NATIONAAL LUCHT- EN RUIMTEVAARTLABORATORIUM

NATIONAL AEROSPACE LABORATORY NLR

THE NETHERLANDS

NLR TR 78110 U

EVALUATION OF NON-DESTRUCTIVE INSPECTION METHODS APPLIED TO MILLED STEP-DOWN AREAS

VOLUME I: TEXT AND TABLES

BY

E.A.B. DE GRAAF AND P. DE RIJK

SN-776565

DOCUMENT CONTROL SHEET

	ORIGINATOR'S REF.		SECURITY CLASS.
	NLR TR 78110 U		Unclassified

ORIGINATOR

National Aerospace Laboratory NLR
Amsterdam, The Netherlands

TITLE

EVALUATION OF NON-DESTRUCTIVE INSPECTION METHODS APPLIED TO MILLED STEP-DOWN AREAS

PRESENTED AT

AUTHORS	DATE	pp	ref
E.A.B. de Graaf and P. de Rijk	29-IX-1978	144	5

DESCRIPTORS

Nondestructive tests
Reliability
Inspection
Eddy currents
Ultrasonic tests
Gray inspection penetrants
Fractography
Fatigue (materials)
Corrosion
Cracks
Wing panels
Aluminium alloys

ABSTRACT

The present report describes how fatigue cracks were produced in 102 specimens. After cracking these specimens were inspected non-destructively by means of eddy currents, ultrasonics, X-rays and penetrants, and the indications were recorded. Successively the specimens were exposed to corrosion whereafter the inspections were repeated. Upon completion of the second inspection cycle the specimens were opened up forcefully and the fatigue nuclei were measured visually from the fracture surface. All the data obtained by the various non-destructive inspections and the visual examination were translated onto punchcards for computer processing. The results are presented in a graphical form.

NLR TR 78110 U

EVALUATION OF NON-DESTRUCTIVE INSPECTION METHODS APPLIED TO MILLED STEP-DOWN AREAS
VOLUME I TEXT AND TABLES

by

E.A.B. de Graaf and P. de Rijk

SUMMARY

The present report describes how fatigue cracks were produced in 102 specimens. After cracking these specimens were inspected non-destructively by means of eddy currents,ultrasonics, X-rays and penetrants,and the indications were recorded. Successively the specimens were exposed to corrosion whereafter the inspections were repeated. Upon completion of the second inspection cycle the specimens were opened up forcefully and the fatigue nuclei were measured visually from the fracture surface. All the data obtained by the various non-destructive inspections and the visual examination were translated onto punchcards for computer processing. The results are presented in a graphical form.

This investigation has been carried out under contract for the Research Branch of the Directorate of Material Air, RNLAF.

Division: Structures and Materials
Prepared: EABdG/PdR/
Approved: GB/
Typ. : AvdV

Completed : 29-IX-1978
Contractnumber: RB-KLu-C12
Ordernumber : 108.822
Classification: Unclassified

CONTENTS

CONTENTS (Continued)

1 INTRODUCTION

The efficiency of any type of non-destructive inspection is mainly governed by three closely related properties: reliability, sensitivity and accuracy.

Inspection reliability is determined by the question whether the results of an inspection are correct or subject to error. Two types of errors occur:

1) the acceptance of defective components (false acceptance)
and
2) the rejection of sound components (false rejection)

The first type of error might in practice lead to structural failure, whereas the second type results in extra inspection and rework costs. Generally there is a tendency to ignore the consequences of false rejections in the attempt to prevent failures at the penalty of extra costs. In the present investigation no special attention will be paid to the problem of false rejection, because no uncracked specimens were mixed purposely among the other specimens that had been subjected to fatigue.

Inspection reliability has a probabilistic nature. This is because one cannot say that a part is entirely free of flaws after a negative result from non-destructive inspection, but only that there is a certain probability that the part does not contain flaws of a specific type and size. The reliability increases as this probability increases, and so does the overall reliability of the assembly containing the inspected part.

Sensitivity is generally understood to be the ability to detect small cracks which, when using probabilistic terminology, depends on the smallest flaws that can be detected with a specific probability.

Once a flaw is detected its size has to be established and compared with a rejection criterium. To be able to make a valid comparison the detected defect size has to correspond with the actual defect size. Therefore inspection accuracy is defined as the degree of correspondence between the size of the defect indication and the actual defect size.

The configuration of the specimens used in the present investigation was inspired by the occurrence of fatigue cracks in fighter aircraft upper wing skin access panel milled step-down areas (Ref.1 and 2). The location of this type of cracks is schematically drawn in figure 1. The actual in-service inspection for these particular cracks had to be carried out primarily without disassembly by means of ultrasonics. This means that the inspection was carried out from the flat outer surface of the panels. Panels with an ultrasonic indication were detached and subjected to a penetrant back up inspection for further confirmation.

Based upon this service experience a specimen was developed (Fig.2, that is taken from Ref.3) in which fatigue cracks could be produced that closely resembled the service cracks. The specimens were fatigue loaded up to the point where cracking could occur in the milled step-down radii.

After that,ultrasonic and eddy current inspections were conducted from the flat outer surface, followed by a penetrant inspection of the radius. In addition an X-ray inspection was included. The specimens were inspected in the as machined and in a severely corroded condition successively. After completion of the inspections the results were confirmed by measurements of the fracture surfaces of the forcibly opened-up specimens.

The prime aim of the investigation was to compare inspection methods rather than inspectors. Therefore the problem of inspector fatigue was minimized as far as possible by reducing the daily inspection work load for the investigation and making the inspector feel as comfortable as possible. In comparison with the actual access panel situation, this means that the inspector could sit back comfortably in a chair inside his laboratory instead of crawling over an aeroplane exposed to weather conditions. Due to these human factors actual inspection results will be less good than what was achieved during this investigation.

In regard to the applicability of the results of the present investigation it should be underlined that, apart from general tendencies the conclusions drawn in principle only apply to the type of inspection situation investigated here. Every other specific inspection situation might lead to more or less different conclusions. To evaluate this further, the National Aerospace

Laboratory NLR has already conducted one (Ref.4) and proposed another complementary evaluation of non-destructive inspection methods, both using rejected (on the basis of both hours and cracks) F-104G undercarriage components, drag strut rod ends and inner cylinders, respectively. The advantage of such purely practical evaluations is, of course, the fact that it is not necessary to develop and produce specimens, because they are "presented" by actual service.

2 TESTING PROCEDURE

The first step of the investigation was the fabrication of 102 specimens of the type shown in figure 2. The specimens were fatigue loaded in the rig of figure 3 up to the point where cracking could occur.

Before the next step of the investigation, the first non-destructive inspection cycle, identification numbers were engraved in the specimens. Successively they were coupled two by two by means of pins with the milled step-down areas facing each other. In doing so, the specimens could be inspected by means of eddy currents and ultrasonics from their flat outer surfaces without the inspector eventually being misled by possible visible indications in the radii. Following this, the specimens were uncoupled for X-ray and penetrant inspection. After every inspection of a particular specimen, its number and the indications found were recorded.

The third step of the testing procedure was the simulation of severe general corrosive attack due to service in order to evaluate in how far inspection reliability was influenced by less favourable surface conditions.

Following the corrosive attack the specimen numbers were polished away and the specimens were renumbered according to a certain code not known to the inspectors. Then, as a fourth step, the non-destructive inspection cycle was repeated (this time without the X-ray inspection). The results were again recorded in relation to the new specimen identification number.

The fifth step in the procedure was the forceful opening of the fatigue cracks, after which the fatigue nuclei were measured from the fracture surface with the aid of a binocular microscope. These data were also recorded.

The sixth and last step in the present investigation was the processing of the established data in the NLR-computer. A further statistical evaluation of these data will be the subject of another report.

The composing details of the investigation will be described in more detail in the following paragraphs.

2.1 The specimens

As has been mentioned before, the specimens were inspired by the occurrence of fatigue cracks in fighter aircraft upper wing skin access panel milled step-down areas (Ref.1 and 2). The location of these cracks is schematically drawn in figure 1. To illustrate the in-service fatigue cracking, figure 4 shows a fluorescent penetrant indication in an access panel and figure 5 an optical macrograph of another. Figure 6 presents a micrograph and figure 7, finally, an optical fractograph of the in-service crack of figure 5. These figures are typical for this particular problem.

Based upon the service experience, a specimen development program was started (Ref.3). This led to the chosen specimen type (Fig.2) with effectively two milled step-down areas per specimen, one at each side of the hole. The specimens were fatigue loaded in a simple test rig as shown in figure 3. With the aid of an electric motor with adjustable eccentric gear the specimens were tested up to the point where fatigue cracks in the milled step-down radii could be expected (about 20 kilocycles per specimen with a lateral displacement of 5 mm). The resulting cracks very closely resembled the service cracks indeed, as can be judged from figure 8 and 9, which show a penetrant indication and a macrograph, respectively.

Because of material availability limitations, the specimens had to be produced in two batches. The first batch comprised 75 specimens with a maximum thickness of 6.35 mm. The material was type 26 ST (2014) aluminium alloy. The second batch of specimens was made up of 27 specimens with a maximum thickness of 6.00 mm. The material of this batch was type 2024 T3 aluminium alloy.

2.2 The non-destructive inspection methods

2.2.1 Eddy current inspection

The eddy current inspection of the specimens was conducted by the NLR using its AUTOMATION INDUSTRIES (SPERRY) EM 3300 MULTITEST equipment. The specimens were inspected from their flat outer surfaces by means of a flat tipped probe operated at 2 kHz during the investigation of crack length. During the inspection of a specimen,either of the two milled step-down areas was cris-crossed with the eddy current probe. Typical indications of this type of inspection are included as figures 10a, b and c for no crack, a shallow and a deeper crack, respectively. The horizontal lines in these figures are produced by placing the probe on and lifting it off the specimen's flat outer surface at either side of the milled step down area before and after the criss-crossing operation, respectively. The difference in material thickness at both sides of this area is responsible for the distance between the two lines. This means that moving the eddy current probe over a crack in the way mentioned displays two phenomena on the screen separately and thus the method is able to distinguish between them: i.e. the thickness step and the crack.

Following the inspection for crack length, an attempt was made to determine crack depth. For this purpose a calibration curve was established in a diagram presenting standard depth of penetration as a function frequency. A 2024 aluminium alloy step wedge was scanned with the same probe as had been used for crack detection. The true (not to confuse with standard) depth of penetration was then determined at every successive thickness step by increasing the inspection frequency and hence decreasing depth of penetration until the indication of the step vanished completely. Frequencies up to 150 kHz were used, this being the upper limit where the probe could still be balanced. The resulting calibration curve is shown in figure 11.

For the inspection of the specimens a crack indication was obtained first with,the probe placed as usual on the flat outer surface. Successively the frequency was increased until the indication dissapeared.

The crack was scanned to see whether there existed regions where the crack penetrated any deeper and, if they existed, the previous step (increasing the frequency) was repeated there.

With the latter frequency the depth of penetration was read from figure 11 using the calibration curve. The resulting depth of undamaged material was then subtracted from the local specimen thickness resulting in an estimate of the actual crack depth. Within the frequency range used the maximum crack depth that could be measured was thought to be 2.4 mm. The weak point of this method is the question in how far a thickness step and a fatigue crack tip are actually comparable in their influence on an eddy current field.

The eddy current inspection was repeated after the specimens had been exposed to the salt spray cabinet environment, but then only crack length was determined.

2.2.2 Ultrasonic inspection

Every specimen was inspected initially by the NLR using its KRAUTKRAEMER USIP 10 W ultrasonic inspection apparatus. The specimens were inspected from their flat outer surfaces by means of a miniature 80^{o} angle shear wave transducer operating at a frequency of 4 MHz. The inspection was carried out with the transducer at the other side of the milled step-down area, its beam facing towards the thicker part. This is schematically shown in figure 12 together with the resulting ultrasonic indication of a typical crack. The present inspection (and also the actual service procedure) had to be carried out in this way because, when inspecting from the thicker section towards the milled step-down area (Fig. 13), a crack would most probably get obscured by the big echoes from the step-down radius itself. This means that with the present specimen configuration ultrasonic inspection is either not able to detect both the thickness step and a crack in one scan or is unable to distinguish between them, depending upon which technique is chosen. Only the crack length was determined by the NLR.

Following the completion of the first ultrasonic inspection, the specimens were sent to the Röntgen Technische Dienst (RTD) of Rotterdam for a second ultrasonic inspection. This time a KRAUTKRAEMER USM 2 was used with a miniature 70^{o} angle shear wave transducer, optimized for the actual in-service inspection and operating at a frequency of 5 MHz.

Apart from a crack length measurement, this time the amplitude of the ultrasound echo caused by a crack was determined as compared to a standard reflector. This was done by measurement of the amplification factor necessary to reach a standard amplitude height. This relative amplitude is expressed in decibels (dB)

Both ultrasonic inspections (NLR and RTD) were repeated after the specimens had been exposed to the salt spray cabinet environment.

2.2.3 Radiographic inspection

The X-ray radiographic inspection was conducted by Fokker-VFW (dep. FPO) at Schiphol Airport. A PHILIPS MCN 161 X-ray tube was employed. The films were mounted on the specimen's flat outer surface. The radiation angle was 90°. The film type used was AGFA GEVAERT STRUCTURIX D4. Following an exposure time of 3 minutes at 37 kV and 20 mA,the films were developed in G 150. The dried films were also interpreted by Fokker-VFW on a WILNOSOL H LANGFELD film viewer with the aid of magnifying glass with a magnification factor of five. A contact print of a radiograph is included as figure 14, however, due to reproduction, almost all detail is lost.

2.2.4 Penetrant inspection

The penetrant inspection of the specimens was conducted by the NLR in using ARDROX 985 P3 (T) thixotropic penetrant. This is a solvent removable fluorescent penetrant or, speaking in the terminology of MIL-1-25135 C (ASG) and in combination with ARDROX 9 PR 551 G penetrant remover and ARDROX 9 D 6 developer, it is classified as a "group VII penetrant". The penetration time was 30 minutes, after which the excess penetrant was rubbed off with tissues dampened with the aforementioned remover. Following this, a very thin coat of 9 D 6 developer was sprayed on. A minimum development time of 30 minutes was employed. The inspection then took place with the aid of a binocular microscope with a maximum magnification factor of 30. The ultraviolet light source was a 100 W MAGNAFLUX ZB-23 A spotlight installed at a distance of about 30 cm of the specimen surface. The inspections were conducted in a fully darkened booth. The measured ultraviolet light intensity at the specimen surface was more than 2500 $\mu W/cm^2$.

A photograph of a penetrant indication in a specimen before exposure to corrosion was already shown in figure 8. This compares very well with the in-service fatigue crack indication of figure 4.

The penetrant inspection was repeated after the specimens had been exposed to the salt spray cabinet environment.

A photograph of a penetrant indication in a specimen after exposure to corrosion, showing severe background fluorescence, is presented as figure 15.

2.3 Exposure to a corrosive environment

The first full cycle of non-destructive inspections was applied to the specimens with, apart from the fatigue cracks, an as machined surface finish. In order to evaluate how inspection reliability was influenced by less favourable surface conditions,it was decided to simulate severe general corrosive attack due to service for the next non-destructive inspection cycle. Therefore the specimens were placed vertically in a salt spray cabinet that operated in accordance with ASTM specification B 117. The exposure was continued for three weeks. The general appearance of the specimens at that time is illustrated by figures 16 and 17.

