In Reply Refer To;

DRDA 80-15-P1

PDR

CONTINUATION OF PERFORMANCE TESTING OF PERSONNEL DOSIMETRY SERVICES

U.S. Nuclear Regulatory Commission
Contract Number NRC-01-77-180

Proposal

Submitted by

The Department of Environmental and Industrial Health
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J. F. BRINKERHOFF, VICE PRESIDENT AND
CHIEF FINANCIAL OFFICER

NOTE TO: Document Control
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FROM: W E Alexander
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PDR File (Select One)		Related Documents (Enter if appropriate)	
Proposed Rule (PR)		ACRS Minutes No.	
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Draft Reg. Guide		Draft Reg. Guide	
Petition (PRM)		Reg. Guide	
Effective Rule (RM)		Petition (PRM)	
		Effective Rule (RM)	
		Federal Register Notice	
		SD Task No.	
		NUREG Report	
		Contract No.	NRC-01-79-180

POOR ORIGINAL

Subject: Continuation Of Performance testing of Personnel Security Services

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TECHNICAL PROPOSAL

INTRODUCTION

We are currently completing a two-year pilot study of the Health Physics Society Standards Committee (HPSSC) draft standard, "Criteria for Testing Personnel Dosimetry Performance." The pilot study will conclude on September 27, 1979.

Two tests were administered to 59 dosimetry processors during the pilot study. The results to date are not encouraging for any regulatory agency considering the adoption of the HPSSC Standard for a future mandatory testing program. Only 22% of the radiation categories tested in Test #1 were passed, and only 38% were passed in Test #2. Only one processor passed all eight categories outlined in the Standard, and only a small number of processors passed the few categories in which they chose to be tested.

It is our opinion, based on the pilot study data, on numerous telephone conversations we have had with the processors, and on visits we made to a few of the processors, that most of the processors have not exerted the effort required to pass the HPSSC Standard. We do not know if these processors are unwilling, for a variety of reasons, to exert the required effort, or if they are willing but lack the ability to initiate improvement steps.

We assume that, beginning in October 1979, the Nuclear Regulatory Commission (NRC) and other interested regulatory agencies will initiate the necessary legal procedures to require mandatory testing in the future. These legal actions will undoubtedly cause many processors to consider performance testing more seriously than they have during the pilot study. However, the evidence generated in the current pilot study demonstrates that if the HPSSC Standard were adopted in its present form for a mandatory testing program, few, if any, processors could pass. Our final report on the pilot study will contain our recommendations for revisions of the Standard. These revisions, if adopted, may allow more processors to pass the Standard, but we will have no evidence of this.

We propose that the pilot study be extended for two additional years. This extension will not lengthen the time required to initiate a mandatory testing program since the extension will parallel the legal procedures required. Rather, the extension will increase the data base necessary to insure that the best possible testing procedure is finally adopted. The current pilot study is providing the information required for major adjustments of the Standard. The extension will enable us to make minor adjustments just before a mandatory program becomes effective.

The objectives of the extension of the pilot study are:

1. to prepare a value/impact statement
2. to conduct site visits to all the processors not yet visited
3. to administer a third test to any processor that voluntarily chooses to participate.

Each of these objectives will be discussed in detail below.

PHASE I: Value/Impact Statement

The NRC and other relevant regulatory agencies will soon announce their intent for a mandatory testing program, and the necessary legal procedures will be initiated. All processors will be informed as to the estimated time schedule for the rule-making procedures, the number of tests to be passed per year, penalties for failure, etc. This is necessary to convince all processors that the HPSSC Standard will be used in an enforcement capacity by the NRC and other regulatory agencies and will not simply remain as yet another passive standard.

At the same time these procedures are being derived, we will be preparing a value/impact statement. This statement will be written under the guidelines set forth by the NRC Office of Standards Development. Advice will be solicited from various groups concerned with the Standard.

The value/impact statement will include a description of the proposed action of implementing the HPSSC Standard and the need for such action. We will attempt to describe the effect such an implementation would have on the NRC, other government agencies, industry, workers and the public. The statement will include whether the proposed action should or should not be undertaken.

In addition, alternatives and methods will be discussed and compared for accomplishing the proposed action. The technical tradeoffs and state of the art will also be considered. Finally, a technical approach will be chosen to accomplish the action.

Procedural approaches and methods will be proposed as a means of carrying out the action. Alternative procedural approaches will be considered and developed. The arguments for and against a particular alternative will be discussed, and a procedural method will be selected for implementation.

PHASE II: Site Visits

It was assumed that the processors would use the three months they had between Test #1 and Test #2 to review their calibration procedures and make any necessary adjustments to improve their performance in Test #2. This does not appear to have been the case. We regret that the pilot study was not designed with enough time to permit us to visit many of the processors between the two tests to determine why they had problems with Test #1 and what they could do to correct those problems for Test #2.

