REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:8002120678 DOC.DATE: 80/02/06 NOTARIZED: NO DOCKET #
FACIL:50-269 Oconee Nuclear Station, Unit 1, Duke Power Co. 05000269
50-270 Oconee Nuclear Station, Unit 2, Duke Power Co. 05000270
50-287 Oconee Nuclear Station, Unit 3, Duke Power Co. 05000287

AUTH.NAME AUTHOR AFFILIATION
PARKER,W.O. Duke Power Co.
RECIP.NAME RECIPIENT AFFILIATION
REID,R.W. Operating Reactors Branch 4

SUBJECT: Forwards proposed Tech Spec 4.17 for steam generator tubing surveillance,in response to NRC 800130 ltr.Program comparison encl.

DISTRIBUTION CODE: A001S COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 7+9
TITLE: General Distribution for after Issuance of Operating Lic

NOTES: M. CUNNINGHAM - ALL AMENDMENTS TO FSAR + CHANGES TO TECH SPECS

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
ACTION:	05 BC ORB#4	7	7			
INTERNAL:	01 REG FILE	1	1	02 NRC PDR	1	1
	12 I&E	2	2	15 CORE PERF BR	1	1
	17 ENGR BR	1	1	18 REAC SFTY BR	1	1
	19 PLANT SYS BR	1	1	20 EEB	1	1
	21 EFLT TRT SYS	1	1	EPB-DOR	1	1
	OELD	1	0	STS GROUP LEADR	1	1
EXTERNAL:	03 LPDR	1	1	04 NSIC	1	1
	23 ACRS	16	16			

T

FEB 14 1980

TOTAL NUMBER OF COPIES REQUIRED: LTTR 38 ENCL 37

Appl

DUKE POWER COMPANY
POWER BUILDING
422 SOUTH CHURCH STREET, CHARLOTTE, N. C. 28242

WILLIAM O. PARKER, JR.
VICE PRESIDENT
STEAM PRODUCTION

TELEPHONE: AREA 704
373-4083

February 6, 1980

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. R. W. Reid, Chief
Operating Reactors Branch No. 4

Re: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287

Dear Sir:

This is provided in response to your letter of January 18, 1980 concerning steam generator tube inspection. On January 30, 1980 Duke discussed with the Staff the following probability data which has been utilized to develop the attached proposed Oconee Technical Specification 4.17 (Attachment 2). Duke considers this specification to be at least as conservative as the Standard Technical Specification while at the same time minimizes overall exposure to personnel.

The major difference between the Standard Technical Specification (STS) and the Duke version are the requirements for additional sampling in the C3 category of Table 4.17-1. STS assumes that the defect mechanism is random and that a 3% random sample is sufficient basis to decide whether to perform a 100% inspection of the steam generator tubes. To our knowledge, there is no defect mechanism known in operating steam generators which produces defects in a random manner. Therefore, our draft provides for a second sample in the C3 category (significantly larger than 3%) to better define the defect problem.

The objective of the Duke Technical Specification is to provide an inspection plan which will insure with a high degree of conficence that no more than 30 defective tubes will remain in the steam generator after an initial C3 category inspection. This number of tubes is a substantially more conservative position than that allowed by the C2 category of the STS.

Such an inspection plan adequately meets the intent of the STS, and in addition, will offer the following advantages:

1. Minimize the inspection required to insure, to the same or greater degree as the STS, the unit's continued safe operation.

A001 S/1

8002120678

2. Reduces radiation exposure to workers, which would otherwise be required according to STS without any added benefit in safety.

3. Allows the affected area of the steam generator to be identified with a minimum amount of inspection.

In order to demonstrate that the above objective is met subsequent to an 18% random inspection (C3 category inspection) it must be shown that:

1. If the actual number of defective tubes in the generator is $\geq$ 1% and randomly distributed the probability is very low that one or more defective tubes will not be found in any significant portion of the generator during the inspection.