2.4 Visual examination of the fatigue crack fracture surfaces

Upon completion of the second and last non-destructive inspection cycle, the fatigue cracks were forcefully opened. This was done with great care to avoid damage to the fracture surface. Typical fracture surfaces are shown in figures 18 through 23. The visual examination of the specimen fracture surfaces was conducted with the aid of a binocular microscope with a maximum magnification factor of 30. Crack length and crack depth were both determined.

Because the possibility existed that very small fatigue nuclei would not open up during the forceful fracturing of the specimens over the cracks, perhaps because they were not situated immediately in line with the final failure, the existance of such nuclei had to be investigated.

For this purpose the fracture surfaces of some specimens with a great number of very small penetrant indications (so-called additional nuclei as will be defined in paragraph 2.5.11) were examined in the scanning electron microscope (S.E.M.). Figure 24 until 29 show scanning electron micrographs of this investigation. It can be clearly seen from figure 24 and 28 that small fatigue nuclei will not always be opened up by fracturing of the specimen, sometimes they will only be blunted. An attempt was made to trace penetrant residues in the nuclei with the aid of energy dispersive x-ray analysis (EDAX). During some initial tests this was found possible by monitoring the phosphor content on the specimen in the S.E.M. The presence of the penetrant used in this investigation would immediately show up as a peak in this phosphor content. However, no penetrant could be traced in the actual nuclei. This means either that the nuclei have never been wetted by penetrant or, what seems less likely, due to the long time elapsed since penetrant application and the EDAX-investigation, that the penetrant has vanished in some way.

In conclusion it can be said that, because of the presence of not-opened-up nuclei, a penetrant inspection might turn out to be more sensitive than a visual examination of the fracture surface!

2.5 Data format

All the data obtained by the various non-destructive inspections and the visual examination were translated onto punchcards for computer processing.

Tables 1, 2, 3 and 4 are examples of the computer output. Tables 1 and 3 present data before exposure to corrosion and tables 2 and 4 are composed of data obtained after corrosion. Tables 1 and 2 compare eddy-current, ultrasonics and X-ray inspections with crack size measurements, whereas table 3 and 4 do so for penetrant indications and (the same!) actual crack size measurements.
All four tables are listed according to specimen number (code no. 1). The column headings of these tables will be explained below, starting off with table 1 and 2.

2.5.1 Spec. code nr. 1

SPEC. CODE NR. 1 stands for specimen code nr. 1. This is the specimen identification number during the first cycle of non-destructive inspections before exposure to corrosion.

2.5.2 Spec. code nr. 2

SPEC. CODE NR. 2 stand for specimen code nr. 2. This is the specimen identification number during the second cycle of non-destructive inspections after exposure to corrosion.

2.5.3 Loc. code

LOC. CODE stands for location code. This indicates which of the two radii of the milled step down area is meant when viewing upon the specimen with the identification number at the top left. UP stands for upper and LO means lower.

2.5.4 Eddy current "sperry"/eddy current "sp"

EDDY CURRENT "SPERRY" is the heading of the columns containing the crack length (L) and depth (D) measurements conducted with eddy current by the NLR in accordance with paragraph 2.2.1. The measurements are presented in millimeters. An exception is the value 1 which means: there is something, but its length cannot be defined more accurately, it is too small.

2.5.5 Ultrasonics NLR

ULTRASONICS NLR is the heading of the column containing the crack length (L) measurement conducted with ultrasonics by the NLR in accordance with paragraph 2.2.2. The measurements are presented in millimeters.

2.5.6 Ultrasonics RTD

ULTRASONICS RTD is the heading of the columns containing the crack length (L) and relative echo amplitudes (dB) measurements conducted with ultrasonics by the RTD in accordance with paragraph 2.2.2. The measurements are presented in millimeters and decibels, respectively.

2.5.7 X-ray

Under the heading X-RAY, all the crack length (L) measurements as conducted with X-rays by Fokker-VFW in accordance with paragraph 2.2.3 are listed. The measurements are presented in millimeters.

2.5.8 Measured crack length, main cracks

MEASURED CRACK LENGTH, MAIN CRACKS is the heading of four columns containing the fractographically determined crack length measurements as far as main cracks are concerned. A nucleus is called a main crack generally, when its size exceeds 2 mm. Otherwise it is classified as an additional nucleus. A nucleus is called additional, generally, when it is smaller than 2 mm and does not intersect the specimen centreline or without that length limit in those cases where it is located remotely from the specimen centreline*. However, due to the multitude of crack patterns that proved to exist, the distinction between main crack and additional nucleus is unavoidably somewhat subjective. An example of this subjectivity is given by the fact that some cracks smaller than 2 mm that are not intersecting the specimen centreline, are nevertheless classified as main cracks. This is the case where these smaller nuclei are located very closely to other main cracks (e.g. specimen no. 20 LO in table 1).

The measurements were conducted in accordance with paragraph 2.4 and the results are presented in millimeters.

The main cracks are divided in three groups, namely: those to the left of (LE), those intersecting (CE) and those to the right of (RI) the specimen centreline. In the column headed "TOTAL", these three values are added.

2.5.9 Measured crack length, add. nuclei

MEASURED CRACK LENGTH, ADDITIONAL NUCLEI is the heading of six columns containing the fractographically determined crack length measurements as fas as additional nuclei are concerned. The distinction between additional nuclei and main cracks is outlined in the previous paragraph.

The measurements were conducted in accordance with paragraph

---

*) At the start of the investigation the specimens were administratively divided into two equal halves along the specimen centreline. This was done because cracks were expected to originate near the centreline in order to propagate at both sides of this centreline after a relatively short life. In this way crack length could be presented easily by mirror image coordinate systems originating at the centreline and going left or right, respectively. However, the cracks did not behave exactly as expected and in the end the coordinate systems of the left and right halves of the specimens were transformed into the coordinate system used here.

2.4 and the results are presented in millimeters.

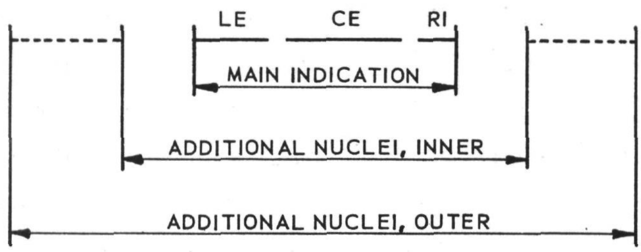
The group of six columns is composed of two groups of three, the first group containing values obtained left (LE) of the specimen centreline and the other three to the right (RI). If there is more than one indication to the left of the centreline,the indication more to the left is included in a column more left and the opposite holds for the right-hand side.

2.5.10 Measured crack length, max. depth

Under the heading MEASURED CRACK LENGTH, MAXIMUM DEPTH measurements conducted in accordance with paragraph 2.4 are listed. The data are presented in millimeters.

2.5.11 Penetrant, main indications

PENETRANT, MAIN INDICATIONS is the title of six columns containing the penetrant indication measurements as far as the main indications are concerned. Main indications generally are longer than 2 mm. Otherwise the classification additional nucleus was given. A nucleus is called additional, generally, when it is smaller than 2 mm and does not intersect the specimen centreline or, without that length limit, in those cases where it is located far remote from the specimen centreline. However, due to the multitude of indication patterns (see accompanying schematic) that proved to exist,the distinction between main indications and additional



TERMINOLOGY OF PENETRANT INDICATIONS

nucleus is unavoidably somewhat subjective. An example of this subjectivity is given by the fact that some indications smaller than 2 mm and not intersecting the specimen centreline are nevertheless classified as main cracks. This is the case when these nuclei are located very closely to other main indications (e.g. specimen no. 5 UP in table 4).

The measurements were conducted in accordance with paragraph 2.2.4 and the results are presented in millimeters.

Generally speaking the penetrant indications have an appearance as shown in the schematic "terminology of penetrant indications". In the tables main indications are included to the left (LE) of, to the right (RI) of or intersecting the centreline (CE), up to five in total. If there existed two main indications at the left side of the centreline,the indication more to the left is included in the column more left and equally so at the right-hand side. In the column "TOTAL" the five main indication values are added.

2.5.12 Penetrant, add. nuclei

PENETRANT, ADDITIONAL NUCLEI is the heading of two columns containing the penetrant indication measurements as far as the additional nuclei are concerned. The distinction between additional nuclei and main indications is outlined in the previous paragraph. Because of the fact that additional penetrant indications were so numerous (typical values of say 10 at each side of the main indications!) and the indications itself so small, the way of presentation differs from the practice followed previously. In the case of the additional penetrant indications,only the width of the region containing those indications was recorded instead of the size of the indications itself. In tables 3 and 4 these data are listed as additional nuclei, inner (boundary of) and outer (boundary of), respectively. The term inner and outer can best be explained with the aid of the schematic "terminology of penetrant indications" from the previous paragraph,which is considered self-explanatory. If there are no additional nuclei,then the values for inner and outer correspond with the total of the main indications. In that case inner and outer loose their real meaning.

3 OBSERVATIONS

3.1 Validity of the data

Some specimens, notably the numbers 1, 2 and 7 (spec. code no. 1) did not behave in the way that was predicted. In the course of the investigation it appeared that in these specimens cracks had developed in a cross section a few millimeters away from the milled step-down area and possibly also in that area itself. Both ultrasonic and eddy current inspection indications were not unambiguous as to which crack was meant. With the X-ray and penetrant inspections this was no problem due to the very nature of these methods. To be able to present all the information from these specimens, the results per specimen were listed as if they were obtained from two separate specimens. For this purpose the associated specimens 111, 112 and 117 (spec. code no. 1) were created administratively. The original specimen numbers were used for the behaviour as standard specimen, whereas the associated numbers were used in conjunction with data from the crack slightly remote from the milled step-down area. Inspection results that were not unambiguous appear in both cases (eddy current and ultrasonics). To avoid any confusion, data from the specimens 1, 2, 7, 111, 112 and 117 (spec. code no. 1) were considered as unvalid and not used in the graphical evaluation.

The data from the penetrant inspection before corrosion from specimens nos. 55 and 56 (spec. code no. 1) were accidentally lost during the investigation. Therefore the entry in table 3 (99.9) was not used in the graphical evaluation.

In some cases special comments are presented by footnotes.

3.2 Graphical evaluation

3.2.1 General

The graphical evaluation was conducted with the aid of the NLR computer display facility as far as was practicable. For this purpose the computer was programmed in such a way as to produce figures 31 to 52, 77 to 81 and 84 to 115. The variables plotted are denoted clearly at the axes, so that the diagrams can be read without much further explanation. Only one point remains to be made.

In this type of diagram data points for identical data cannot be distinguished separately. One single cross might stand for more than one data point. To give some indication in how far data points coincide (especially those lying on the axes),three numbers appear in every figure mentioned above: one at the outer end of each axis, respectively,and one at the upper right-hand side of the diagram. These numbers stand for the number of points on the x-axis, the y-axis and in the diagram itself with the exception of the origin. Added together these figures give the total number of data available (outside the origin).

In the aforementioned diagrams,where applicable, a dashed line is drawn representing the relationship between the plotted variables that would be expected at first instance. In the graphs with crack length this is a straight line, but in those with crack depth the reference line used is derived from a plot of the total of fractographically determined main crack lengths against fractographically determined crack depth (Fig.30).

Additional graphical evaluation was done by means of a desk calculator and plotter. The results are presented in figures 30, 53 to 76, 82 and 83.

3.2.2 Selection of the figures of prime importance

The accompanying diagrams are printed on either white or yellow paper. The first way is used for diagrams considered to be of prime importance and the second for the others, which are therefore included at the end. A selection is made on the basis of criteria outlined in the following two paragraphs. Graphs meeting both criteria (where applicable) are the ones considered to be of prime importance.

3.2.2.1 Total of main crack length

The figures 31 to 39, 44 to 52 and in addition 84 to 88 plus 95 to 98 present inspection data, both before and after corrosion, plotted against data determined from the fracture surface. In these three groups of graphs identical data are presented on the vertical axis which are plotted against total of main crack lengths, crack depth and main centre crack length, respectively (e.g. figures 31 to 35 and 44 to 48 and 84 to 88). The first and the last of these three variables are closely related. Upon comparing all the corresponding diagrams, one with total of main crack lengths and the other with main centre crack length, it can be clearly seen that both ways of presentation hardly show any difference. Apparently in most of the specimens there existed only one main crack. This can also be deduced from tables 1 to 4. Therefore either way of presentation might be chosen in the following evaluation. In the present report the choice is made in favour of total of main crack lengths. This is the reason why the diagrams with main centre crack length are printed on yellow paper and appear at the end of the report.

3.2.2.2 Total length of penetrant main indications

The results of the penetrant inspections are plotted in four different ways: total length of main indications, main centre indication and inner and outer boundary of additional nuclei. These four ways of presentation of penetrant inspection results before exposure to corrosion are plotted against the total of fractographically determined main crack lengths (when main centre crack length is left out because of arguments outlined in the previous paragraph) in figures 35, 92, 93 and 94 and crack depth in figures 48, 108, 109 and 110, respectively. After exposure to corrosion we find the same relationships in figures 39, 102, 103 and 104 and 52, 111, 112 and 113, respectively. From all four groups of four graphs it appears that the first three very closely resemble each other, although they are not at all identical. This is not surprising, because in a great number of cases there existed only one penetrant indication or, if there existed more than one, the largest was at the centre and they were very close together. The additional nuclei were, in turn, again very close to the main indication or indications. This can also be seen in tables 3 and 4. This means that the average value of the inner boundary of additional nuclei (see also the schematic in paragraph 2.5.11) will be only slightly higher than the average value of the total of main crack lengths. This, in turn, will only be slightly higher than the average value of the main centre crack lenghts. With a lot of imagination these tendencies might also be deduced from the graphs.

In conclusion it can be said that, in the four ways of presentation of penetrant results, the exceptions are the plots with the relationships between outer boundary of additional nuclei and the fractographically determined data (figures 94, 110, 104 and 113). As far as the graphs 94 and 104 are concerned (with total of main crack lengths), in graph 94 the values for the penetrant indications lie well above the dashed one to one relation line around which the the data points gather in the graphs 35, 92 and 93. It is realized that the values for the penetrant indications in graph 104 correspond better with the dashed line but the data points from graphs 39, 102 and 103 lie well under that line. So, generally, it might be concluded that the values of the outer boundaries of additional nuclei are relatively high in relation to the other types of penetrant indications in the corresponding graphs in the case of plots against total of main crack lengths. Thus, again in general, additional penetrant indications are found over a greater length than fractographically determined additional nuclei for the uncorroded case and over about the same length for the corroded one. The existence of small fatigue nuclei that did not open up during the forceful fracturing of the specimens over the cracks, as was already mentioned in paragraph 2.4, might give some explanation for this. The additional penetrant indications could very well correspond with actual small additional fatigue nuclei, generally positioned at both sides of the main crack(s), which were not counted during the fractographic examination of the fracture surface because they remained unopened! If this were the case, then the total area with fatigue damage is larger than was anticipated on the basis of the visual examination of the fracture surface according to paragraph 2.4. This explanation will be clear enough for graph 94, but for graph 104 some addition is necessary. In that case it has to be established first from graphs 39, 102 and 103, that one of the effects of corrosion to a penetrant inspection is a general underestimation of the actual crack length. This effect might offset the effect of the unopened fatigue nuclei mentioned previously.