We believe that, as we assist in the transition from a voluntary pilot study to a mandatory testing program, it is imperative for us to visit any processor that will invite us to their facilities. The purposes of these site visits are:

1. to determine why two thirds of the processors were not able to pass Test #2 of the pilot study even after they participated in Test #1 and were given an opportunity to generate the necessary correction factors. We are unable to determine at the present time if the high failure rate is due to problems attributable to the Standard, technical problems attributable to the processors, or simply to a lack of effort by the processors to pass the voluntary tests of the pilot study.
2. to determine from each processor their candid opinions of the HPSSC Standard including the appropriateness of the radiation sources and the impact to them of a mandatory testing program.

We, the radiological health faculty at The University of Michigan, are not a personnel dosimetry processor nor are we affiliated with a processor. This has been both an asset and a liability during the pilot study. It is an asset in that we have been able to design and conduct the pilot study with consideration given only to the technical aspects of the radiation sources required by the HPSSC Standard. We were not biased by any prior methods of processing dosimeters. However, during Task 3 in which we must formulate recommendations concerning the Standard, our lack of perspective from a processor's point of view is somewhat of a liability. Most people we have spoken with during the pilot study are in favor of a mandatory testing program. But many of these people have expressed strong opinions concerning the Standard and the operational procedures we have developed. Among the problems we are currently trying to address based, in part, on comments we have received during the pilot study are:

1. Radiation Sources. The committee that drafted the HPSSC Standard selected cesium-137 or cobalt-60 as the gamma-ray sources, yttrium-90 as the beta particle source, unmoderated californium-252 as the neutron source, and standard NBS X ray spectra. We have received numerous complaints and a few complements about the choice of gamma, beta, and neutron sources. Most processors seem to be too mystified by the NBS X-ray spectra to offer any comments. Site visits would enable us to document the most appropriate radiation sources for a mandatory testing program.

2. Processor Effort. In order for a mandatory testing program to succeed, it must be possible for a processor that is operating with state-of-the-art dosimetry technology to pass, and it must be possible for an incompetent processor to fail. Most processors did poorly in Test #1 and showed no significant improvement in Test #2. However, some processors showed considerable improvement in Test #2 while other processors actually did worse in Test #2 than in Test #1. We believe a competent processor should be able to generate the correction factors necessary to pass a mandatory testing program regardless of the radiation sources used. If this is true, then some of the complaints we have received simply represent resistance to a mandatory testing program. If this is not true, then the Standard may have to be revised to be realistic with the state of the art of personnel dosimetry. Site visits would enable us to draw well-founded conclusions concerning the relationship between processor effort and their results.

3. Dosimeter Use. In spite of the criteria we placed on processors before allowing them to participate in the pilot study, we received information during the pilot study that some processors were:

   a. submitting prototype personnel dosimeters to see how they might perform.

   b. submitting dosimeters for irradiations with sources for which the dosimeters were never intended to be used (e.g., X rays) to see if the dosimeters are versatile.

   c. submitting environmental dosimeters to obtain free calibration information.

It is not fair for these processors to influence decisions concerning use of the HPSSC Standard, but at the moment, we cannot tell exactly if and when these misuses of the pilot study have occurred. Site visits would enable us to eliminate from statistical analyses those dosimeters that are not being used as primary dosimeters for radiation workers.

4. Clerical Errors. During the pilot study, clerical errors caused several processors to fail. For example, a thermoluminescent dosimeter reader displayed 1700 mR for a particular dosimeter but the technician recorded 170 mR. Such a clerical error made on one dosimeter out of a set of 40 required for testing will cause the processor to fail an entire category. Some processors altered their regular handling procedures so they could report doses in the format required for the pilot study. These processors claim that in a mandatory testing program, their procedures would be permanently altered and clerical errors would not occur. Site visits would help us to determine the importance of clerical errors as part of all problems in personnel dosimetry. The Standard may have to allow for clerical errors, perhaps in the form of a tolerated outlier, even among the most technically competent processors.

During the pilot study, we visited eight of the largest processors to determine some of the reasons for the high failure rate. We were able to learn much about the problems attributable to the processors and the problems they feel are caused by the Standard. However, these eight processors represent a small fraction of the 59 processors that participated

in the pilot study. Also, since these were large organizations as opposed to the numerous in-house processors, our site visits were biased toward one segment of the dosimetry industry. (For example, some of the commercial processors would become even larger if the mandatory testing program became too costly for the small in-house processors such as hospitals and power reactors.) Site visits to most or all of the processors would enable us to make better recommendations concerning the design and operation of a mandatory testing program than we will be able to make at the end of the present pilot study.

