam EPA offices and on its website, and also provided public notice of an opportunity to comment, from March 19, 2024 to April 18, 2024. **[28]** No public comments were received.[29]

EPA finds that Guam followed its CPP and provided adequate opportunities for public participation and comment.

[27] Guam EPA. TMDL Report. "8.2.1 Chlordane and Dieldrin" January 2024. p. 38.
[28] Guam EPA. "Public Notice: Public Commenting Period: Tuesday, March 19, 2024 – Thursday, April 18, 2024: Draft Report: Chlordane & Dieldrin TMDLs for Tumon Bay." Email from Guam EPA to US EPA on March 13, 2024 and in the Guam EPA TMDL Report, p. 41.
[29] Guam EPA. Email from Guam EPA to US EPA on May 22, 2024 and in the Guam EPA TMDL Report, p. 41.