Now as far as the graphs 110 and 113 are concerned (featuring crack depth), identical arguments hold. In graph 110 the data points lie well above the reference line, around which the data points gather in graphs 48, 108 and 109. This shows again, and this time at a specific crack depth, that additional penetrant indications are found over a greater length in relation to the total of fractographically determined main crack lengths (remember that the reference line is based on that value) for the uncorroded case. In the corroded case, again, the data points of the first three figures (52, 111 and 112) lie well below the reference line, whereas in figure 113 they tend to lie about that line. Here, again, both counteracting tendencies of the unopened nuclei on the one hand and the general underestimation of cracks with a penetrant after corrosion on the other might offset each other.

The existence of the unopened fatigue nuclei and their possible behaviour during a penetrant inspection actually might lead to the conclusion, that a penetrant inspection is more sensitive than a visual examination of the fracture surface. Further investigation could add further proof to this statement. This could be done by examining accurately administrated additional penetrant indications in a scanning electron microscope. This problem can be handled best in a microscope with a specimen stage able to hold a specimen's full width. An additional Edax-analysis of the unopened nuclei with special reference to e.g. phosphorus will then show which nuclei contain penetrant and which do not.

Having noticed the correspondence between the three ways of presentation of penetrant inspection results and having attempted to explain the deviation of the fourth one, one way of presentation is finally chosen for further evaluation. To be consistent with the choice concerning the fracture data the total length of penetrant main indications is chosen. This is why the diagrams with the other three ways of presentation of penetrant data are printed on yellow paper and are included at the end of the report.

3.2.3 Inspection accuracy before corrosion

In the introduction the accuracy of an inspection was defined as the degree of correspondence between the length of an inspection indication and the actual crack length. Figures 31 to 35 present such relations before exposure to corrosion for the inspection methods used.

A general examination of the inspection accuracy before exposure to corrosion of eddy current, ultrasonic and X-ray inspection from figures 31 to 34 yields some general conclusions:

a) All three methods underestimate the actual crack length severely in the present inspection situation. Yet RTD ultrasonics emerges as the most accurate and X-ray, closely followed by NLR ultrasonics as the least accurate inspection technique.

b) With all three methods scatter increases with decreasing crack length. This corresponds with earlier NLR observations (Ref.4).

c) With all three methods there exists a clear tendency to miss cracks under a certain threshold level of the fractographically determined main crack length. This also closely corresponds to observations made earlier in reference 4. The value of the threshold level appears to be of the order of magnitude of 10 mm for eddy current and 15 mm for the other methods. So, in terms of inspection sensitivity, i.e. the ability to detect small cracks, eddy current turns out to be more sensitive than both ultrasonics and X-ray radiagraphy in the present inspection configuration. The ability to detect any cracks at all of these three methods (a measure related with the reliability) can also be judged by the figures at the upper right-hand side of the diagrams 31 to 34, giving the number of detections out of a total of 198 cracks. Again the ranking is eddy current first and X-ray radiography last, with both types of ultrasonics in between. This will be further dealt with in paragraph 3.2.6.

The accuracy of a penetrant inspection before corrosion can be judged by examination of figure 35. It will immediately be clear from this graph that penetrant inspection data correlate much better with the fractographic data than the inspection results of the three methods mentioned previously. Furthermore, penetrant inspections hardly miss actual cracks (compare the figure at the upper righthand side of the diagram: 188 detections out of a total of 194 cracks), and observe that the longest crack missed by penetrant is about 17 mm, whereas the other methods all miss cracks of 40 mm length! Finally there seems to be no particular threshold value for crack detection. The smallest cracks present in the specimens were in most cases still detected. Another argument in support of the absence of a particular threshold level is the existence of the aforementioned so-called additional penetrant indications in very small unopened fatigue nuclei. This result seemingly disagrees with reference 4, where the existence of a threshold value for the crack length as regards detection with a penetrant was postulated. Whether or not such a threshold level really will be present depends on the existence of enough small cracks in the specimens to find or to miss by the inspection techniques. This presence, in turn, will depend upon one's possibilities to observe such small cracks on the fracture surface, i.e. on the threshold level of visual fractographic examination. Now in those cases, where a penetrant inspection is considered possibly more sensitive than a visual fractographical examination, this means that no threshold level will emerge from diagrams like figure 35 (and 39 for that matter). This does, of course, not necessarily mean, that every small crack also will be detected. This can be seen in plots giving the percentage of detected cracks as a function of crack size as will be presented in paragraph 3.2.6.

3.2.4 Inspection accuracy after corrosion

Figures 36 to 39 present the relation between the length of an inspection indication after exposure to corrosion and the actual crack length. The general tendencies that can be derived from these diagrams follow the lines formulated for the situation before exposure to corrosion; however, some changes are noteworthy:

a) In addition to the results achieved by eddy current and ultrasonics now a penetrant inspection also leads to an under-estimation of the actual crack length.

b) Apart from the general trend that scatter increases with decreasing crack length, which was also observed before exposure to corrosion, penetrant data points are now scattered most.

c) Concerning threshold levels, there is a tendency for them to increase, when no attention is paid to single isolated data points, with NLR ultrasonics and to a lesser degree with RTD ultrasonics and eddy current. Again, for the penetrant inspection no threshold level emerges.

d) The longest cracks missed now range from 42 mm in the case of penetrant to 63 mm for NLR ultrasonics.

e) The number of missed cracks, in some cases already high before corrosion, has increased significantly. Although this figure is more closely related to inspection reliability and therefore will be treated in detail in paragraph 3.2.6, some figures will already be discussed below.

The influence of the exposure to corrosion on the accuracy of an inspection can be judged from figures 40 to 43, depending on the type of inspection.

Figure 40 shows that the accuracy of an eddy current inspection is almost uninfluenced by corrosion. However, the number of detections after corrosion (110 out of a total 198) is far lower than before (159). This means that inspection reliability decreases due to corrosion. The data points in the graph hardly show a particular tendency as compared to the dashed line. This leads to the following interesting conclusion about two successive eddy current inspections. Because inspection accuracy is hardly influenced by corrosion, figure 40 illustrates the scatter of two successive and completely identical inspections. So, even if the same inspector with the same equipment repeats an inspection, the resulting scatter between both results is of the magnitude shown in figure 40.

Figures 41 and 42 show the decrease in the number of detections the decrease in inspection reliability, due to corrosion with both ultrasonic inspections. In the cases of NLR ultrasonics, the number of detections after corrosion (52 out of a total 198) is only about half of the already low figure before (97). But in the cases where indications were obtained, they were, apparently also hardly influenced in magnitude by corrosion. Therefore the data points also present an idea of the scatter in the results of two successive identical ultrasonic inspections. However, figure 43, the influence of corrosion on the accuracy of a penetrant inspection cannot be looked upon as being representative for two identical successive inspections because of the clear influence of the corrosion. Apart from the fact that the extremely high number of detections before corrosion (188 out of a total 194) decreases somewhat (to 149), corrosion causes a clear tendency to underestimate crack lengths. This was already deduced from figure 39. The reason for this underestimation might be twofold. Firstly there is the possibility that corrosion products prevent the penetrant from entering the crack or part of it. Secondly there are the corrosion pits which, filled with penetrant, give rise to the so called background fluorescence that makes detection, and especially interpretation, more difficult in general. The inspector has to discriminate between spurious indications due to pitting and actual cracks and therefore might reject indications of a (corroded!) crack tip in the conviction they are only caused by corrosion. The problem of background fluorescence touches the question whether the type of penetrant used, solvent removable, is the best suited for this particular application.Probably penetrant inspection results would have been even better with e.g. a water-washable penetrant. This question has to be cleared in a separate investigation.

3.2.5 Length of an inspection indication as a function of crack depth

It is very interesting to plot the same data as used in the previous paragraphs not as a function of fractographically determined crack length but, rather, of crack depth. This is shown in 44 to 48 before corrosion and 49 to 52 after corrosion. The dashed line in these figures is derived from a diagram giving the relationship between total of fractographically determined main crack lengths and crack depth (Fig.30). The purpose of this line is to serve as a reference only. The tendencies emerging from these figures closely follow, as might be expected, the observations of the two previous paragraphs. However, the only exception is that threshold values for crack detection and hence sensitivity apparently can be expressed far better in terms of crack depth than crack length. This will be considered in more detail in paragraph 3.2.6.

3.2.6 Inspection reliability and sensitivity

In the introduction reliability was claimed to depend upon the probability with which flaws of a certain type and size are detected. For the present investigation inspection reliability can already be judged by the total number of detections denoted at the upper right hand side of the concerning graphs. However, a better way is the examination of diagrams with the percentage of detected cracks (the point estimate of the probability $\bar{p}$ according to reference 5) as a function of crack size. Such diagrams are presented as figures 53 to 62. The first of every two of these diagrams presents $\bar{p}$ as a function of crack length and the second of crack depth. In preparing the data for these diagrams from table 1 to 4 an attempt has been made to keep the number of specimens in each class about constant, so the confidence level for all the computed percentages is comparable. The diagrams present data both before and after exposure to corrosion, where applicable.

The first point that can be made when examining figures 53 to 62 is that threshold levels on the one hand and 100 % detection probability on the other can be far better judged from the diagrams with crack depth. Inspection effectivity might therefore be said to be governed by crack depth rather than crack length. In other words, this means a long, but shallow crack has more chance to escape detection than a short but deep one, although both cracks, if they had been present in identical components, might have led to the same residual strength.

The advantage of presenting the data as a function of crack depth was already mentioned in the previous paragraph. When figures 54, 56, 58, 60 and 62 are examined, it is clear that eddy current performs at a higher probability of detection at the smaller crack lengths than ultrasonics and X-ray radiography. As has been said in paragraph 3.2.3, this means that eddy current inspection is more sensitive than ultrasonics and X-ray radiography. Later on in that same paragraph, penetrant, in turn, performed much better than eddy current a.o. as regards sensitivity. This is supported by figure 62, where in the case of a penetrant inspection before corrosion there hardly seems to exist a threshold value indeed. The smallest class of cracks found in the visual investigation of the fracture surface ranges from 0.2 to 0.45 mm crack depth. Penetrant detects before corrosion more than 80 % of the cracks in that class. This does not change very much after exposure to corrosion, although there is significant decrease in reliability up to a crack depth of 2.25 mm.

With penetrant inspection emerging as the most sensitive and reliable inspection method <u>in the present inspection situation</u>, X-ray radiography turns out to be the worst. Apart from a mere 5 % probability in the lowest crack depth class of figure 60, most probably due to a single spurious indication (the spurious indications that do not correspond with actual cracks are still included in the data!), the first detections take place in the class ranging from 1.05 to 1.25 mm crack depth. This means that detection does not start at all before the crack has penetrated to a depth of about 30 % of the local specimen thickness! This differs tremendously from the 3 % that is often quoted as being necessary for crack detections with that technique. 100 % detection takes place from crack depths of 1.75 mm, or over 50 % of the local specimen thickness!

Both NLR and RTD ultrasonics show somewhat smaller threshold levels (Figs. 45, 46, 50 and 51) or a higher probability of detection in the smaller classes (Fig. 56 and 58) than X-ray radiography. The RTD performs slightly better than the NLR, especially in the smaller crack depth classes. This last aspect is perhaps best explained by bearing in mind that the NLR used much older ultrasonic equipment, still containing electrical tubes, in comparison to the fully transistorized equipment of the RTD. The NLR apparatus apparently has a much lower signal to-noise-ratio, which results in an unsteady screen image with a lot of "grass", (Figs. 12 and 13). It is among this "grass" that the smaller echoes appear which govern inspection sensitivity. (This argument strongly supports renewal of the NLR ultrasonic equipment!)

Another aspect in the RTD ultrasonic inspection deserves attention, and that is that sensitivity (probability of detection at small crack depth) after corrosion is apparently better than before (Fig.58). No arguments can be thought of to explain this other than that the job was done differently the second time. The reason for this might be another inspector, differently calibrated equipment or some other improvement in the inspection circumstances. However, the inspection accuracy did not change after corrosion as can be seen from figures 33, 38 and 42. In addition corrosion has a significant influence on inspection reliability. Both ultrasonic inspections do not reach 100 % reliability any more after corrosion.

Here, noticing the relatively poor results as regards reliability of both types of ultrasonics,especially after exposure to corrosion, a severe shortcoming of the present investigation is revealed. This is the absence of X-ray radiography inspection dates after exposure to corrosion, which is caused by the fact that X-ray radiography was originally included only on the basis of the prejudice that this method would show up far more unreliable than the other methods. (Besides it did not quite fit within the scope of the present investigation: "in situ" inspection of wing access panels from the flat outer surface and verification by penetrant from the inside.) Therefore no X-ray radiography inspection was conducted after exposure to corrosion. However, now after having learned the disappointing results especially of ultrasonics,it would have been very interesting to know where radiography would have ended after exposure to corrosion.

Between the penetrant inspection without a specific threshold level on the one hand and the inspection methods with a distinct threshold level, such as both types of ultrasonics and X-ray radiography on the other, eddy current inspection takes an intermediate position. It appears to be a reliable and sensitive method before and to a lesser degree after corrosion, bettered only by penetrant. In one sense eddy current inspection is an exception, and that is the inspection accuracy at low crack depth values. From figure 44 it can be seen that there exists quite a long row of data points belonging to an indicated length of 1 mm. As was explained in paragraph 2.5.4,the value 1 was used in those cases where there existed some indication but where length could not be defined more accurately because it was too small. This means, in fact, inspection sensitivity without accuracy. The data points in figure 44 show that crack detection takes place from 0.2 mm crack depth onward, but the first real crack length measurement (value different from one) appears at a crack depth of 0.9 mm. This picture slightly changes after exposure to corrosion in figure 49, where one gets the impression that the inspection threshold level has increased slightly. But the indications received at the smaller crack depth values are, in contradiction to those in figure 44, different from one. This could mean, that during the inspection after exposure to corrosion the inspector (one and the same person!)

actually achieved better results as concerned inspection accuracy at the cost of sensitivity.

Now if a situation like the one illustrated in figure 44 were the best that could be obtained with eddy current (for a while forgetting the contradicting results of figure 49 at the smallest crack depths) this could result in a penalty concerning the application of the method. Because, if there existed a crack depth region where the method would detect cracks without being able to measure them, the high sensitivity of the method would be of no practical value in those cases where a damage tolerance approach is adopted. In such a case the size of a crack has to be compared with a specific rejection criterium. If no size can be measured, this comparison seems impossible. However, this is not necessarily true. On the basis of further investigation and aided by a calibration block containing small cracks of various known depths (and aspect ratios!), it should be possible to learn to use the sensitivity of the method more fully by measuring the small cracks in the block. In practice this means that increased attention has to be given to the fabrication of calibration blocks.

3.2.7 Cumulative reliability

Another way of presentation of inspection reliability data is by means of diagrams giving cumulative reliability in the form of the percentage of detections of cracks of a certain size or greater as a function of that size. Such diagrams are presented as figures 63 to 76. They are very well suited for a mutual comparison of the various methods both before (Figs. 63 and 70) and after corrosion (Figs. 64 and 71), whereas the influence of the exposure to corrosion per inspection method is given in the figures 65 to 69 and 72 to 76.

This way of presentation again proves that reliability is more depending on crack depth than on length. Expressed in terms of crack length, two of the methods applied do not reach 100 % detection before corrosion and four thereafter (eddy current and both types of ultrasonics, and most probably X-ray radiography if this type of inspection had been included after corrosion). In terms of crack depth these figures are none before corrosion and two thereafter.

The order of merit in terms of reliability at smallest crack lengths or depths (sensitivity) is consistent: penetrant wins followed by eddy current, RTD ultrasonics, NLR ultrasonics and X-ray radiography, in this order. This picture does not change much at greater crack lengths or depths, so that the same rating applies to overall reliability. The significant influence of corrosion to all methods can be seen very clearly.