2. If the generator can be divided into an affected area and an unaffected area following our inspection plan, then the probability of a significant number of defective tubes being left in service in the unaffected area is low.

Since the outcome of any tube examination can be classified as either defective or nondefective, the probability function is thus a binomial distribution:

$$P(x) = \frac{n!}{x!\,(n-x)!} \qquad p^{x}(1-p)^{n-x}$$

where n is the sample size

x is the number of defective tubes

p is the actual fraction of defective tubes

P(x) is probability of finding x defective tubes in the inspection of n tubes.

To conservatively demonstrate item (1), let us assume that 1% of the tubes are defective and are randomly distributed. Figure 1 of Attachment 1 shows that if the sample size is greater than 300, then the probability of finding at least one defective tube is greater than 95%; if the sample size is greater than 400, the probability of finding at least one defective tube is greater than 98%; etc.

Therefore, if 18% of the total tubes in the unaffected area are examined (at least 300) and none are found defective then the probability is greater than 95% that the total number of actual defective tubes in this area is less than 1%.

Summarizing the above, if the area should contain $\geq$ 1% defective tubes, the probability is very low that it cannot be immediately detected when a subsequent 18% examination is performed.

To demonstrate item (2), Figure 2 of Attachment 1 shows that if the actual number of defective tubes in the unaffected area is greater than 20, then there is a greater than 97.3% probability that at least one defective tube will be found in the 18% sample. If the actual number of defective tubes is greater than 30, then there is a greater than 99.6% probability that at least one defective tube will be found in the 18% sample. It should be noted that this plot is virtually independent of the size of the unaffected area.

An unaffected area within this context, is an area which can be logically and consistently defined from the generator design, defect location and operating characteristics and supported by the inspection data has a greater than 95% probability of having less than 30 defective tubes.

In summary, utilizing the Duke proposed specification results in an inspection program which has a low probability of permitting significant tube degradation to remain undetected and allows some flexibility in identifying an affected area in the generator. A program comparison is provided in Table 1 of Attachment 1.

Very truly yours,

William O. Parker, Jr.

