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PROPOSED RULE

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USNRC

Western General Offices, Office of the General Manager

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OFFICE OF SECRETARY
DOCKETING & SERVICE
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July 10, 1985

Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555ATTENTION: Docketing and Service Branch

Gentlemen:

Phelps Dodge Corporation presents the following comments on the licenses and radiation safety requirements for well logging operations proposed rule that appeared in the April 8, 1985 Federal Register, Volume 50, No. 67. We agree that most of the well logging regulations proposed in the April 8 Federal Register are acceptable, scientifically advisable and currently in practice by the mining industry. However, there are two exceptions: 1) the proposed regulation limiting well logging to case boreholes (through fresh water aquifers) and 2) the training requirements.

The proposed rule does not recognize that well logging is important to the successful completion of groundwater wells. The major emphasis is on well logging used in the oil/gas industry and in mineral exploration. However, well logging is extremely important in defining water-bearing zones prior to casing installation, so that casing location does not limit groundwater entrance into a well. The nuclear logs are used to define water-bearing zones as these logs individually respond to hydrogeologic parameters such as porosity, density, and natural radioactivity. The relevancy of nuclear logging in the water well industry has been discussed by Keys and MacCary (1971, "Application of Borehole Geophysics to Water-Resources Investigations," Techniques of Water-Resources Investigations of the U.S. Geological Survey, Book 2 Collection of Environmental Data, chapter E1). Water wells are normally drilled, logged, and the wells cased following identification of water-bearing zones. Wells constructed in the oil/gas industry are normally drilled, cased, logged with subsequent perforation of casing adjacent to production zones.

The use of oil/gas well completion techniques in the water well industry normally results in the destruction of the formation

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porosity and hydraulic conductivity adjacent to the borehole. This almost always results in a severe decrease in well yield. The oil/gas industry completion techniques can be used in petroleum wells because of the need to prevent interformational flows and the extremely low production rates desired. It would be totally inappropriate to use oil/gas completion techniques in water well drilling. The use of well logging in uncased water wells becomes increasingly important to groundwater development as deeper supplies are evaluated, especially those from consolidated rock aquifers such as volcanics, to fulfill irrigation, municipal, and industrial water requirements. The logging of mineral exploration drill holes may sometimes be necessary to obtain groundwater data.

The proposed regulations require 40 hours of classroom training with three months on-the-job training to qualify as a logging supervisor. We believe that this proposal greatly over estimates the degree of training required to safely conduct well logging. Experience has shown that eight-hours per year training should be considered sufficient.

The proposed "agreement" between the well logger and the well owner is problematic. With some mining companies logging equipment only has been used in company wells and company exploration drill holes. It is unclear how this proposed "agreement" may apply to the logging of Company wells located on federal lands.

Specific comments of the proposed NRC well logging regulations follow:

1. Page 13797, middle column, top paragraph

There is a lack of recognition of the need to determine "characteristics of underground formations." This is essential to groundwater development. This recognition becomes increasingly important as deeper wells are needed and more development is attempted from consolidated rock aquifers. Additionally, the definitions section (pages 13803 and 13804) does not refer to water well logging.

2. Page 13797, middle column, second paragraph

Phelps Dodge water exploration has resulted in the logging of wells up to 2,195 feet deep. For the most part, water well exploration and development is limited to a maximum depth of 5,000 feet. These proposed regulations appear to be designed for deeper oil/gas wells up to 30,000 feet deep.

3. Same as above

A logging instrument (except the temperature probe) is calibrated while entering a well and the log recorded

during exit of the well. The logging is repeated if correlation between downhole and uphole logs is insufficient. Log responses are therefore recorded on a chart during both entrance and exit. The temperature log is recorded downhole while the well/formation(s) are in equilibrium.

4. Page 13797, right column, top

Water well drilling is accomplished without the use of drilling additives. Water is used as the drilling fluid. Drilling mud is occasionally used in mineral exploration holes.

5. Page 13798, left column, third paragraph

We are aware of only one "accident" involving water well logging during the past ten years in the mining industry. This involved the U.S. Geological Survey loss of a neutron-epithermal-neutron (NN) probe in an 800-foot deep observation well in Idaho in 1978. Additionally, we are familiar with only one disruption of logging activities due to the temporary failure to remove a probe from a borehole. This probe was easily retrieved using a conventional method.