Now what is the practical value of this type of diagrams? If the critical crack length of a component has been calculated on the basis of fracture mechanics and the crack propagation rate is known then, for a specifically chosen inspection interval, a rejection criterium can be established on the basis of these two properties. A crack just a bit smaller than the rejection criterium must not grow to a critical size in the following inspection period. Using the size of this rejection criterium in diagrams like 63 to 76 gives an impression of the percentage of detections of that size or greater that might be expected in practice per inspection method. This could lead to a decision what method is best suited for that particular purpose. If the percentage of detections were too low for a method that could be applied practically, then lowering the number of hours of the inspection interval (inspecting more frequently) would automatically allow for an increase of the rejection criterium and hence the reliability of the detection. In practice this means, that a method that is very reliable already at small crack sizes (very sensitive) can be used with relatively long inspection intervals up to the same overall safety level as an unsensitive method in conjunction with short inspection intervals.

3.2.8 Ultrasound echo amplitude as a function of crack dimensions

As has been mentioned in paragraph 2.2.2 the ultrasound echo amplitude as compared to a standard reflector was determined, or rather the amplification factor necessary to match a standard amplitude, which is the same with an opposite sign. It is general practice in ultrasonic testing to estimate defect sizes on the basis of ultrasound amplitudes. To check this relation the ultrasound amplification factors were plotted as a function of crack length and depth in figures 77 and 79 (before corrosion) and 78 and 80 (after corrosion), respectively. All four diagrams show an enormous scatter, from which it is hardly possible to recognize the slightest tendency (the crosses on the horizontal axis belong to undiscovered cracks and are unimportant here). It can be seen that small, shallow cracks generally need a high positive amplification, whereas longer and deeper cracks go to the negative side. After corrosion the entire cloud of data points moves upward, which means that more amplification is necessary in relation to the standard, or an underestimation of crack size relative to the situation before exposure to corrosion. This effect can also be seen in figure 81, particularly showing the influence of corrosion. Again the enormous scatter is apparent.

The conclusion of the diagrams 77 to 81 must be that using ultrasound echo amplitude for an estimation of crack size had no practical value in the present investigation. The concept needs further investigation with the aid of specially developed calibration blocks.

3.2.9 Eddy current crack depth measurements

The correlation between the eddy current crack depth measurements and the actual crack depth as measured from the fracture surface is presented in figure 82. For reasons explained already in paragraph 2.2.1, cracks deeper than 2.4 mm were not measured.

Figure 82 shows an extremely poor correlation between the measured and the actual crack size. Apparently the method does not work in the way it was applied. However, in paragraph 2.2.1 the weak point of the method was already mentioned. This was the correspondence between the cracks in the specimens and the thickness steps in the calibration block. It is therefore still an open question whether better results would have been achieved when a better suited calibration block had been used. In practice this, again, means that increased attention has to be given to the fabrication of calibration blocks.

Perhaps the eddy current response not only depends on crack depth but also on crack area. A commonly used method for crack area estimation is based on ultrasound echo amplitude, although the correlation between these two variables has been shown to be extremely poor in the previous paragraph. Still an attempt was made to correlate ultrasound echo amplitude with eddy current crack depth. However, as might have been expected after the foregoing the correlation was very poor.

4 CONCLUSIONS

It is noted that the following conclusions only apply to the present inspection situation!

i) Eddy current inspection and both types of ultrasonic inspection and X-ray radiography inspection have missed astonishingly long cracks both before and after corrosion, especially then when these cracks penetrated not very deep. In addition, before corrosion all cracks exceeding a certain depth were detected. Furthermore, threshold values for crack detection and hence sensitivity can be expressed far better in terms of crack depth. Therefore: Inspection effectivity is governed by crack depth rather than crack length.

ii) With X-ray radiography, with both types of ultrasonic inspection and to a lesser degree eddy current inspection there exists a clear tendency to miss cracks under a certain threshold level of crack depth.

iii) For all inspection methods involved scatter with regard to accuracy increases with decreasing crack length.

iv) Accuracy of eddy current and both types of ultrasonic inspection is not influenced remarkably by exposure to corrosion. However, all three methods underestimate crack length in the present inspection configuration.

v) Accuracy of penetrant inspection is decreased significantly by exposure to corrosion. The crack size was underestimated only after corrosion and not before.

vi) Sensitivity and reliability of eddy current inspection, both types of ultrasonic inspection, X-ray radiography and penetrant inspection decrease significantly due to exposure to corrosion.

vii) The order of merit in terms of reliability and sensitivity both before and after corrosion <u>for the present inspection situation</u> is: penetrant wins, followd by eddy current. RTD ultrasonics, NLR ultrasonics and X-ray radiography, in this order.

viii) A long and shallow crack has more chance to escape detection than a short but deep one.

ix) The question whether a penetrant inspection is more sensitive than a visual fractographic examination of the fracture surface needs further investigation.

x) Eddy current crack depth measurments conducted in the way of the present investigation have no value. More investigation is needed to develop better procedures.

xi) Ultrasound echo amplitude as an estimation of crack size has shown to have no practical value in the present situation.

xii) In order to make better use of the possible abilities of eddy current inspection (and perhaps ultrasonic inspection) the technology of manufacturing calibration blocks needs thorough attention.

5 REFERENCES

1. De Graaf, E.A.B., Boogers, J.A.M. and Bartelds, G. — Investigation concerning cracked F-104G aileron servo access panels. NLR TR 75064 C Amsterdam, April 1975.

2. Van Gestel, G.F.J.A. and De Jonge, J.B. — Investigation concerning cracks in the F-104G upper wing skin. NLR TR 77034 C Amsterdam, March 1977.

3. De Rijk, P. — Evaluation of non-destructive inspection methods. Interim report. NLR TR 76063 C Amsterdam, July 1976.

4. De Graaf, E.A.B., De Rijk, P. and Van Gestel, G.F.J.A. — Evaluation and comparison of non-destructive inspection methods as applied to 4340 steel aircraft under-carriage components. NLR TR 78069 C Amsterdam, June 1978.

5. Packman, P.F. et al — Reliability of flaw detection by non-destructive inspection. Metals Handbook, Vol. 11 pp. 414-424 Metals Park, Ohio 1976.

TABLE 1 DATA BEFORE EXPOSURE TO SALT SPRAY AS COMPARED TO THE MEASURED CRACK LENGTH

SPEC. CODE NR.1	LOC. CODE	EDDY CURRENT "SPERRY" L	EDDY CURRENT "SPERRY" D	ULTRASONICS NLR L	ULTRASONICS RTD L	ULTRASONICS RTD DB	X-RAY L	MEASURED CRACK LENGTH: MAIN CRACKS LE	MAIN CRACKS CE L	MAIN CRACKS RI	MAIN CRACKS TOTAL L	ADD. NUCLEI LE	ADD. NUCLEI LE	ADD. NUCLEI L	ADD. NUCLEI L	ADD. NUCLEI RI	ADD. NUCLEI RI	MAX DEPTH D	REMARKS
1	UP	59	3.3	49	70	-20	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	LO	60	2.1	54	70	-18	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	UP	40	1.5	37	44	-18	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	LO	66	3.3	54	68	-20	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3	UP	1	2.0	0	0	0	0	3.2	25.0	0.0	28.2	.4	.2	.5	0.0	0.0	0.0	.8	
3	LO	0	0.0	0	0	0	0	0.0	42.0	0.0	42.0	0.0	0.0	0.0	.3	0.0	0.0	.7	
4	UP	1	1.3	0	18	8	0	0.0	31.0	0.0	31.0	.4	2.0	.4	3.4	0.0	0.0	1.1	
4	LO	9	1.5	3	0	0	0	0.0	32.0	0.0	32.0	0.0	0.0	.2	4.0	2.2	0.0	1.2	
5	UP	33	2.1	33	42	-14	35	0.0	44.5	0.0	44.5	0.0	0.0	.9	0.0	0.0	0.0	2.4	
5	LO	1	2.2	0	0	0	0	0.0	20.5	0.0	20.5	0.0	0.0	5.1	0.0	0.0	0.0	.6	
6	UP	21	>2.4	21	28	-10	19	0.0	21.8	0.0	21.8	0.0	.5	1.2	0.0	0.0	0.0	1.9	
6	LO	22	>2.4	20	25	-6	12	0.0	39.5	0.0	39.5	0.0	.5	1.0	.4	.5	.5	1.9	
7	UP	15	1.9	3	23	-16	0	0.0	.5	0.0	.5	0.0	0.0	0.0	0.0	0.0	0.0	.2	
7	LO	0	0.0	0	10	8	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
8	UP	72	3.3	57	73	-16	62	0.0	79.3	0.0	79.3	0.0	0.0	0.0	0.0	0.0	0.0	3.3	
8	LO	0	2.3	0	15	22	0	0.0	24.5	0.0	24.5	0.0	0.0	0.0	.5	.9	.6	1.0	
9	UP	1	2.1	0	0	0	0	3.5	9.2	7.9	20.6	0.0	.4	4.0	1.5	0.0	0.0	.3	
9	LO	17	>2.4	13	29	-12	12	0.0	32.0	0.0	32.0	0.0	1.1	.8	1.6	.4	0.0	1.5	
10	UP	24	>2.4	26	39	-14	27	0.0	45.5	0.0	45.5	0.0	0.0	0.0	0.0	0.0	0.0	2.3	
10	LO	12	2.3	6	17	-6	0	0.0	31.8	0.0	31.8	0.0	0.0	0.0	0.0	0.0	0.0	1.3	
11	UP	38	>2.4	36	43	-14	32	0.0	47.5	0.0	47.5	0.0	0.0	0.0	1.2	0.0	0.0	2.5	
11	LO	10	2.3	0	16	2	0	0.0	24.3	0.0	24.3	0.0	0.0	0.0	1.3	0.0	0.0	1.1	
12	UP	1	2.2	0	0	0	0	0.0	22.0	0.0	22.0	0.0	0.0	0.0	0.0	0.0	0.0	.9	
12	LO	33	>2.4	30	35	-14	28	0.0	43.3	0.0	43.3	0.0	0.0	0.0	.8	0.0	0.0	2.3	
13	UP	1	2.2	0	0	0	0	0.0	21.5	0.0	21.5	0.0	0.0	0.0	0.0	0.0	0.0	.6	
13	LO	32	>2.4	33	40	-12	17	0.0	45.0	0.0	45.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	
14	UP	1	2.2	0	0	0	0	0.0	10.5	0.0	10.5	0.0	2.2	.5	.5	0.0	0.0	.6	
14	LO	20	>2.4	21	29	-16	12	0.0	37.0	0.0	37.0	.4	.3	.2	1.3	1.0	0.0	1.8	
15	UP	8	2.4	2	21	-2	0	0.0	28.0	0.0	28.0	0.0	0.0	2.2	.2	0.0	0.0	1.2	
15	LO	39	>2.4	38	41	-14	34	0.0	49.0	0.0	49.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	
16	UP	44	>2.4	43	52	-16	41	0.0	54.0	0.0	54.0	0.0	0.0	.8	0.0	0.0	0.0	2.4	
16	LO	12	2.2	15	25	-12	11	0.0	29.0	0.0	29.0	0.0	0.0	0.0	.6	.3	.4	1.4	
17	UP	11	2.2	12	21	4	3	0.0	38.0	0.0	38.0	.7	1.2	.7	0.0	0.0	0.0	1.4	
17	LO	27	>2.4	28	43	2	22	0.0	44.0	0.0	44.0	0.0	0.0	0.0	.4	.7	0.0	1.9	
18	UP	7	2.3	11	28	-14	0	0.0	35.8	0.0	35.8	0.0	0.0	1.9	0.0	0.0	0.0	1.3	
18	LO	5	2.4	5	22	-6	0	0.0	26.0	0.0	26.0	0.0	0.0	0.0	.4	1.1	0.0	1.2	
19	UP	0	0.0	0	0	0	0	0.0	24.5	0.0	24.5	0.0	1.4	.3	1.0	0.0	0.0	.6	
19	LO	41	>2.4	39	50	-14	35	0.0	51.0	0.0	51.0	0.0	0.0	1.2	.4	.3	.3	2.3	
20	UP	0	0.0	0	0	0	0	0.0	23.5	0.0	23.5	1.4	.5	.3	1.1	.5	0.0	.8	
20	LO	45	>2.4	43	59	-14	39	0.0	55.0	0.0	55.0	0.0	.7	.4	0.0	0.0	0.0	2.5	
21	UP	25	>2.4	26	31	-12	22	0.0	38.5	0.0	38.5	0.0	0.0	0.0	0.0	0.0	0.0	1.8	
21	LO	16	2.3	16	29	-12	14	0.0	37.0	0.0	37.0	0.0	0.0	0.0	.5	0.0	0.0	1.5	
22	UP	1	1.9	2	12	0	0	0.0	18.5	0.0	18.5	0.0	1.3	.8	.5	0.0	0.0	1.2	
22	LO	25	>2.4	23	33	-10	23	0.0	43.0	0.0	43.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	
23	UP	28	>2.4	29	38	-10	28	0.0	41.0	0.0	41.0	0.0	0.0	0.0	1.5	0.0	0.0	2.1	
23	LO	17	>2.4	18	28	-10	14	0.0	36.0	0.0	36.0	0.0	0.0	0.0	.5	0.0	0.0	1.4	
24	UP	60	>2.4	57	68	-16	52	0.0	68.5	0.0	68.5	0.0	0.0	0.0	0.0	0.0	0.0	2.9	
24	LO	0	0.0	0	0	0	0	0.0	13.5	.9	14.4	0.0	0.0	1.9	4.8	1.0	1.6	.5	
25	UP	14	>2.4	10	23	-10	14	0.0	33.5	0.0	33.5	0.0	1.2	.8	0.0	0.0	0.0	1.5	
25	LO	17	>2.4	17	28	-12	10	0.0	37.0	0.0	37.0	0.0	0.0	0.0	2.0	.6	0.0	1.7	