RLG:scs
Attachments

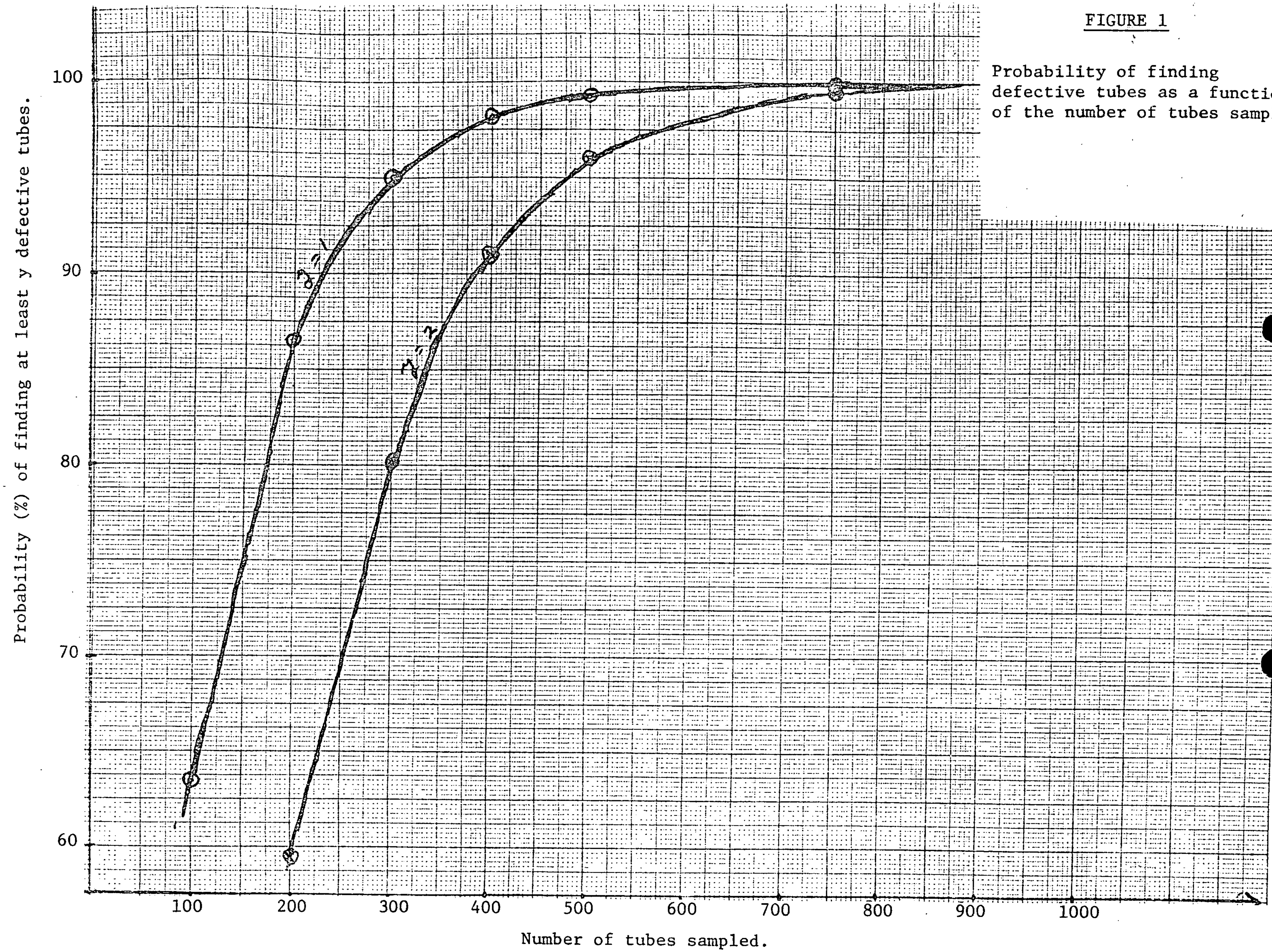
ATTACHMENT 1

TABLE 1

COMPARISON OF STANDARD TECHNICAL SPECIFICATION (STS) AND DUKE PROPOSAL

CATEGORY	RANDOM DEFECTS	NON-RANDOM DEFECTS
C-2	STS: > 1 defective tube but < 1% tubes yields 21% of tubes inspected. 79% of S.G. with < 1% defects not inspected. Maximum of ∿ 120 defective tubes left in service. DPC: Same as STS	STS: Same as Random Defects DPC: Same as STS
C-3	STS: > 1% defective tubes in ≥ 3% sample yields 100% of tubes inspected with corresponding high radiation doses, etc. This 3% sample (which includes all previous degraded tubes) gives very little confidence with respect to actual defect rate. DPC: ≥ 1% defective tubes in ≥ 3% sample yields additional 18% sample. ≥ 1% defective tubes in second sample yields 100% of tubes inspected. Therefore if defect rate is actually ≥ 1%, 100% of S.G. is inspected. However, confidence of the defect rate estimate is greatly improved by basing results on larger sample size. With this improved confidence, the additional dose, etc. is justifiable.	STS: Same as Random Defects. DPC: ≥ 1% defective tubes in ≥ 3% sample yields additional 18% sample inspected. ≥ 1% defective tubes in this second sample yields determination of affected and unaffected areas. 100% of affected area is inspected. Unaffected area has a > 95% probability of having < 30 degraded tubes. Following this procedure: (1) The confidence in the defect rate estimate greatly improved by basing results on larger sample size. (2) The total amount of inspection is minimized (thereby reducing radiation exposures, etc.) while still maintaining a high probability of not being a safety concern (3) The DPC C-3 category is substantially more conservative than the STS C-2 category.

FIGURE 1



Probability of finding defective tubes as a function of the number of tubes sampled.

