



October 16, 2001

Mr. Paul A. Rakowski, Code EV2
Atlantic Division, Naval Facilities Engineering Command
Environmental Division
6500 Hampton Boulevard, Building A
Norfolk, VA 23508-1297

RE: Isla de Vieques Bombing Range, Puerto Rico: Focused Petitioned Public Health Assessment

Dear Mr. Rakowski:

The Agency for Toxic Substances and Disease Registry (ATSDR) is pleased to provide you with three copies of the Final Release version (October 16, 2001) of our focused petitioned public health assessment of Isla de Vieques Bombing Range. This health assessment is ATSDR's evaluation of any past, current, or future impacts on the health of people who work and live in the community from releases of environmental contaminants from the facility.

Copies of a questionnaire designed to help us improve our communications are also enclosed. We are interested in knowing whether we have presented our findings clearly. Readers' responses will help us make our reports better. Please furnish a copy of the questionnaire to each person who receives a copy of the health assessment and ask each of them to complete the questionnaire and mail it to us. No postage is necessary.

If you have any questions about the report or ATSDR's public health activities at Isla de Vieques Bombing Range, do not hesitate to contact the health assessor, Mark Weber, at (404) 498-0371. Thank you for your time and interest.

Sincerely yours,

Max M. Howie, Jr.
Chief, Program Evaluation, Records, and Information Services Branch
Division of Health Assessment and Consultation
ATSDR, Mailstop E-56
1600 Clifton Road, NE
Atlanta, GA 30333

Enclosures

You May Contact ATSDR TOLL FREE at
1-888-42ATSDR
or
Visit our Home Page at: <http://www.atsdr.cdc.gov>

Groundwater and Drinking Water Public Health Assessment for Isla de Vieques, Puerto Rico

October 17, 2001

This fact sheet contains highlights of the Groundwater and Drinking Water Public Health Assessment for Isla de Vieques, Puerto Rico, released October 17, 2001. The Agency for Toxic Substances and Disease Registry has addressed, as appropriate, comments received on the **draft** of the water document released for public comment February 20. The overall conclusions drawn in the draft assessment remain the same in the October 17 version.

What is ATSDR?

◆ The Agency for Toxic Substances and Disease Registry (ATSDR) is a federal public health agency with headquarters in Atlanta, Georgia. The agency's mission is to prevent harm to human health from exposure to hazardous substances present in the environment.

Why did ATSDR come to Vieques?

◆ In May 1999, an island resident requested (petitioned) ATSDR to evaluate any health effects of island residents that might be associated with potential releases of hazardous substances as a result of bombing range activities on the island.

How does ATSDR determine if there is a danger to human health at a site?

◆ Exposure Pathways

ATSDR must first find out whether there is a way that people could contact a hazardous substance. Without a way to contact a hazardous substance (an *exposure pathway* to that

substance), a person could not be harmed by the substance.

Exposure can result if people contact a contaminant at its source or if the substance moves from the source to a place where people can contact it. Contaminants can move through air, soil, and water, and, at times, through food we eat. ATSDR looks at air, soil, water, or food *pathways* to determine if hazardous substances could reach people and cause harmful effects to their health.

*To be harmed by a substance,
a
person must first come in contact
with that substance*

◆ Water Pathway

On Vieques, ATSDR first decided to evaluate the water that people drink on the island. The two main sources of water for the residents of Vieques are the public water system (which is supplied from the mainland of Puerto Rico) and drinking water wells, which tap into the island's groundwater. ATSDR then evaluated information on both of these systems and prepared a public health assessment (PHA) to report the results.

ATSDR reviewed the data reported by several investigations of the drinking water on Vieques. The water samples collected for those studies were analyzed according to safe drinking water standards and for evidence of explosives.

What did ATSDR find out about the safety of the drinking water?

A summary of the primary results of ATSDR's investigation is presented on the following page in the form of answers to questions asked by residents of Vieques. More detailed information is available in the PHA.

Is it safe to drink water from the public water supply on Vieques? Yes

Most of the residents of Vieques get their drinking water through a pipeline supply system from the mainland of Puerto Rico. Water from this system was tested by the Puerto Rico Department of Health (PRDOH), the U.S. Environmental Protection Agency (EPA), and by an environmental company hired by the Navy. ATSDR reviewed and evaluated the results of all of those tests and concluded that the public drinking water supply is not being impacted by the bombing range activities and is safe to drink.