TABLE 1 DATA BEFORE EXPOSURE TO SALT SPRAY AS COMPARED TO THE MEASURED CRACK LENGTH

SPEC. CODE NR.1	LOC. CODE	EDDY CURRENT "SPERRY"		ULTRASONICS			X-RAY	MEASURED CRACK LENGTH											REMARKS
				NLR	RTD			MAIN CRACKS				ADD. NUCLEI						MAX DEPTH	
		L	D	L	L	DB	L	LE	CE L	RI	TOTAL L	LE		L		RI		D	
26	UP	36	>2.4	35	47	-16	35	0.0	46.5	0.0	46.5	0.0	0.0	.7	0.0	0.0	0.0	2.3	
26	LO	18	>2.4	19	27	-12	14	0.0	20.5	0.0	20.5	.4	.4	1.7	.3	.7	0.0	1.6	
27	UP	1	2.2	0	0	0	0	0.0	19.2	0.0	19.2	1.2	.7	.6	1.6	.6	0.0	.4	
27	LO	1	2.3	0	0	0	0	0.0	21.8	0.0	21.8	0.0	0.0	0.0	.8	0.0	0.0	.6	
28	UP	15	1.8	13	29	-10	12	0.0	30.0	0.0	30.0	.3	.6	.5	.6	.5	0.0	1.4	
28	LO	0	0.0	0	0	0	0	0.0	6.0	4.0	10.0	2.1	.7	.4	.4	4.8	.4	.5	
29	UP	35	>2.4	29	40	-14	30	0.0	41.8	0.0	41.8	0.0	1.8	.6	1.2	0.0	0.0	2.4	
29	LO	1	2.3	0	0	0	19	0.0	16.8	0.0	16.8	0.0	0.0	3.0	0.0	0.0	0.0	.4	
30	UP	0	0.0	0	0	0	0	0.0	11.1	0.0	11.1	0.0	0.0	4.0	1.3	0.0	0.0	.7	
30	LO	1	1.9	0	0	0	0	0.0	15.5	0.0	15.5	0.0	0.0	0.0	0.0	0.0	0.0	.7	
31	UP	6	1.8	0	12	2	0	0.0	26.5	0.0	26.5	0.0	0.0	0.0	1.2	0.0	0.0	1.0	
31	LO	27	>2.4	25	34	-14	24	0.0	45.7	0.0	45.7	0.0	0.0	0.0	0.0	0.0	0.0	2.2	
32	UP	13	>2.4	9	26	-8	0	0.0	27.0	0.0	27.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	
32	LO	22	>2.4	19	34	-10	18	0.0	37.5	0.0	37.5	0.0	0.0	0.0	0.0	0.0	0.0	2.0	
33	UP	0	0.0	0	0	0	0	0.0	2.2	0.0	2.2	0.0	2.2	1.3	.4	4.0	.3	.2	
33	LO	0	0.0	0	0	0	0	1.4	.6	0.0	2.0	.4	.2	1.5	1.2	.8	0.0	.2	
34	UP	3	2.2	0	12	4	0	0.0	34.0	0.0	34.0	0.0	0.0	.6	.9	0.0	0.0	1.0	
34	LO	1	2.3	0	0	0	0	0.0	18.0	0.0	18.0	0.0	0.0	0.0	2.4	0.0	0.0	.8	
35	UP	14	2.2	14	26	-12	10	0.0	33.0	0.0	33.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	
35	LO	2	2.0	0	11	4	0	0.0	21.5	0.0	21.5	0.0	0.0	0.0	0.0	0.0	0.0	.9	
36	UP	1	2.2	0	10	6	0	0.0	28.0	0.0	28.0	0.0	0.0	0.0	0.0	0.0	0.0	.9	
36	LO	1	>2.4	0	0	0	0	0.0	26.5	0.0	26.5	0.0	0.0	0.0	0.0	0.0	0.0	.5	
37	UP	1	2.2	0	12	10	0	0.0	18.5	0.0	18.5	0.0	0.0	1.2	3.2	0.0	0.0	.9	
37	LO	26	>2.4	23	36	-16	19	0.0	36.5	0.0	36.5	0.0	0.0	.7	.6	0.0	0.0	2.0	
38	UP	1	2.3	0	0	0	0	0.0	15.0	0.0	15.0	0.0	.4	.5	0.0	0.0	0.0	.4	
38	LO	26	>2.4	26	39	-16	23	0.0	46.5	0.0	46.5	0.0	0.0	0.0	2.7	0.0	0.0	1.8	
39	UP	0	0.0	0	0	0	0	0.0	30.0	0.0	30.0	0.0	.5	.7	.5	0.0	0.0	.7	
39	LO	1	2.2	0	0	0	0	0.0	23.0	0.0	23.0	0.0	0.0	.4	.7	0.0	0.0	.7	
40	UP	0	0.0	0	0	0	0	0.0	14.5	0.0	14.5	1.8	1.4	1.7	.8	.7	.7	.4	
40	LO	0	0.0	0	0	0	0	0.0	15.7	0.0	15.7	0.0	0.0	2.0	1.9	.4	0.0	.6	
41	UP	1	1.9	0	0	0	0	0.0	25.0	0.0	25.0	0.0	.7	.4	0.0	0.0	0.0	.6	
41	LO	1	2.3	0	16	4	0	0.0	28.5	0.0	28.5	0.0	0.0	2.6	0.0	0.0	0.0	.9	
42	UP	1	2.3	0	0	0	0	0.0	23.7	0.0	23.7	0.0	0.0	1.1	5.0	1.5	0.0	.6	
42	LO	16	>2.4	13	26	-10	15	0.0	32.2	0.0	32.2	0.0	0.0	.5	.4	0.0	0.0	1.5	
43	UP	31	>2.4	10	41	-14	15	0.0	46.0	0.0	46.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	
43	LO	25	>2.4	24	36	-16	19	0.0	39.5	0.0	39.5	0.0	.2	.4	0.0	0.0	0.0	2.3	
44	UP	1	1.5	2	9	4	0	0.0	30.5	0.0	30.5	0.0	0.0	0.0	0.0	0.0	0.0	1.1	
44	LO	0	0.0	0	0	0	0	7.0	17.0	0.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	.8	
45	UP	30	2.3	2	18	-4	0	0.0	25.4	0.0	25.4	0.0	0.0	0.0	0.0	0.0	0.0	1.3	
45	LO	39	>2.4	40	46	-16	38	0.0	58.0	0.0	58.0	0.0	0.0	0.0	.4	0.0	0.0	2.4	
46	UP	47	>2.4	42	49	-14	41	0.0	49.5	0.0	49.5	0.0	0.0	0.0	0.0	0.0	0.0	2.3	
46	LO	3	2.3	3	14	-2	0	0.0	16.0	0.0	16.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	
47	UP	10	>2.4	10	21	-6	0	0.0	32.0	0.0	32.0	0.0	.9	.3	0.0	0.0	0.0	1.4	
47	LO	29	>2.4	24	30	-10	22	0.0	42.0	0.0	42.0	0.0	0.0	.8	0.0	0.0	0.0	2.2	
48	UP	16	>2.4	17	27	-12	7	0.0	34.3	0.0	34.3	.5	.4	.7	.5	0.0	0.0	1.5	
48	LO	27	>2.4	25	34	-12	20	0.0	40.5	0.0	40.5	1.6	.4	.3	.8	.7	.4	2.0	
49	UP	14	>2.4	6	21	-8	0	0.0	26.5	0.0	26.5	0.0	0.0	0.0	1.3	3.5	0.0	1.3	
49	LO	11	>2.4	2	20	-2	0	0.0	25.5	0.0	25.5	0.0	0.0	0.0	.4	0.0	0.0	1.2	
50	UP	13	>2.4	0	12	2	0	0.0	30.5	0.0	30.5	0.0	0.0	1.3	1.1	.5	.4	1.0	
50	LO	0	0.0	0	0	0	0	0.0	18.5	0.0	18.5	0.0	0.0	2.0	2.2	.4	0.0	.9	

TABLE 1 DATA <u>BEFORE EXPOSURE TO SALT SPRAY</u> AS COMPARED TO THE MEASURED CRACK LENGTH

SPEC. CODE NR.1	LOC. CODE	EDDY CURRENT "SPERRY"		ULTRASONICS NLR	RTD		X-RAY	MEASURED CRACK LENGTH: MAIN CRACKS LF	CF	RI	TOTAL	ADD. NUCLEI LF				RI		MAX DEPTH	REMARKS
		L	D	L	L	DB	L		L		L	L						D	
51	UP	15	2.3	2	21	-4	0	0.0	35.0	0.0	35.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	
51	LO	1	1.9	0	0	0	0	0.0	24.5	0.0	24.5	0.0	0.0	0.0	0.0	0.0	0.0	.4	
52	UP	8	>2.4	13	20	-12	13	0.0	35.0	0.0	35.0	0.0	0.0	0.0	.5	.9	0.0	1.7	
52	LO	21	>2.4	0	0	0	0	0.0	24.0	0.0	24.0	0.0	0.0	0.0	1.6	1.4	0.0	.8	
53	UP	0	0.0	0	7	6	0	0.0	20.5	0.0	20.5	0.0	0.0	0.0	1.1	1.6	.9	1.0	
53	LO	0	0.0	0	0	0	0	0.0	8.0	0.0	8.0	0.0	0.0	4.5	1.5	0.0	0.0	.5	
54	UP	6	2.0	12	20	-12	9	0.0	35.0	0.0	35.0	0.0	0.0	0.0	.6	0.0	0.0	1.8	
54	LO	16	2.4	2	7	4	0	0.0	31.0	0.0	31.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	
55	UP	1	2.2	0	0	0	0	0.0	26.0	0.0	26.0	0.0	.4	6.5	.7	.4	1.1	.6	
55	LO	13	2.3	6	25	-8	6	0.0	35.5	0.0	35.5	.4	.4	.7	0.0	0.0	0.0	1.4	
56	UP	14	>2.4	9	23	-14	8	0.0	32.5	0.0	32.5	0.0	1.3	1.2	0.0	0.0	0.0	1.6	
56	LO	1	2.2	0	0	0	0	0.0	11.5	0.0	11.5	0.0	0.0	0.0	1.1	.8	0.0	.4	
57	UP	0	0.0	0	16	6	0	0.0	23.5	0.0	23.5	0.0	0.0	0.0	0.0	0.0	0.0	.7	
57	LO	0	0.0	0	0	0	0	0.0	19.0	0.0	19.0	0.0	0.0	.9	.6	0.0	0.0	.4	
58	UP	3	>2.4	14	31	-8	10	0.0	35.5	0.0	35.5	.6	.8	.2	1.0	.4	0.0	1.8	
58	LO	21	>2.4	0	11	14	0	0.0	24.5	0.0	24.5	0.0	0.0	0.0	.9	.4	.3	1.0	
59	UP	0	0.0	0	0	0	0	0.0	25.3	0.0	25.3	0.0	0.0	0.0	0.0	0.0	0.0	.9	
59	LO	0	0.0	0	0	0	0	0.0	20.2	0.0	20.2	0.0	.7	.9	.5	0.0	0.0	.4	
60	UP	1	1.9	0	0	0	0	0.0	9.5	0.0	9.5	0.0	.6	.8	0.0	0.0	0.0	.4	
60	LO	25	2.4	16	30	-14	19	0.0	39.0	0.0	39.0	0.0	0.0	0.0	1.1	.7	1.2	1.4	
61	UP	19	>2.4	11	25	-8	23	0.0	44.6	0.0	44.6	0.0	0.0	.5	0.0	0.0	0.0	1.6	
61	LO	1	2.2	0	0	0	0	0.0	12.0	0.0	12.0	0.0	1.9	2.2	0.0	0.0	0.0	.4	
62	UP	1	1.9	0	0	0	0	0.0	28.5	0.0	28.5	.4	1.7	2.0	.3	.4	0.0	.8	
62	LO	14	2.3	10	22	-8	10	0.0	35.0	0.0	35.0	0.0	0.0	0.0	1.3	0.0	0.0	1.5	
63	UP	44	>2.4	41	50	-12	40	0.0	54.0	0.0	54.0	0.0	0.0	.5	0.0	0.0	0.0	2.5	
63	LO	0	0.0	0	0	0	0	0.0	23.0	0.0	23.0	0.0	0.0	0.0	1.6	0.0	0.0	.4	
64	UP	0	0.0	0	0	0	0	0.0	6.8	0.0	6.8	0.0	0.0	.5	.7	0.0	0.0	.3	
64	LO	33	>2.4	28	43	-16	27	0.0	41.8	0.0	41.8	0.0	0.0	.4	.5	.2	0.0	2.5	
65	UP	8	>2.4	3	15	-16	0	0.0	28.0	0.0	28.0	2.2	.5	.3	0.0	0.0	0.0	1.2	
65	LO	22	>2.4	20	26	-14	18	0.0	35.2	0.0	35.2	0.0	0.0	0.0	.6	.4	0.0	2.0	
66	UP	1	1.9	0	0	0	0	0.0	12.5	0.0	12.5	.5	.6	.7	.8	.5	0.0	.2	
66	LO	15	>2.4	11	24	-8	0	0.0	23.0	0.0	23.0	1.4	2.7	.4	3.7	1.0	0.0	1.3	
67	UP	14	2.3	7	21	-12	9	0.0	31.5	0.0	31.5	1.0	1.7	.7	0.0	0.0	0.0	1.4	
67	LO	1	1.9	0	0	0	0	0.0	20.0	0.0	20.0	0.0	0.0	0.0	1.0	0.0	0.0	.6	
68	UP	1	2.1	0	0	0	0	0.0	17.0	0.0	17.0	0.0	0.0	1.0	2.7	0.0	0.0	.7	
68	LO	1	2.2	0	0	0	0	0.0	18.0	0.0	18.0	0.0	0.0	0.0	3.6	.6	.3	.4	
69	UP	1	2.2	0	0	0	0	0.0	26.5	0.0	26.5	0.0	1.2	.9	0.0	0.0	0.0	.8	
69	LO	1	2.2	0	0	0	0	0.0	13.0	0.0	13.0	1.8	2.5	1.3	0.0	0.0	0.0	.9	
70	UP	0	0.0	0	0	0	0	0.0	25.5	0.0	25.5	.4	5.0	.8	0.0	0.0	0.0	.3	
70	LO	0	0.0	0	0	0	0	0.0	16.3	0.0	16.3	0.0	0.0	0.0	0.0	0.0	0.0	.2	
71	UP	1	>2.4	0	12	10	0	0.0	19.5	0.0	19.5	.5	.4	1.2	.4	0.0	0.0	.9	
71	LO	25	>2.4	21	28	-12	21	0.0	35.5	1.7	37.2	0.0	0.0	.6	.7	.7	.8	1.8	
72	UP	1	>2.4	0	8	2	0	0.0	23.5	0.0	23.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0	
72	LO	13	>2.4	9	24	-8	11	0.0	25.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	
73	UP	15	2.3	11	21	-10	13	0.0	32.5	0.0	32.5	0.0	0.0	0.0	0.0	0.0	0.0	1.5	
73	LO	30	>2.4	28	37	-14	29	0.0	45.5	0.0	45.5	0.0	0.0	.7	1.1	0.0	0.0	2.1	
74	UP	8	>2.4	3	18	-2	0	0.0	29.0	0.0	29.0	0.0	0.0	0.0	1.2	0.0	0.0	1.1	
74	LO	1	>2.4	0	0	0	0	0.0	26.0	0.0	26.0	0.0	0.0	0.0	.6	.8	.8	.8	
75	UP	4	2.3	0	11	-4	0	0.0	25.0	0.0	25.0	0.0	0.0	1.7	0.0	0.0	0.0	1.3	
75	LO	24	>2.4	0	25	-14	17	0.0	28.3	0.0	28.3	0.0	0.0	0.0	0.0	0.0	0.0	2.0	