6. Page 13798, next paragraph

It is hard to believe it cost \$1.5 million to clean up five accidents, unless the cost of drilling new wells is included. The cost of the 1978 USGS accident probably totaled several tens of thousands of dollars including the cost of abandoning the well (drilling cost), filling the well with cement slurry and removing the NN probe. No replacement well was drilled.

7. Page 13798, middle column, No. 4

Copper mining industry well logging operations do not use radioactive collar markers. The gamma-gamma probe can be used to locate casing collars and past logging operations have used a magnetic (?) casing collar locator. The copper mining companies which we are familiar with do not use uranium sinker bars.

8. Same paragraph

The term "surface casing" is defined different in the oil/gas industry than in the water well industry. The oil/gas industry apparently uses "surface casing" to mean the initial string(s) of casing which is (are) installed through fresh water aquifers which occur above the petroleum target formations. The pipe installed to keep a well

open during drilling operations is normally referred to as the "surface casing" in the water well industry. This casing is installed through unconsolidated surficial material and is normally less than 20 feet in length.

9. Page 13800, No. J

- a. See comment No. 8 above regarding the definition of "surface casing".
- b. The statement "However, if surface casing [the oil/gas definition] cannot be placed, a licensee may not use a sealed source in an uncased well" could greatly limit the opportunity to construct high-yield water wells, especially in consolidated rock aquifers. The concept of drilling high-yield wells in consolidated rock is to: 1) choose the location where geologic conditions are thought appropriate, 2) drill to the target depth, 3) record geophysical logs, and 4) case off those portions of the well from which water production is not desired with perforations or open hole opposite potential production zones. Perforation of the casing prior to installation may place blank casing opposite production zones following well completion. It is not always possible to achieve the desired porosity opposite a production zone when perforating in-place casing. The oil/gas industry normally installs casing, cements the casing in place, and then perforates opposite the production zones. The forcing of cement into the pore space of an aquifer normally completely destroys the hydraulic conductivity of the zone near the well bore. In cases where oil/gas techniques have been used in water well completion, the result has been disastrous to well yield.
- c. Groundwater is protected from radioactive contamination during well logging by the dual encapsulation of the source and the housing of the logging probe. The radioactivity emitted from the source is attenuated rather rapidly within the borehole environment by the rock and water surrounding the borehole. The radiation then becomes just another piece of unchanged matter within the formation. Natural radiation within an aquifer is a greater source of radioactivity to groundwater than that induced through well logging. The only possibility of contaminating groundwater would occur if the housing of a logging probe were destroyed. The chances of this occurring during normal logging operations are extremely slight. It is possible that some unknowns may result in the destruction of the housing of a probe abandoned in a well. This is why the regulations require that a well containing an abandoned nuclear probe be filled with cement slurry.

10. Page 13801, No. K

The proposed regulations appear to overestimate the knowledge and training required to safely handle the radioactive sources used in well logging. The logging supervisor need not have a great amount of radiation training. Experience has shown that an 8-hour short course offered once per year is sufficient training (and annual refresher). The most important aspects of well logging safety are the common sense applied to handling the sources and the persistence with which the logging cable is watched to ensure that no slack cable results while logging downhole and that sufficient tension is not created during exit logging to break the cable. Additionally, nuclear logging should not be attempted in boreholes where unstable conditions are thought to exist. This information can be obtained from the well driller responsible for completing a bore hole and by initially logging with the temperature and caliper probes to determine borehole characteristics.

11. Page 13802, middle column, lines 5 and 6

The word "would" should be changed to "may". All proposed items in the regulations, with the exception of logging in a cased hole to protect fresh groundwater (see Nos. 8 and 9 above), are routinely followed by all logging companies.

12. Page 13802, column 3, second paragraph

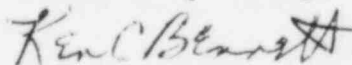
The proposed regulation that well logging only be performed in cased boreholes could become extremely costly in groundwater development. The regulatory necessity of casing a well prior to logging could result in the sealing off of the production zones necessary to obtain the desired yield. This could turn a suitable well into a nonproducer, resulting in the abandonment of a potential wellfield location or the make it necessary to drill a new well adjacent to the original or force the use of expensive techniques in an attempt to recapture the cased off water.

13. Page 13802, right column, bottom

See comment No. 10, above.

We appreciate the opportunity to comment on the Nuclear Regulatory Commission's proposed rule.

Yours very truly,



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