In the past, residents obtained their drinking water from wells. Water from private wells, as well as community supply wells, has been tested by PRDOH, EPA and the Navy. Although little water quality data is available prior to 1995, the location and flow patterns of the groundwater suggest that the available data can be used to evaluate past water quality as well. On that basis, ATSDR believes that the water supplied by the water wells on Vieques was not affected by contaminants, except as discussed in the following sections.

Are the water wells on Vieques safe to use in emergencies? Yes

At present, disruptions to the pipeline water supply system due to local emergencies or other problems may occasionally require that residents use drinking water from wells until the pipeline water supply is restored. In the past, progressive saltwater (sea water) intrusion into the groundwater caused water from the

primary water supply wells on the island (Well 2-3, the four "B" wells, and the three Sun Bay wells) to become somewhat salty. ATSDR concluded that *the water from those wells is safe to drink, except for people on sodium-restricted diets.*

Only one of the private wells tested, Well 3-7, was found to be unsafe to drink. The nitrate and nitrite contamination found in the well suggests contamination from agricultural sources or an onsite sewage disposal system. ATSDR has determined that *the water from Well 3-7 is not safe to drink, especially for children.* PRDOH issued a health advisory on this well and notified the local users.

Has groundwater contamination from the bombing range affected the drinking water supply of Vieques? No

Groundwater, like surface water in streams, flows downhill. The Navy Live Impact Area (LIA) bombing range is downhill from the groundwater wells on the island. The groundwater from those wells is geologically isolated from and has not been affected by any groundwater contamination migrating from any potential source area within the LIA.

What comes next?

ATSDR understands that the residents of Vieques need to have their public health questions answered as soon as possible. We will be releasing our findings on other potential environmental pathways of human exposure to hazardous substances as soon as each analysis is completed.

Where can I get more information about ATSDR's activities?

For more information, call Maria Teran-MacIver, Community Involvement Specialist, toll free, at 1-888-42ATSDR (extension 0649), or call Arthur Block, ATSDR Regional Representative, Region 2, in New York at 212-637-4307.

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CLANTFLT/LANTDIV COMMENTS

“ATSDR DRAFT- FOCUSED PHA FOR
DRINKING WATER SUPPLIES
&
GROUNDWATER PATHWAYS EVALUATION
Isla de Vieques, Puerto Rico, November 21, 2000”

FOREWARD

1. Page i: ATSDR has a mandate under CERCLA to conduct PHAs at NPL sites. This effort is tied directly to a citizen petition and but not to an NPL listing. The report should make it clear that Camp Garcia, NASD, EMA, or the Live Impact Area (LIA) are **not** NPL sites. All of the Navy's Installation Restoration (IR) sites on Vieques were reviewed in the past by EPA and had HRS scores of <28.5. ATSDR should be specific and address uniqueness of the situation: “ATSDR is assessing potential health impacts of the utilization of the Live Impact Area in response to a citizen's petition”. Or, we recommend that ATSDR quote the citizen petition directly in the “Foreword”.

LIST OF ABBREVIATIONS

2. Page vi: The IUPAC names listed for HMX and RDX are correct, but the common chemical name for HMX is cyclotetramethylenetetranitramine and for RDX is cyclotrimethylenetrinitramine.

SUMMARY

3. Page 1: Please specify that the aboveground water tank that holds the drinking water piped from the mainland has an engineered cover and is not susceptible to atmospheric deposition.

4. Page 2: Last paragraph needs to be clarified. The samples acquired by the Navy in 1978 were taken prior to the creation of current CERCLA and/or RCRA protocols and standard testing methods for most of the contaminants we test for today. In 1978, there were no standardized test methods for the explosive compounds of concern. The Navy explosive research laboratory that analyzed the samples utilized non-standardized methods which were, in all likelihood, created by that laboratory as noted in those 1978 reports. As such, those methods did (do) not allow for validation or QA/QC of the 22 year old data. Furthermore, this Navy laboratory was used routinely to analyze production grade quality of explosives (i.e. “%” level of HMX, RDX, etc.) versus the level of these compounds reported as “detected” in the water samples. If these trace levels of explosives were actually “detected” in these water samples, it could

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have been caused by laboratory contamination from their routine explosives materials testing. Regardless, using today's modern and sophisticated equipment, standard methods for explosive contaminants, and QA/QC protocols, the detection limits reported as being achieved in 1978 Navy study could not be reproduced today. It is questionable whether this data should be mentioned in the text of the report since, as in the summary the data, it is appropriately discredited.