TABLE 1

DATA <u>BEFORE EXPOSURE TO SALT SPRAY</u> AS COMPARED TO THE MEASURED CRACK LENGTH

SPEC. CODE NR.1	LOC. CODE	EDDY CURRENT "SPERRY"		ULTRASONICS			X-RAY	MEASURED CRACK LENGTH											REMARKS
				NLR	RTD			MAIN CRACKS				ADD. NUCLEI						MAX DEPTH	
								LE	CE	RI	TOTAL	LE				RI			
		L	D	L	L	DB	L		L		L	L						D	
76	UP	16	2.3	0	17	-4	0	0.0	33.9	0.0	33.9	0.0	0.0	2.5	0.0	0.0	0.0	1.5	
76	LO	14	2.3	0	20	-2	4	0.0	27.7	0.0	27.7	0.0	0.0	.8	0.0	0.0	0.0	1.4	
77	UP	0	0.0	0	0	0	0	0.0	24.5	0.0	24.5	.2	1.8	.8	2.2	.2	0.0	.6	
77	LO	0	0.0	0	0	0	0	1.9	.8	0.0	2.7	.6	.4	.5	2.3	1.8	1.4	.2	
78	UP	10	2.3	8	16	4	0	0.0	35.5	0.0	35.5	0.0	0.0	0.0	0.0	0.0	0.0	1.4	
78	LO	11	2.3	6	25	4	0	0.0	37.5	0.0	37.5	0.0	.2	.4	.4	0.0	0.0	1.3	
79	UP	0	0.0	0	0	0	0	0.0	20.0	0.0	20.0	.9	1.5	1.1	.4	1.6	1.0	.6	
79	LO	0	0.0	0	0	0	0	0.0	25.0	0.0	25.0	0.0	0.0	.8	.4	0.0	0.0	.7	
80	UP	13	2.2	2	16	4	0	0.0	37.1	0.0	37.1	0.0	0.0	.7	1.6	0.0	0.0	1.1	
80	LO	1	2.1	0	0	0	0	0.0	27.4	0.0	27.4	0.0	0.0	0.0	.8	0.0	0.0	.9	
81	UP	1	1.9	0	0	0	0	0.0	18.0	0.0	18.0	0.0	5.4	.9	0.0	0.0	0.0	.5	
81	LO	0	0.0	0	0	0	0	0.0	21.4	0.0	21.4	0.0	0.0	0.0	.6	0.0	0.0	.3	
82	UP	12	2.0	4	22	14	0	0.0	34.0	0.0	34.0	.3	.2	2.6	.7	.6	.4	1.4	
82	LO	0	0.0	0	0	0	0	0.0	30.5	0.0	30.5	0.0	.3	.4	.4	0.0	0.0	.7	
83	UP	30	>2.4	29	40	-14	30	0.0	42.5	0.0	42.5	0.0	0.0	.8	1.8	0.0	0.0	2.3	
83	LO	1	1.7	0	0	0	0	0.0	29.5	0.0	29.5	0.0	0.0	.2	2.6	1.2	1.5	.5	
84	UP	6	2.3	3	20	6	0	0.0	34.0	0.0	34.0	.3	.5	.4	.6	.2	0.0	1.4	
84	LO	1	2.3	0	0	0	0	0.0	28.0	0.0	28.0	0.0	0.0	0.0	0.0	0.0	0.0	.7	
85	UP	1	1.9	0	0	0	0	0.0	27.0	0.0	27.0	2.0	1.8	1.0	0.0	0.0	0.0	.9	
85	LO	22	2.3	14	32	-6	8	0.0	38.5	0.0	38.5	.6	.2	1.0	0.0	0.0	0.0	1.8	
86	UP	13	>2.4	2	15	4	0	0.0	29.5	0.0	29.5	0.0	0.0	0.0	0.0	0.0	0.0	1.2	
86	LO	1	2.3	0	28	2	0	0.0	45.5	0.0	45.5	0.0	0.0	0.0	2.5	1.6	0.0	1.3	
87	UP	3	1.5	0	0	0	0	0.0	38.0	0.0	38.0	0.0	0.0	0.0	0.0	0.0	0.0	.9	
87	LO	0	0.0	0	0	0	0	0.0	31.5	0.0	31.5	0.0	0.0	0.0	.3	0.0	0.0	.9	
88	UP	6	1.8	0	0	0	0	0.0	28.5	0.0	28.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0	
88	LO	1	2.1	0	0	0	0	0.0	31.5	0.0	31.5	0.0	0.0	0.0	0.0	0.0	0.0	.9	
89	UP	42	>2.4	36	42	-12	34	0.0	48.5	0.0	48.5	0.0	1.0	.4	1.0	0.0	0.0	2.6	
89	LO	9	2.2	11	15	2	0	0.0	32.0	0.0	32.0	.5	1.0	.4	.6	0.0	0.0	1.3	
90	UP	0	0.0	0	11	12	0	0.0	30.5	0.0	30.5	0.0	0.0	0.0	0.0	0.0	0.0	.9	
90	LO	26	2.4	23	28	-6	14	0.0	39.0	0.0	39.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	
91	UP	54	>2.4	51	62	-14	63	0.0	62.5	0.0	62.5	0.0	0.0	0.0	0.0	0.0	0.0	2.7	
91	LO	1	2.1	0	19	10	0	0.0	27.0	0.0	27.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	
92	UP	13	2.2	10	24	2	0	0.0	34.5	0.0	34.5	0.0	0.0	0.0	0.0	0.0	0.0	1.4	
92	LO	50	>2.4	50	56	-14	43	0.0	55.5	0.0	55.5	0.0	0.0	0.0	0.0	0.0	0.0	2.8	
93	UP	0	0.0	0	0	0	0	0.0	23.0	0.0	23.0	1.2	.7	2.1	3.2	.6	.4	.8	
93	LO	22	1.9	16	23	-12	0	0.0	38.0	0.0	38.0	0.0	0.0	1.4	3.2	.2	.7	1.6	
94	UP	0	0.0	0	0	0	0	0.0	17.0	0.0	17.0	0.0	0.0	0.0	.8	0.0	0.0	.6	
94	LO	0	0.0	0	13	8	0	0.0	17.5	0.0	17.5	0.0	0.0	1.4	0.0	0.0	0.0	.2	
95	UP	14	2.3	3	13	2	0	0.0	22.5	0.0	22.5	0.0	0.0	.5	0.0	0.0	0.0	1.2	
95	LO	5	1.8	0	16	4	0	0.0	28.0	0.0	28.0	0.0	0.0	0.0	1.5	0.0	0.0	1.1	
96	UP	0	0.0	0	0	0	0	0.0	27.0	0.0	27.0	0.0	0.0	0.0	.8	0.0	0.0	.6	
96	LO	0	0.0	0	0	0	0	0.0	16.5	0.0	16.5	0.0	.4	.7	.7	.6	0.0	.9	
97	UP	14	1.5	0	42	6	13	0.0	46.5	0.0	46.5	0.0	0.0	.5	0.0	0.0	0.0	1.3	
97	LO	17	2.3	14	27	-6	0	0.0	36.0	0.0	36.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	
98	UP	7	2.3	0	23	4	8	0.0	34.5	0.0	34.5	0.0	0.0	0.0	0.0	0.0	0.0	1.2	
98	LO	0	0.0	0	7	8	0	0.0	37.3	0.0	37.3	0.0	0.0	0.0	0.0	0.0	0.0	1.1	
99	UP	6	2.1	4	0	0	0	0.0	33.5	0.0	33.5	0.0	.8	1.0	0.0	0.0	0.0	1.4	
99	LO	8	2.1	0	17	10	0	0.0	31.5	0.0	31.5	0.0	0.0	.8	.6	1.3	.5	1.1	
100	UP	23	2.3	21	34	-10	11	0.0	39.0	0.0	39.0	.9	.3	.3	1.1	0.0	0.0	2.0	
100	LO	1	2.2	0	0	0	0	0.0	27.0	0.0	27.0	0.0	0.0	.4	.4	1.6	0.0	.7	

TABLE 1 DATA <u>BEFORE EXPOSURE TO SALT SPRAY</u> AS COMPARED TO THE MEASURED CRACK LENGTH

SPEC. CODE NR.1	LOC. CODE	EDDY CURRENT "SPERRY"		ULTRASONICS NLR	RTD		X-RAY	MEASURED CRACK LENGTH MAIN CRACKS LE	CE	RI	TOTAL	ADD. NUCLEI LE			RI			MAX DEPTH	REMARKS
		L	D	L	L	DR	L		L		L	L						D	
101	UP	8	2.1	3	15	6	0	0.0	33.5	0.0	33.5	1.1	.6	1.0	1.4	0.0	0.0	1.4	
101	LO	0	0.0	0	0	0	0	0.0	29.5	0.0	29.5	1.5	.2	.5	.5	0.0	0.0	.8	
102	UP	17	2.2	16	33	0	0	0.0	34.5	0.0	34.5	0.0	0.0	6.0	0.0	0.0	0.0	1.5	
102	LO	1	2.2	0	0	0	0	0.0	31.5	0.0	31.5	0.0	0.0	.8	0.0	0.0	0.0	.8	
111	UP	59	3.3	49	70	-20	53	0.0	54.5	0.0	54.5	0.0	0.0	0.0	0.0	0.0	0.0	3.2	
111	LO	60	2.1	54	70	-18	55	0.0	56.5	0.0	56.5	0.0	0.0	0.0	0.0	0.0	0.0	3.2	
112	UP	40	1.5	37	44	-18	23	0.0	26.0	0.0	26.0	0.0	0.0	0.0	5.3	0.0	0.0	2.1	
112	LO	66	3.3	54	68	-20	61	0.0	62.0	0.0	62.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	
117	UP	15	1.9	3	99	-16	7	8.5	2.1	4.9	15.5	0.0	0.0	0.0	1.0	0.0	0.0	1.9	
117	LO	0	0.0	0	10	8	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

TABLE 2 DATA AFTER EXPOSURE TO SALT SPRAY AS COMPARED TO THE MEASURED CRACK LENGTH

SPEC. CODE NR. 1	SPEC. CODE NR. 2	LOC. CODE	EDDY CURRENT "SP" L	ULTRASONICS NLR L	ULTRASONICS RTD L	ULTRASONICS RTD DB	MEASURED CRACK LENGTH: MAIN CRACKS LE	MAIN CRACKS CE L	MAIN CRACKS RI	MAIN CRACKS TOTAL L	ADD. NUCLEI LE L	ADD. NUCLEI LE L	ADD. NUCLEI LE L	ADD. NUCLEI RI L	ADD. NUCLEI RI L	ADD. NUCLEI RI L	MAX DEPTH D	REMARKS
1	63	UP	73	48	58	-6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	63	LO	67	51	61	-10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	47	UP	0	0	11	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	47	LO	65	57	62	-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3	42	UP	23	0	0	0	3.2	25.0	0.0	28.2	.4	.2	.5	0.0	0.0	0.0	.8	
3	42	LO	0	0	0	0	0.0	42.0	0.0	42.0	0.0	0.0	0.0	.3	0.0	0.0	.7	
4	18	UP	9	0	18	0	0.0	31.0	0.0	31.0	.4	2.0	.4	3.4	0.0	0.0	1.1	
4	18	LO	8	0	0	10	0.0	32.0	0.0	32.0	0.0	0.0	.2	4.0	2.2	0.0	1.2	
5	30	UP	36	22	45	0	0.0	44.5	0.0	44.5	0.0	0.0	.9	0.0	0.0	0.0	2.4	
5	30	LO	0	0	0	0	0.0	20.5	0.0	20.5	0.0	0.0	5.1	0.0	0.0	0.0	.6	
6	45	UP	16	0	15	12	0.0	21.8	0.0	21.8	0.0	.5	1.2	0.0	0.0	0.0	1.9	
6	45	LO	35	0	26	10	0.0	39.5	0.0	39.5	0.0	.5	1.0	.4	.5	.5	1.9	
7	57	UP	4	0	12	0	0.0	.5	0.0	.5	0.0	0.0	0.0	0.0	0.0	0.0	.2	
7	57	LO	3	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
8	28	UP	73	53	77	-6	0.0	79.3	0.0	79.3	0.0	0.0	0.0	0.0	0.0	0.0	3.3	
8	28	LO	2	0	15	4	0.0	24.5	0.0	24.5	0.0	0.0	0.0	.5	.9	.6	1.0	
9	52	UP	0	0	0	0	3.5	9.2	7.9	20.6	0.0	.4	4.0	1.5	0.0	0.0	.3	
9	52	LO	17	0	31	-2	0.0	32.0	0.0	32.0	0.0	1.1	.8	1.6	.4	0.0	1.5	
10	69	UP	30	27	40	-18	0.0	45.5	0.0	45.5	0.0	0.0	0.0	0.0	0.0	0.0	2.3	
10	69	LO	8	0	21	-4	0.0	31.8	0.0	31.8	0.0	0.0	0.0	0.0	0.0	0.0	1.3	
11	70	UP	42	41	47	-10	0.0	47.5	0.0	47.5	0.0	0.0	0.0	1.2	0.0	0.0	2.5	
11	70	LO	0	0	19	2	0.0	24.3	0.0	24.3	0.0	0.0	0.0	1.3	0.0	0.0	1.1	
12	79	UP	1	0	0	0	0.0	22.0	0.0	22.0	0.0	0.0	0.0	0.0	0.0	0.0	.9	
12	79	LO	34	28	44	-6	0.0	43.3	0.0	43.3	0.0	0.0	0.0	.8	0.0	0.0	2.3	
13	97	UP	0	0	0	0	0.0	21.5	0.0	21.5	0.0	0.0	0.0	0.0	0.0	0.0	.6	
13	97	LO	39	21	45	-2	0.0	45.0	0.0	45.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	
14	9	UP	0	0	5	10	0.0	10.5	0.0	10.5	0.0	2.2	.5	.5	0.0	0.0	.6	
14	9	LO	12	10	25	6	0.0	37.0	0.0	37.0	.4	.3	.2	1.3	1.0	0.0	1.8	
15	66	UP	0	0	28	2	0.0	28.0	0.0	28.0	0.0	0.0	2.2	.2	0.0	0.0	1.2	
15	66	LO	40	25	45	2	0.0	49.0	0.0	49.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	
16	56	UP	47	46	0	0	0.0	54.0	0.0	54.0	0.0	0.0	.8	0.0	0.0	0.0	2.4	
16	56	LO	3	9	16	-12	0.0	29.0	0.0	29.0	0.0	0.0	0.0	.6	.3	.4	1.4	
17	72	UP	7	3	28	-2	0.0	38.0	0.0	38.0	.7	1.2	.7	0.0	0.0	0.0	1.4	
17	72	LO	26	31	41	-4	0.0	44.0	0.0	44.0	0.0	0.0	0.0	.4	.7	0.0	1.9	
18	46	UP	25	0	7	6	0.0	35.8	0.0	35.8	0.0	0.0	1.9	0.0	0.0	0.0	1.3	
18	46	LO	0	0	25	0	0.0	26.0	0.0	26.0	0.0	0.0	0.0	.4	1.1	0.0	1.2	
19	60	UP	0	0	0	0	0.0	24.5	0.0	24.5	0.0	1.4	.3	1.0	0.0	0.0	.6	
19	60	LO	69	40	52	-4	0.0	51.0	0.0	51.0	0.0	0.0	1.2	.4	.3	.3	2.3	
20	55	UP	0	0	0	0	0.0	23.5	0.0	23.5	1.4	.5	.3	1.1	.5	0.0	.8	
20	55	LO	61	35	43	-8	0.0	55.0	0.0	55.0	0.0	.7	.4	0.0	0.0	0.0	2.5	
21	71	UP	26	24	36	0	0.0	38.5	0.0	38.5	0.0	0.0	0.0	0.0	0.0	0.0	1.8	
21	71	LO	21	26	34	-4	0.0	37.0	0.0	37.0	0.0	0.0	0.0	.5	0.0	0.0	1.5	
22	15	UP	0	0	0	8	0.0	18.5	0.0	18.5	0.0	1.3	.8	.5	0.0	0.0	1.2	
22	15	LO	31	0	110	0	0.0	43.0	0.0	43.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	
23	33	UP	34	33	0	0	0.0	41.0	0.0	41.0	0.0	0.0	0.0	1.5	0.0	0.0	2.1	
23	33	LO	20	0	0	0	0.0	36.0	0.0	36.0	0.0	0.0	0.0	.5	0.0	0.0	1.4	
24	59	UP	58	53	58	4	0.0	68.5	0.0	68.5	0.0	0.0	0.0	0.0	0.0	0.0	2.9	
24	59	LO	3	0	110	-10	0.0	13.5	.9	14.4	0.0	0.0	1.9	4.8	1.0	1.6	.5	
25	3	UP	14	2	31	2	0.0	33.5	0.0	33.5	0.0	1.2	.8	0.0	0.0	0.0	1.5	
25	3	LO	23	0	33	0	0.0	37.0	0.0	37.0	0.0	0.0	0.0	2.0	.6	0.0	1.7	