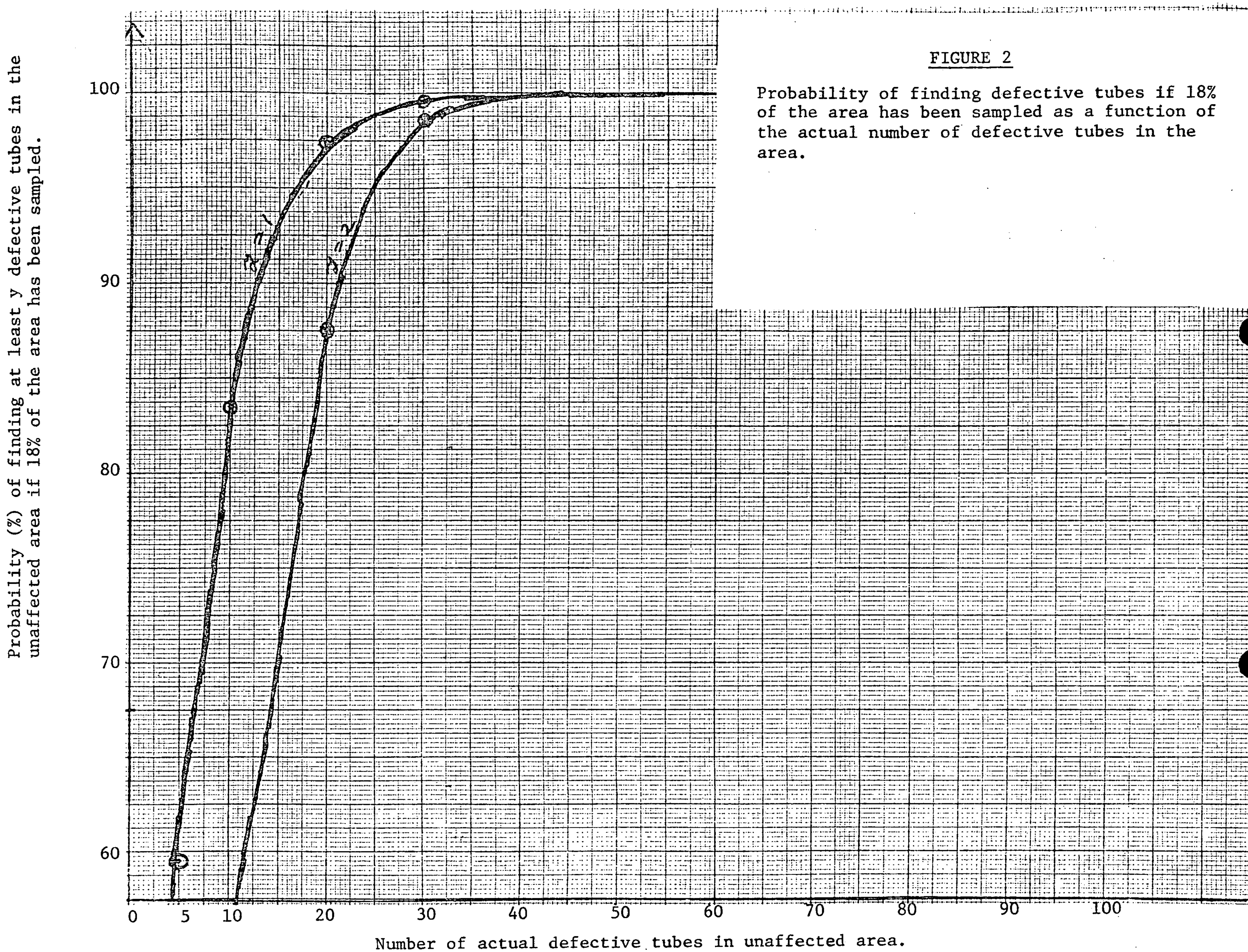


FIGURE 2

Probability of finding defective tubes if 18% of the area has been sampled as a function of the actual number of defective tubes in the area.