The 1978 Navy study should not be so prominent in this report as the explosive results are clearly suspect when compared to today's acceptable testing technology. Overemphasis on this outdated work serves to undercut the recent and valid data that ATSDR has pulled together in this report. At a minimum, we suggest inserting the following after the second sentence: "A completely positive identification of the RDX and tetryl was not possible due to the extremely low concentrations found." (as stated later in the report on pg. 29) as well as "The ammonia and nitrate plus nitrite may reflect other sources of contamination and are not conclusive evidence of explosive contamination." (as stated on pg. 30 of the report) and "Subsequent analyses of drinking water samples did not detect any explosive related constituents." (as stated on pg. 17 of the report). We believe that if this 1978 data discussion remains in the summary (the part of the report read/quoted most often), then these statements should be brought forward from the body of the report to the Summary.

Last sentence should be changed to read, "...human health and *any potential* past exposure to these compounds *would not have posed* a public health hazard"

5. Page 1: ATSDR has determined that only "nitrate plus nitrite" levels in Well 3-7 were a public health hazard. The water from this well is not safe to drink. The nitrate plus nitrite concentration detected at 1,700 – 12,600 ppb (Table 5, page 51) was higher than the drinking water standards (10,000 ppb for nitrate plus nitrite, 10,000 ppb for nitrate, and 1,000 ppb for nitrite as shown in Table 3, page 48). Based on this conclusion, the following data may cause additional concerns:

- (a) In the Navy Well 14 (Table 3, Page 48), the nitrate was detected at 11,000 ppb and also exceeded the standard at 10,000 ppb. This Well is close to the monitoring wells.
- (b) In Table 6, page 52, nitrate plus nitrite in historical drinking water samples from NASD and Esperanza were detected at 5,100 and 4,900 ppb respectively. If the nitrate and nitrite had been determined separately, it was possible the nitrite values might exceed the standard at 1,000 ppb.

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- (c) In Table 5 with Wells 3-7, the Well 2-3 contained the nitrate plus nitrite at 500-1,330 ppb. If the high value of 1330 ppb was assumed nitrite, the nitrite would be 987 ppb and close to the standard 1,000 ppb.
- (d) In the Sun Bay Wells (Table 3, Page 48), it is questionable the nitrate plus nitrite at 260-1860 ppb was less than nitrate at 1,600-2,100 ppb while the nitrite was not detected.

BACKGROUND

6. Page 5: More discussion should be given on other potential past and current private and public sector groundwater and/or drinking water contamination sources on the island. What types of operations have occurred at these facilities? Are they under any RCRA Subtitle C/D permits? Are they still operational? Answering these questions would assist in clarifying if there is the potential for additional sources of contamination. We recommend that all other non-Navy potential contamination problems (local industries like the GE plant, car exhausts, other waste sites (i.e. Municipality landfill), farming/cattle ranching, etc.) be mentioned in the report as they have higher risk of impacting groundwater and open cisterns on Vieques than the LIA due to their locations within the population centers. While the citizen petition is focused on Navy operations in the LIA, ATSDR should be inclusive of all potential sources that could/did impact the groundwater and/or drinking water pathways. Since this is a unique situation, that is, not the specific investigation of an NPL CERCLA site, ATSDR should cast a "wide net" in their discussion of contamination sources and not just limit this to the Navy.

7. Page 5: According to the report's figures, currently a population of 9,400 residents lives in the central portion of the island compared to 8,600 Navy and residents that lived on the island in 1990. Does the 9,400 figure also include any Navy residents such as the military who may live on Vieques?

NAVY OPERATIONAL HISTORY

8. Page 8: The Open Detonation area inside the LIA has Interim Status under RCRA Subtitle C. The permit application has been withdrawn and the Navy is awaiting EPA response. Furthermore, Navy records indicate that no Open Burning has ever occurred on the site.

9. Page 8: "The NASD is currently being studied for potential transfer of all or portions of the area to the Commonwealth of Puerto Rico". NASD will be transferred December 31, 2000. 4000 acres to the municipality of Vieques, 3100 acres to DOI, and 800 acres to Puerto Rico Conservation Trust.

10. Page 9: "That team successfully recovered the equivalent of 57

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complete DU penetrators". To date, 113 units have been recovered. Removal of the remaining units will be accomplished during range refurbishment as the units are exposed over time. The remaining units are in locations where UXO is a major concern.