TABLE 2

DATA AFTER EXPOSURE TO SALT SPRAY AS COMPARED TO THE MEASURED CRACK LENGTH

SPEC. CODE NR.1	SPEC. CODE NR.2	LOC. CODE	EDDY CURRENT "SP" L	ULTRASONICS NLR L	ULTRASONICS RTD L	ULTRASONICS RTD DB	MEASURED CRACK LENGTH MAIN CRACKS LE	MAIN CRACKS CE L	MAIN CRACKS RI	MAIN CRACKS TOTAL L	ADD. NUCLEI LE	ADD. NUCLEI L	ADD. NUCLEI L	ADD. NUCLEI L	ADD. NUCLEI RI	ADD. NUCLEI L	MAX DEPTH D	REMARKS
26	43	UP	35	31	40	-8	0.0	46.5	0.0	46.5	0.0	0.0	.7	0.0	0.0	0.0	2.3	
26	43	LO	19	17	35	-4	0.0	20.5	0.0	20.5	.4	.4	1.7	.3	.7	0.0	1.6	
27	49	UP	0	0	0	0	0.0	19.2	0.0	19.2	1.2	.7	.6	1.6	.6	0.0	.4	
27	49	LO	0	0	0	0	0.0	21.8	0.0	21.8	0.0	0.0	0.0	.8	0.0	0.0	.6	
28	32	UP	20	16	30	-4	0.0	30.0	0.0	30.0	.3	.6	.5	.6	.5	0.0	1.4	
28	32	LO	0	0	0	0	0.0	6.0	4.0	10.0	2.1	.7	.4	.4	4.8	.4	.5	
29	50	UP	33	36	45	-12	0.0	41.8	0.0	41.8	0.0	1.8	.6	1.2	0.0	0.0	2.4	
29	50	LO	0	0	0	0	0.0	16.8	0.0	16.8	0.0	0.0	3.0	0.0	0.0	0.0	.4	
30	44	UP	0	0	0	0	0.0	11.1	0.0	11.1	0.0	0.0	4.0	1.3	0.0	0.0	.7	
30	44	LO	0	0	0	0	0.0	15.5	0.0	15.5	0.0	0.0	0.0	0.0	0.0	0.0	.7	
31	64	UP	0	0	25	-2	0.0	26.5	0.0	26.5	0.0	0.0	0.0	1.2	0.0	0.0	1.0	
31	64	LO	30	27	37	-4	0.0	45.7	0.0	45.7	0.0	0.0	0.0	0.0	0.0	0.0	2.2	
32	21	UP	7	0	17	10	0.0	27.0	0.0	27.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	
32	21	LO	25	0	36	-8	0.0	37.5	0.0	37.5	0.0	0.0	0.0	0.0	0.0	0.0	2.0	
33	86	UP	0	0	0	0	0.0	2.2	0.0	2.2	0.0	2.2	1.3	.4	4.0	.3	.2	
33	86	LO	0	0	0	0	1.4	.6	0.0	2.0	.4	.2	1.5	1.2	.8	0.0	.2	
34	80	UP	0	0	13	4	0.0	34.0	0.0	34.0	0.0	0.0	.6	.9	0.0	0.0	1.0	
34	80	LO	0	0	8	12	0.0	18.0	0.0	18.0	0.0	0.0	0.0	2.4	0.0	0.0	.8	
35	75	UP	14	10	23	-2	0.0	33.0	0.0	33.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	
35	75	LO	0	0	11	12	0.0	21.5	0.0	21.5	0.0	0.0	0.0	0.0	0.0	0.0	.9	
36	2	UP	0	0	0	0	0.0	28.0	0.0	28.0	0.0	0.0	0.0	0.0	0.0	0.0	.9	
36	2	LO	0	0	0	0	0.0	26.5	0.0	26.5	0.0	0.0	0.0	0.0	0.0	0.0	.5	
37	25	UP	0	0	0	0	0.0	18.5	0.0	18.5	0.0	0.0	1.2	3.2	0.0	0.0	.9	
37	25	LO	26	25	35	-6	0.0	36.5	0.0	36.5	0.0	0.0	.7	.6	0.0	0.0	2.0	
38	11	UP	0	0	0	-2	0.0	15.0	0.0	15.0	0.0	.4	.5	0.0	0.0	0.0	.4	
38	11	LO	41	4	43	0	0.0	46.5	0.0	46.5	0.0	0.0	0.0	2.7	0.0	0.0	1.8	
39	36	UP	0	0	21	6	0.0	30.0	0.0	30.0	0.0	.5	.7	.5	0.0	0.0	.7	
39	36	LO	0	0	0	0	0.0	23.0	0.0	23.0	0.0	0.0	.4	.7	0.0	0.0	.7	
40	14	UP	2	2	0	0	0.0	14.5	0.0	14.5	1.8	1.4	1.7	.8	.7	.7	.4	
40	14	LO	14	0	0	0	0.0	15.7	0.0	15.7	0.0	0.0	2.0	1.9	.4	0.0	.6	
41	37	UP	2	0	110	6	0.0	25.0	0.0	25.0	0.0	.7	.4	0.0	0.0	0.0	.6	
41	37	LO	0	0	18	4	0.0	28.5	0.0	28.5	0.0	0.0	2.6	0.0	0.0	0.0	.9	
42	99	UP	0	0	0	0	0.0	23.7	0.0	23.7	0.0	0.0	1.1	5.0	1.5	0.0	.6	
42	99	LO	16	3	27	2	0.0	32.2	0.0	32.2	0.0	0.0	.5	.4	0.0	0.0	1.5	
43	5	UP	31	25	38	-2	0.0	46.0	0.0	46.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	
43	5	LO	29	25	36	-2	0.0	39.5	0.0	39.5	0.0	.2	.4	0.0	0.0	0.0	2.3	
44	23	UP	0	0	6	0	0.0	30.5	0.0	30.5	0.0	0.0	0.0	0.0	0.0	0.0	1.1	
44	23	LO	0	0	0	8	7.0	17.0	0.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	.8	
45	74	UP	9	0	12	10	0.0	25.4	0.0	25.4	0.0	0.0	0.0	0.0	0.0	0.0	1.3	
45	74	LO	43	37	45	-8	0.0	58.0	0.0	58.0	0.0	0.0	0.0	.4	0.0	0.0	2.4	
46	1	UP	48	38	21	-2	0.0	49.5	0.0	49.5	0.0	0.0	0.0	0.0	0.0	0.0	2.3	
46	1	LO	0	0	0	0	0.0	16.0	0.0	16.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	
47	67	UP	24	0	23	4	0.0	32.0	0.0	32.0	0.0	.9	.3	0.0	0.0	0.0	1.4	
47	67	LO	42	16	33	-4	0.0	42.0	0.0	42.0	0.0	0.0	.8	0.0	0.0	0.0	2.2	
48	68	UP	19	0	32	-2	0.0	34.3	0.0	34.3	.5	.4	.7	.5	0.0	0.0	1.5	
48	68	LO	29	20	35	-6	0.0	40.5	0.0	40.5	1.6	.4	.3	.8	.7	.4	2.0	
49	73	UP	0	0	21	-14	0.0	26.5	0.0	26.5	0.0	0.0	0.0	1.3	3.5	0.0	1.3	
49	73	LO	8	7	28	10	0.0	25.5	0.0	25.5	0.0	0.0	0.0	.4	0.0	0.0	1.2	
50	35	UP	0	0	24	-2	0.0	30.5	0.0	30.5	0.0	0.0	1.3	1.1	.5	.4	1.0	
50	35	LO	0	0	0	0	0.0	18.5	0.0	18.5	0.0	0.0	2.0	2.2	.4	0.0	.9	

TABLE 2

DATA AFTER EXPOSURE TO SALT SPRAY AS COMPARED TO THE MEASURED CRACK LENGTH

SPEC. CODE NR.1	SPEC. CODE NR.2	LOC. CODE	EDDY CURRENT "SP" L	ULTRASONICS NLR L	ULTRASONICS RTD L	ULTRASONICS RTD DB	MEASURED CRACK LENGTH: MAIN CRACKS LE	MAIN CRACKS CE L	MAIN CRACKS RI	TOTAL L	ADD. NUCLEI	ADD. NUCLEI LE	ADD. NUCLEI	ADD. NUCLEI L	ADD. NUCLEI RI	ADD. NUCLEI	MAX DEPTH D	REMARKS
51	26	UP	2	2	24	4	0.0	35.0	0.0	35.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	
51	26	LO	0	0	0	0	0.0	24.5	0.0	24.5	0.0	0.0	0.0	0.0	0.0	0.0	.4	
52	27	UP	12	0	30	-2	0.0	35.0	0.0	35.0	0.0	0.0	0.0	.5	.9	0.0	1.7	
52	27	LO	25	0	0	0	0.0	24.0	0.0	24.0	0.0	0.0	0.0	1.6	1.4	0.0	.8	
53	22	UP	0	0	0	0	0.0	20.5	0.0	20.5	0.0	0.0	0.0	1.1	1.6	.9	1.0	
53	22	LO	0	0	0	0	0.0	8.0	0.0	8.0	0.0	0.0	4.5	1.5	0.0	0.0	.5	
54	20	UP	26	14	29	-4	0.0	35.0	0.0	35.0	0.0	0.0	0.0	.6	0.0	0.0	1.8	
54	20	LO	0	28	12	2	0.0	31.0	0.0	31.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	
55	8	UP	0	0	7	0	0.0	26.0	0.0	26.0	0.0	.4	6.5	.7	.4	1.1	.6	
55	8	LO	33	0	0	6	0.0	35.5	0.0	35.5	.4	.4	.7	0.0	0.0	0.0	1.4	
56	76	UP	13	0	13	6	0.0	32.5	0.0	32.5	0.0	1.3	1.2	0.0	0.0	0.0	1.6	
56	76	LO	3	0	0	0	0.0	11.5	0.0	11.5	0.0	0.0	0.0	1.1	.8	0.0	.4	
57	39	UP	0	0	0	0	0.0	23.5	0.0	23.5	0.0	0.0	0.0	0.0	0.0	0.0	.7	
57	39	LO	0	0	0	0	0.0	19.0	0.0	19.0	0.0	0.0	.9	.6	0.0	0.0	.4	
58	58	UP	11	0	29	-6	0.0	35.5	0.0	35.5	.6	.8	.2	1.0	.4	0.0	1.8	
58	58	LO	1	0	0	0	0.0	24.5	0.0	24.5	0.0	0.0	0.0	.9	.4	.3	1.0	
59	4	UP	0	0	8	6	0.0	25.3	0.0	25.3	0.0	0.0	0.0	0.0	0.0	0.0	.9	
59	4	LO	0	0	0	0	0.0	20.2	0.0	20.2	0.0	.7	.9	.5	0.0	0.0	.4	
60	10	UP	0	0	0	0	0.0	9.5	0.0	9.5	0.0	.6	.8	0.0	0.0	0.0	.4	
60	10	LO	13	0	39	-6	0.0	39.0	0.0	39.0	0.0	0.0	0.0	1.1	.7	1.2	1.4	
61	38	UP	18	22	30	-6	0.0	44.6	0.0	44.6	0.0	0.0	.5	0.0	0.0	0.0	1.6	
61	38	LO	0	0	0	0	0.0	12.0	0.0	12.0	0.0	1.9	2.2	0.0	0.0	0.0	.4	
62	101	UP	0	0	9	-6	0.0	28.5	0.0	28.5	.4	1.7	2.0	.3	.4	0.0	.8	
62	101	LO	14	0	0	-10	0.0	35.0	0.0	35.0	0.0	0.0	0.0	1.3	0.0	0.0	1.5	
63	12	UP	43	40	50	0	0.0	54.0	0.0	54.0	0.0	0.0	.5	0.0	0.0	0.0	2.5	
63	12	LO	0	0	0	-2	0.0	23.0	0.0	23.0	0.0	0.0	0.0	1.6	0.0	0.0	.4	
64	90	UP	0	0	0	0	0.0	6.8	0.0	6.8	0.0	0.0	.5	.7	0.0	0.0	.3	
64	90	LO	32	0	39	-6	0.0	41.8	0.0	41.8	0.0	0.0	.4	.5	.2	0.0	2.5	
65	19	UP	0	8	0	-2	0.0	28.0	0.0	28.0	2.2	.5	.3	0.0	0.0	0.0	1.2	
65	19	LO	23	22	24	0	0.0	35.2	0.0	35.2	0.0	0.0	0.0	.6	.4	0.0	2.0	
66	95	UP	0	0	0	0	0.0	12.5	0.0	12.5	.5	.6	.7	.8	.5	0.0	.2	
66	95	LO	10	0	19	-2	0.0	23.0	0.0	23.0	1.4	2.7	.4	3.7	1.0	0.0	1.3	
67	84	UP	7	0	16	6	0.0	31.5	0.0	31.5	1.0	1.7	.7	0.0	0.0	0.0	1.4	
67	84	LO	0	0	0	0	0.0	20.0	0.0	20.0	0.0	0.0	0.0	1.0	0.0	0.0	.6	
68	88	UP	3	0	0	0	0.0	17.0	0.0	17.0	0.0	0.0	1.0	2.7	0.0	0.0	.7	
68	88	LO	0	0	0	0	0.0	18.0	0.0	18.0	0.0	0.0	0.0	3.6	.6	.3	.4	
69	98	UP	0	0	20	10	0.0	26.5	0.0	26.5	0.0	1.2	.9	0.0	0.0	0.0	.8	
69	98	LO	0	0	0	0	0.0	13.0	0.0	13.0	1.8	2.5	1.3	0.0	0.0	0.0	.9	
70	13	UP	0	0	0	0	0.0	25.5	0.0	25.5	.4	5.0	.8	0.0	0.0	0.0	.3	
70	13	LO	0	0	0	0	0.0	16.3	0.0	16.3	0.0	0.0	0.0	0.0	0.0	0.0	.2	
71	16	UP	0	0	110	0	0.0	19.5	0.0	19.5	.5	.4	1.2	.4	0.0	0.0	.9	
71	16	LO	20	22	34	0	0.0	35.5	1.7	37.2	0.0	0.0	.6	.7	.7	.8	1.8	
72	31	UP	0	0	0	0	0.0	23.5	0.0	23.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0	
72	31	LO	15	7	25	-4	0.0	25.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	
73	29	UP	9	1	19	8	0.0	32.5	0.0	32.5	0.0	0.0	0.0	0.0	0.0	0.0	1.5	
73	29	LO	31	24	41	-6	0.0	45.5	0.0	45.5	0.0	0.0	.7	1.1	0.0	0.0	2.1	
74	87	UP	0	0	12	6	0.0	29.0	0.0	29.0	0.0	0.0	0.0	1.2	0.0	0.0	1.1	
74	87	LO	0	0	16	4	0.0	26.0	0.0	26.0	0.0	0.0	0.0	.6	.8	.8	.8	
75	94	UP	0	0	21	-6	0.0	25.0	0.0	25.0	0.0	0.0	1.7	0.0	0.0	0.0	1.3	
75	94	LO	18	25	32	-4	0.0	28.3	0.0	28.3	0.0	0.0	0.0	0.0	0.0	0.0	2.0	