PHASE III: Pilot Test #3

At the conclusion of Phase II, we would administer a third three-month pilot test to any processor that voluntarily chose to participate. Test #3 would serve two purposes. First, it would determine if the combined efforts of Phases I and II had been successful. Second, it would reflect the conditions of dosimetry processors at a time just prior to the start of a mandatory testing program.

ADVISORY COMMITTEE

Throughout the 24 months of this extension to the pilot study, and especially during the site visits, we would like to have access to an

Advisory Committee. This Committee should be composed of representatives from commercial processors, Government laboratories and contractors that process their own dosimeters, and in-house processors. The Committee would provide us with a formal group of people among whom we could discuss various aspects of the value/impact statment, the site visits, the operation of Test #3, and possible revisions of the Standard.

We have one reservation concerning the Advisory Committee. During the pilot study, we convinced the processors that their test results and any comments they made to us concerning their procedures, their technical problems, and their opinions of the Standard would be held in the strictist confidence between them and us. If the Advisory Committee wanted to become too intimate with our confidential files, it would jeapordize our good relations with most of the processors.

We propose that Committee discussions be mainly by telephone and mail. Approximately five times during the extension of the pilot study, the Committee would be invited to Ann Arbor to review our work, including the results of the site visits, and to offer their suggestions.

SPECIAL IRRADIATIONS

During the 24-month extension to the pilot study, there may be many times when we would like to irradiate a processor's dosimeters in addition

to the irradiations required for Test #3. For example, during the few site visits we conducted during the present pilot study, one processor questioned the need to use the standard NBS X-ray spectra instead of the spectra they were using. By using our X-ray machine to irradiate some of their dosimeters to NBS spectra and to the processor's spectra, we were able to document the necessity of using a few standard spectra. Special irradiations such as these help us to develop a thorough understanding of the consequences of varying the methods, procedures, and radiation sources specified in the Standard.

FACILITIES AND EQUIPMENT

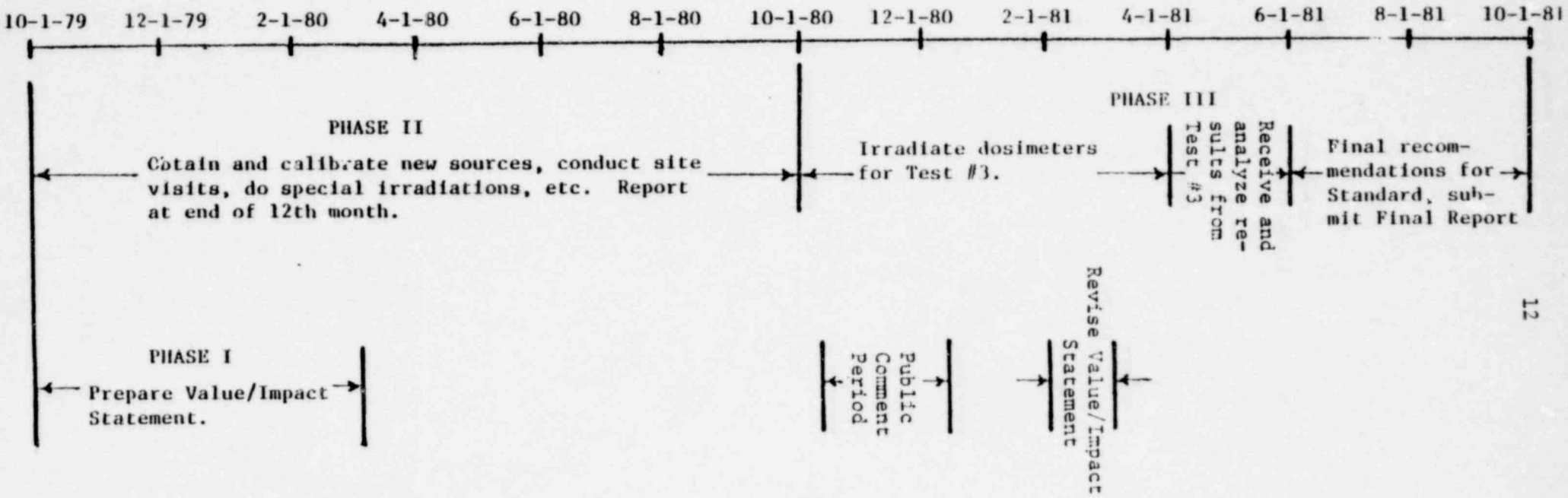
The radiation sources and calibration instruments at The University of Michigan are already presently being used for the HPSSC pilot study. The buildings and facilities are still at our disposal. We expect to continue working closely with the National Bureau of Standards to maintain high quality specifications on the exposure rates and procedures.