COMPLETED PATHWAYS

11. Page 11/12: This PHA is evaluating the drinking water and groundwater pathways. Is it necessary to include discussion of the worker and Navy personnel exposure to the soils on LIA in this report? Also, the statement "Since very little is known right now about the extent of *soil* contamination from the LIA and OB/OD area to the residential areas if Vieques.." only refers to soil and not to groundwater (the main thrust of this PHA). As noted under incomplete pathways, the hydrogeology precludes contamination from these Navy areas and operations into the groundwater. Recommend that the soil pathway be addressed under a different PHA. Further, the Navy's air model results for the LIA operations which ATSDR is reviewing, documents clearly that there is no potential deposition of explosive compounds to the residential areas on Vieques. These sentences in the draft report clearly state the opposite. We request that these sentences either be deleted or significantly modified in light of both the air modeling report and the explosives soil data including in the Hydro-Geo effort already provided to ATSDR by the Navy.

POTENTIAL PATHWAYS

12. Page 13: Question 4 should be rephrased or removed. As discussed previously, the incomplete data from 1978 is highly circumspect and provides no technical defensibility and should not be used in the report. In fact, prominent inclusion and discussion of this 1978 report only serves to undercut discussion of the recent, defensible data.

EVALUATION OF DW QUALITY

13. Page 15: There is no section in the report that discusses the distances between the LIA and the nearest receptor population. If air deposition of contaminants is being evaluated in this PHA for groundwater and drinking water, it is important to understand the relationship between the LIA and the wells, cisterns, receptor population, etc. This should be more clearly spelled out or the discussion of the potential for impact of air deposition on the former open cisterns. Preferably, this discussion on cistern impacts from air sources should be removed and included in a PHA for the air pathway once ATSDR has completed review and evaluation of the Navy's air model and other air related sources.

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QUESTION 1

14. Page 16: EPA performed the sampling that occurred in September 1999. Our contractor was sent to obtain several split samples from EPA. However, EPA allowed the Navy to split only one sample at the Navy owned water tank at NASD which receives water piped from the mainland of Puerto Rico. The Navy offered to assist EPA and fund additional splits for some of the other samples EPA collected on the Island as a QA/QC check for EPA's sampling effort. This request was not followed-up on by EPA. As noted in the report, the Navy has provided ATSDR the results of the one split sample with EPA at NASD which showed non-detect for all explosive compounds.

QUESTION 2

15. Page 18: The report states that the supply wells were not sampled for explosives but other wells in the same aquifer were tested and found not to contain explosives. Were the wells that were sampled closer to the LIA than the supply wells? Please clarify. Recommend all the Esperanza drinking water supply water wells be sampled and conclusively found to not have any contamination from explosives.

At the end of the last paragraph suggest adding: "The levels of nitrate plus nitrite most likely results from agricultural pollution and are not conclusive evidence of explosive contamination" (as stated on pg. 2)

SAMPLING SUMMARY

16. Page 21: Please clarify why EPA's explosive data was determined to be unusable.

QUESTION 4

17. Pages 27-30: As discussed previously, the incomplete data from 1978 is highly circumspect and is not technically sound. We recommend that the three pages of emphasis and ATSDR's discussion on this unreliable and highly questionable data is not in keeping with this suspect 22 year old data. The "trace" levels reported in the 1978 report are not scientifically sound enough information and, as the draft ATSDR report states, even if this data were valid, the "level" would cause no adverse health effects. Detailed discussions of this data should be adjusted and limited in the body of the text due to the technical uncertainties surrounding the "numbers". If necessary, the data should only be placed in the Appendix.

CONCLUSIONS

18. Page 34: In the fifth conclusion, After the second sentence suggest adding the following sentences: "A completely positive identification of the RDX

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and tetryl was not possible due to the extremely low concentrations found." (as stated on pg. 29) and "The ammonia and nitrate plus nitrite may reflect other sources of contamination and are not conclusive evidence of explosive contamination." (as stated on pg. 30) and "Subsequent analyses of drinking water samples did not detect any explosive related constituents." (as stated on pg. 17)

RECOMMENDATIONS FOR FURTHER ACTION

19. Page 36: "ATSDR recommends that PRDOH or PREQB identify examples of such collection systems and collect representative samples to evaluate if these systems deliver tap water that is safe to drink. If the storage tanks associated with these collection systems contain bottom sediments, it is recommended that those sediments be sampled to provide an indication of potential past water quality". A Navy representative should take part in the process and obtains split water and sediment sample from the representative rain water collection systems.

TABLE 1

20. Pages 43 & 44: The meaning of the asterisk is not footnoted

21. Page 44, Suggest that the comments under "Past Drinking water sources" be changed to: "*Sampling for explosives conducted in 1978 using low detection limits. Although levels of explosives were reported, their presence was not conclusive and the data are uncertain. However, even if present at the levels reported, these contaminants were well below levels considered harmful to human health and any potential past exposure to these compounds would not have posed a public health hazard.*"

READER EVALUATION

Division of Health Assessment and Consultation

This questionnaire is designed to help us improve our communications. We would like to know if we have presented our findings clearly. Thank you for taking the time to respond.

- 1) Did you read the entire report? Yes No
If not, which topics did you read about? (Check all that apply.)
 Summary Environmental Exposure Health Effects Conclusions/Actions
 Community Concerns
- 2) How long did it take you to read the report?
 Less than 2 hours 2-4 hours More than 4 hours

CONCLUSIONS

- 3) Did our report clearly say if people have come into *contact* with contamination?
(Contact means to eat, drink, breathe or touch.) Check all that apply.
- | | | | | | | | | | |
|--------------|------------------------------|-----------------------------------|-----------------------------|----------------------------------|-------------------|------------------------------|-----------------------------------|-----------------------------|----------------------------------|
| <i>Soil</i> | <input type="checkbox"/> Yes | <input type="checkbox"/> Possible | <input type="checkbox"/> No | <input type="checkbox"/> Unclear | <i>Air</i> | <input type="checkbox"/> Yes | <input type="checkbox"/> Possible | <input type="checkbox"/> No | <input type="checkbox"/> Unclear |
| <i>Water</i> | <input type="checkbox"/> Yes | <input type="checkbox"/> Possible | <input type="checkbox"/> No | <input type="checkbox"/> Unclear | <i>Food Chain</i> | <input type="checkbox"/> Yes | <input type="checkbox"/> Possible | <input type="checkbox"/> No | <input type="checkbox"/> Unclear |
- 4) Did our report clearly say if health effects are likely from contact?
- | | | | | | | | |
|--------------|---------------------------------|-----------------------------------|----------------------------------|-------------------|---------------------------------|-----------------------------------|----------------------------------|
| <i>Soil</i> | <input type="checkbox"/> Likely | <input type="checkbox"/> Unlikely | <input type="checkbox"/> Unclear | <i>Air</i> | <input type="checkbox"/> Likely | <input type="checkbox"/> Unlikely | <input type="checkbox"/> Unclear |
| <i>Water</i> | <input type="checkbox"/> Likely | <input type="checkbox"/> Unlikely | <input type="checkbox"/> Unclear | <i>Food Chain</i> | <input type="checkbox"/> Likely | <input type="checkbox"/> Unlikely | <input type="checkbox"/> Unclear |

RECOMMENDATIONS

- 5) Did our report clearly indicate what we recommend be done next? (Check all that apply.)
 Collect more data Restrict or reduce exposure Health Study Health Education
 No action at this time

CONTENT

- 6) Does the information in the report support our conclusions and recommendations? Yes No

Comments: _____

- 7) Did you receive this report in the context of your job? Yes No
If yes, was enough information provided to allow you to take action? Yes No
If you needed more information, what kind? Environmental Exposure Health Effects

Comments: _____

- 8) Were your health questions answered in the assessment? Yes No

If no, what questions do you have? _____

9) Is there information in the report that you found confusing? (Check all that apply.)

- Summary
- Environmental Exposure
- Health Effects
- Conclusions/Actions
- Community Concerns

Comments: _____

10) Is there information in the report that you found unnecessary? (Check all that apply.)

- Summary
- Environmental Exposure
- Health Effects
- Conclusions/Actions
- Community Concerns

Comments: _____

11) Which of these categories would best describe you?

- 1) Concerned member of the community
- 2) Government employee
- 3) Health care professional
- 4) Other (please specify) _____

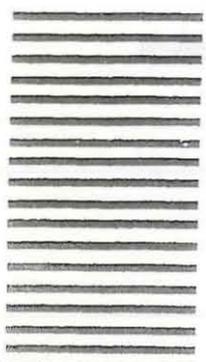
12) How did you obtain your copy of the report?

- 1) Mailed to you by ATSDR.
- 2) Went to the library to use the copy filed there.
- 3) Received from a friend.
- 4) Other (please specify) _____

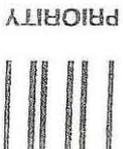
Are there any other comments you would like to make about the report?

Please fold in thirds with address on outside, tape closed, and mail back to us. No postage is required. Thank you for responding.

Public reporting burden of this collection of information is estimated to average 15 minutes per response. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to PHS Reports Clearance Officer, ATTN: PRA (0923-0016); Hubert H. Humphrey Rm 737-F; 200 Independence Ave., SW; Washington, DC 20201. This collection is authorized by law (42 U.S.C.9604(f)).



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