At the present time, we have submitted a draft copy of our Final Report on the two-year pilot study to the Nuclear Regulatory Commission. In the Final Report, we recommended several changes in the radiation sources required for the Standard. We have prepared a budget for this proposal to conduct Test #3 based on the assumption that all of our recommendations will be accepted and the Standard will be changed accordingly.

SCHEDULE OF WORK

The schedule of work below will be followed to complete the proposal in 24 months. The schedule shows the times required for calibration, preparing procedures, irradiations, site visits, and reports.

As during the first two years of the pilot study, progress reports will be submitted monthly. A draft of the Value/Impact Statement will be submitted by March 1, 1980, and the Statement will be revised following the public comment period at the end of 1980. A draft of the final report will be submitted during June, 1981.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PHASE II
Obtain and calibrate new sources, conduct site visits, do special irradiations, etc. Report at end of 12th month.
Irradiate dosimeters for Test #3.
PHASE III
Receive and analyze results from Test #3
Final recommendations for Standard, submit Final Report
PHASE I
Prepare Value/Impact Statement.
Public Comment Period
Revise Value/Impact Statement

FINANCIAL PROPOSAL

PHASE I, Value/Impact Statement (6 months)

Salaries

Glenn Hudson and Phillip Plato, 75% each for 6 months, including some work for Phase II.	$21,049
Half time secretary	5,000
	$26,049
Fringe benefits @ 18%	4,689
Overhead @ 68.7% S&FB	21,117
	$51,855

Travel and Supplies

Travel	$3,000
Duplicating	200
Telephone	600
Miscellaneous	500
	$4,300

Advisory Committee to The University of Michigan

Assume the committee has 10 members:

One trip to Ann Arbor each =	10 man-trips
Travel at $300 per man-trip =	$3,000
Consulting fee at $150 per man-trip =	1,500
	$4,500

TOTAL PHASE I: $60,655

PHASE II, Site Visits (12 months)

Salaries

Glenn Hudson and Phillip Plato, 75% each for the second 6 months, the first 6 months is covered under Phase I.	$21,049
Quarter time secretary	2,500
Full time lab technician for recalibration of sources and special irradiations	10,000
Graduate student to assist lab technician @ $450/month	5,400
	$38,949
Fringe benefits for all but student @ 18%	6,039
Overhead for all but student @ 68.7% S&FB	27,197
	$72,185

Travel

Assume all 51 processors not previously visited want us to visit them.

Each visit:

Discuss the Standard
Review processor's performance to date } 1 day
Discuss proper procedures, instruments

Make several calibration measurements } 1 day

Each visit takes 2 days & 2 nights.
We could visit 2 processors on the same trip.

Thus, 26 trips
5 days per trip } $1,000 per trip for 2 people $26,000

Other travel to Washington and Willow Run 3,000

$29,000

Advisory Committee to The University of Michigan

Assume the committee has 10 members:

Two trips to Ann Arbor each =	20 man-trips
Travel at $300 per man-trip =	$6,000
Consulting fee at $150 per man-trip =	3,000
	$9,000

Supplies

Duplicating	$ 300
Postage: 200 packages @ $5.00	1,000
Telephone	1,500
Maintenance for equipment	2,000
Computer	2,000
Miscellaneous	1,000
	$7,800

TOTAL PHASE II: $117,985

PHASE III, Test #3 (12 months)

Salaries

Glenn Hudson and Phillip Plato, 75% each for 12 months	$46,000
Half time secretary	5,000
Full time lab technician	11,000
Extra lab technician for 8 months	8,000
Graduate student to assist technicians @ $450/month for 8 months	3,600
	$73,600
Fringe benefits for all but student @ 18%	12,600
Overhead for all but student @ 68.7% S&FB	56,746
	$142,946

Travel and Supplies

Travel (Washington, Willow Run)	$ 3,000
Duplicating	300
Postage	1,500
Telephone	1,500
Maintenance of equipment (X-ray units, electronics)	4,000
Beam monitors for all radionuclide sources	3,000
Construct new stands for phantoms	600
Construct new phantoms using acrylic	600
Computer time	1,500
One 400 Ci Cs-137 source and irradiator	9,300
One 20 Ci Cs-137 source and irradiator	4,600
Transportation of new Cf-252 source, Oak Ridge to NBS to Ann Arbor to NBS	4,500
Four slabs natural uranium	5,000
Equipment required to remove dosimeters from uranium automatically	3,000
	$42,400

Advisory Committee to The University of Michigan

Assume the committee has 10 members:

Two trips to Ann Arbor each =	20 man-trips
Travel at $300 per man-trip =	$6,000
Consulting fee at $150 per man-trip =	3,000
	$9,000

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TOTAL PHASE III: $194,346

Summary

PHASE I	$ 60,655
PHASE II	117,985
PHASE III	194,346
	$372,986