TABLE 2

DATA AFTER EXPOSURE TO SALT SPRAY AS COMPARED TO THE MEASURED CRACK LENGTH

SPEC. CODE NR.1	SPEC. CODE NR.2	LOC. CODE	EDDY CURRENT "SP" L	ULTRASONICS NLR L	ULTRASONICS RTD L	ULTRASONICS RTD DR	MEASURED CRACK LENGTH MAIN CRACKS LF	MAIN CRACKS CE L	MAIN CRACKS RI	MAIN CRACKS TOTAL L	ADD. NUCLEI LE	ADD. NUCLEI	ADD. NUCLEI L	ADD. NUCLEI	ADD. NUCLEI RI	ADD. NUCLEI	MAX DEPTH D	REMARKS
76	102	UP	7	0	69	0	0.0	33.9	0.0	33.9	0.0	0.0	2.5	0.0	0.0	0.0	1.5	
76	102	LO	0	0	20	0	0.0	27.7	0.0	27.7	0.0	0.0	.8	0.0	0.0	0.0	1.4	
77	92	UP	9	0	0	0	0.0	24.5	0.0	24.5	.2	1.8	.8	2.2	.2	0.0	.6	
77	92	LO	16	0	0	0	1.9	.8	0.0	2.7	.6	.4	.5	2.3	1.8	1.4	.2	
78	61	UP	17	0	7	-10	0.0	35.5	0.0	35.5	0.0	0.0	0.0	0.0	0.0	0.0	1.4	
78	61	LO	22	0	0	0	0.0	37.5	0.0	37.5	0.0	.2	.4	.4	0.0	0.0	1.3	
79	96	UP	0	0	0	0	0.0	20.0	0.0	20.0	.9	1.5	1.1	.4	1.6	1.0	.6	
79	96	LO	0	0	0	0	0.0	25.0	0.0	25.0	0.0	0.0	.8	.4	0.0	0.0	.7	
80	6	UP	0	0	0	0	0.0	37.1	0.0	37.1	0.0	0.0	.7	1.6	0.0	0.0	1.1	
80	6	LO	10	0	0	0	0.0	27.4	0.0	27.4	0.0	0.0	0.0	.8	0.0	0.0	.9	
81	85	UP	0	0	0	0	0.0	18.0	0.0	18.0	0.0	5.4	.9	0.0	0.0	0.0	.5	
81	85	LO	0	0	0	0	0.0	21.4	0.0	21.4	0.0	0.0	0.0	.6	0.0	0.0	.3	
82	48	UP	0	0	0	0	0.0	34.0	0.0	34.0	.3	.2	2.6	.7	.6	.4	1.4	
82	48	LO	0	0	0	0	0.0	30.5	0.0	30.5	0.0	.3	.4	.4	0.0	0.0	.7	
83	82	UP	29	0	0	0	0.0	42.5	0.0	42.5	0.0	0.0	.8	1.8	0.0	0.0	2.3	
83	82	LO	0	0	0	0	0.0	29.5	0.0	29.5	0.0	0.0	.2	2.6	1.2	1.5	.5	
84	51	UP	1	0	18	12	0.0	34.0	0.0	34.0	.3	.5	.4	.6	.2	0.0	1.4	
84	51	LO	0	0	0	0	0.0	28.0	0.0	28.0	0.0	0.0	0.0	0.0	0.0	0.0	.7	
85	41	UP	0	0	0	0	0.0	27.0	0.0	27.0	2.0	1.8	1.0	0.0	0.0	0.0	.9	
85	41	LO	11	0	19	12	0.0	38.5	0.0	38.5	.6	.2	1.0	0.0	0.0	0.0	1.8	
86	53	UP	0	0	10	12	0.0	29.5	0.0	29.5	0.0	0.0	0.0	0.0	0.0	0.0	1.2	
86	53	LO	13	0	10	6	0.0	45.5	0.0	45.5	0.0	0.0	0.0	2.5	1.6	0.0	1.3	
87	54	UP	1	0	0	0	0.0	38.0	0.0	38.0	0.0	0.0	0.0	0.0	0.0	0.0	.9	
87	54	LO	0	0	0	0	0.0	31.5	0.0	31.5	0.0	0.0	0.0	.3	0.0	0.0	.9	
88	93	UP	18	0	0	0	0.0	28.5	0.0	28.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0	
88	93	LO	3	0	18	8	0.0	31.5	0.0	31.5	0.0	0.0	0.0	0.0	0.0	0.0	.9	
89	100	UP	47	37	0	0	0.0	48.5	0.0	48.5	0.0	1.0	.4	1.0	0.0	0.0	2.6	
89	100	LO	2	0	42	4	0.0	32.0	0.0	32.0	.5	1.0	.4	.6	0.0	0.0	1.3	
90	65	UP	1	0	0	0	0.0	30.5	0.0	30.5	0.0	0.0	0.0	0.0	0.0	0.0	.9	
90	65	LO	23	9	20	-2	0.0	39.0	0.0	39.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	
91	40	UP	54	0	63	-6	0.0	62.5	0.0	62.5	0.0	0.0	0.0	0.0	0.0	0.0	2.7	
91	40	LO	0	0	0	0	0.0	27.0	0.0	27.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	
92	34	UP	5	0	18	4	0.0	34.5	0.0	34.5	0.0	0.0	0.0	0.0	0.0	0.0	1.4	
92	34	LO	44	46	57	0	0.0	55.5	0.0	55.5	0.0	0.0	0.0	0.0	0.0	0.0	2.8	
93	89	UP	0	0	0	0	0.0	23.0	0.0	23.0	1.2	.7	2.1	3.2	.6	.4	.8	
93	89	LO	25	0	36	4	0.0	38.0	0.0	38.0	0.0	0.0	1.4	3.2	.2	.7	1.6	
94	83	UP	0	0	0	0	0.0	17.0	0.0	17.0	0.0	0.0	0.0	.8	0.0	0.0	.6	
94	83	LO	0	0	110	4	0.0	17.5	0.0	17.5	0.0	0.0	1.4	0.0	0.0	0.0	.2	
95	24	UP	0	0	0	0	0.0	22.5	0.0	22.5	0.0	0.0	.5	0.0	0.0	0.0	1.2	
95	24	LO	0	0	0	0	0.0	28.0	0.0	28.0	0.0	0.0	0.0	1.5	0.0	0.0	1.1	
96	91	UP	0	0	0	0	0.0	27.0	0.0	27.0	0.0	0.0	0.0	.8	0.0	0.0	.6	
96	91	LO	0	0	0	0	0.0	16.5	0.0	16.5	0.0	.4	.7	.7	.6	0.0	.9	
97	81	UP	0	0	15	2	0.0	46.5	0.0	46.5	0.0	0.0	.5	0.0	0.0	0.0	1.3	
97	81	LO	12	0	35	0	0.0	36.0	0.0	36.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	
98	78	UP	14	0	0	0	0.0	34.5	0.0	34.5	0.0	0.0	0.0	0.0	0.0	0.0	1.2	
98	78	LO	35	0	0	0	0.0	37.3	0.0	37.3	0.0	0.0	0.0	0.0	0.0	0.0	1.1	
99	62	UP	12	0	0	0	0.0	33.5	0.0	33.5	0.0	.8	1.0	0.0	0.0	0.0	1.4	
99	62	LO	1	0	0	0	0.0	31.5	0.0	31.5	0.0	0.0	.8	.6	1.3	.5	1.1	
100	17	UP	21	17	32	6	0.0	39.0	0.0	39.0	.9	.3	.3	1.1	0.0	0.0	2.0	
100	17	LO	7	0	0	0	0.0	27.0	0.0	27.0	0.0	0.0	.4	.4	1.6	0.0	.7	

TABLE 2 DATA <u>AFTER EXPOSURE TO SALT SPRAY</u> AS COMPARED TO THE MEASURED CRACK LENGTH

SPEC. CODE NR.1	SPEC. CODE NR.2	LOC. CODE	EDDY CURRENT "SP" L	ULTRASONICS NLR L	ULTRASONICS RTD L	DR	MEASURED CRACK LENGTH MAIN CRACKS LE	MAIN CRACKS CE L	MAIN CRACKS RI	MAIN CRACKS TOTAL L	ADD. NUCLEI LE L	ADD. NUCLEI L	ADD. NUCLEI L	ADD. NUCLEI L	ADD. NUCLEI RI L	ADD. NUCLEI L	MAX DEPTH D	REMARKS
101	7	UP	13	0	0	0	0.0	33.5	0.0	33.5	1.1	.6	1.0	1.4	0.0	0.0	1.4	
101	7	LO	0	0	0	0	0.0	29.5	0.0	29.5	1.5	.2	.5	.5	0.0	0.0	.8	
102	77	UP	16	0	0	0	0.0	34.5	0.0	34.5	0.0	0.0	6.0	0.0	0.0	0.0	1.5	
102	77	LO	0	0	0	0	0.0	31.5	0.0	31.5	0.0	0.0	.8	0.0	0.0	0.0	.8	
111	163	UP	73	48	58	-6	0.0	54.5	0.0	54.5	0.0	0.0	0.0	0.0	0.0	0.0	3.2	
111	163	LO	67	51	61	-10	0.0	56.5	0.0	56.5	0.0	0.0	0.0	0.0	0.0	0.0	3.2	
112	147	UP	0	0	11	2	0.0	26.0	0.0	26.0	0.0	0.0	0.0	5.3	0.0	0.0	2.1	
112	147	LO	65	57	62	-14	0.0	62.0	0.0	62.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	
117	157	UP	4	0	12	0	8.5	2.1	4.9	15.5	0.0	0.0	0.0	1.0	0.0	0.0	1.9	
117	157	LO	3	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

TABLE 3 DATA BEFORE EXPOSURE TO SALT SPRAY AS COMPARED TO THE MEASURED CRACK LENGTH

SPEC. CODE NR.1	LOC. CODE	PENETRANT MAIN INDICATIONS	LE	CE L	RI		TOTAL L	ADD. NUCLEI INNER	OUTER L	MEASURED CRACK LENGTH MAIN CRACKS LE	CE L	RI	TOTAL L	ADD. NUCLEI	LE	L		RI		MAX DEPTH D
1	UP	0.0	0.0	7.4	0.0	0.0	7.4		1)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	LO	0.0	0.0	0.0	0.0	0.0	0.0	12.3	31.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	UP	0.0	0.0	6.2	0.0	0.0	6.2	6.2	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	LO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	UP	0.0	0.0	29.0	0.0	0.0	29.0	29.9	51.2	3.2	25.0	0.0	28.2	.4	.2	.5	0.0	0.0	0.0	.8
3	LO	0.0	0.0	22.9	0.0	0.0	22.9	23.2	61.6	0.0	42.0	0.0	42.0	0.0	0.0	0.0	.3	0.0	0.0	.7
4	UP	0.0	0.0	30.9	0.0	0.0	30.9		1)	0.0	31.0	0.0	31.0	.4	2.0	.4	3.4	0.0	0.0	1.1
4	LO	0.0	0.0	35.2	0.0	0.0	35.2	35.8	46.2	0.0	32.0	0.0	32.0	0.0	0.0	.2	4.0	2.2	0.0	1.2
5	UP	0.0	0.0	45.6	0.0	0.0	45.6	46.8	56.0	0.0	44.5	0.0	44.5	0.0	0.0	.9	0.0	0.0	0.0	2.4
5	LO	0.0	14.2	11.8	0.0	0.0	26.0	27.2	47.7	0.0	20.5	0.0	20.5	0.0	0.0	5.1	0.0	0.0	0.0	.6
6	UP	0.0	0.0	38.0	0.0	0.0	38.0	39.0	49.0	0.0	21.8	0.0	21.8	0.0	.5	1.2	0.0	0.0	0.0	1.9
6	LO	0.0	0.0	39.9	0.0	0.0	39.9	41.4	57.0	0.0	39.5	0.0	39.5	0.0	.5	1.0	.4	.5	.5	1.9
7	UP	0.0	0.0	0.0	0.0	0.0	0.0	4.8	15.2	0.0	.5	0.0	.5	0.0	0.0	0.0	0.0	0.0	0.0	.2
7	LO	0.0	0.0	0.0	0.0	0.0	0.0	34.2	52.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	UP	0.0	0.0	78.5	0.0	0.0	78.5	80.2	85.9	0.0	79.3	0.0	79.3	0.0	0.0	0.0	0.0	0.0	0.0	3.3
8	LO	0.0	0.0	17.6	0.0	0.0	17.6	18.1	38.6	0.0	24.5	0.0	24.5	0.0	0.0	0.0	.5	.9	.6	1.0
9	UP	0.0	0.0	11.7	0.0	0.0	11.7	13.5	36.2	3.5	9.2	7.9	20.6	0.0	.4	4.0	1.5	0.0	0.0	.3
9	LO	0.0	0.0	22.2	0.0	0.0	22.2	32.6	55.2	0.0	32.0	0.0	32.0	0.0	1.1	.8	1.6	.4	0.0	1.5
10	UP	0.0	0.0	21.4	0.0	0.0	21.4	41.8	59.5	0.0	45.5	0.0	45.5	0.0	0.0	0.0	0.0	0.0	0.0	2.3
10	LO	0.0	0.0	30.1	0.0	0.0	30.1	30.6	47.2	0.0	31.8	0.0	31.8	0.0	0.0	0.0	0.0	0.0	0.0	1.3
11	UP	0.0	0.0	47.4	0.0	0.0	47.4	47.6	60.8	0.0	47.5	0.0	47.5	0.0	0.0	0.0	1.2	0.0	0.0	2.5
11	LO	0.0	0.0	16.9	0.0	0.0	16.9	17.2	47.3	0.0	24.3	0.0	24.3	0.0	0.0	0.0	1.3	0.0	0.0	1.1
12	UP	0.0	0.0	7.4	0.0	0.0	7.4	28.9	38.4	0.0	22.0	0.0	22.0	0.0	0.0	0.0	0.0	0.0	0.0	.9
12	LO	0.0	0.0	43.4	0.0	0.0	43.4	44.8	52.6	0.0	43.3	0.0	43.3	0.0	0.0	0.0	.8	0.0	0.0	2.3
13	UP	0.0	0.0	21.2	0.0	0.0	21.2	21.5	54.5	0.0	21.5	0.0	21.5	0.0	0.0	0.0	0.0	0.0	0.0	.6
13	LO	0.0	0.0	44.8	0.0	0.0	44.8	45.5	56.3	0.0	45.0	0.0	45.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0
14	UP	0.0	0.0	19.1	0.0	0.0	19.1	19.8	37.4	0.0	10.5	0.0	10.5	0.0	2.2	.5	.5	0.0	0.0	.6
14	LO	0.0	0.0	27.7	0.0	0.0	27.7	37.4	53.0	0.0	37.0	0.0	37.0	.4	.3	.2	1.3	1.0	0.0	1.8
15	UP	0.0	0.0	26.3	0.0	0.0	26.3	27.0	47.4	0.0	28.0	0.0	28.0	0.0	0.0	2.2	.2	0.0	0.0	1.2
15	LO	0.0	0.0	49.0	0.0	0.0	49.0	49.3	66.4	0.0	49.0	0.0	49.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4
16	UP	0.0	0.0	53.7	0.0	0.0	53.7	54.0	57.3	0.0	54.0	0.0	54.0	0.0	0.0	.8	0.0	0.0	0.0	2.4
16	LO	0.0	0.0	28.4	0.0	0.0	28.4	29.4	54.8	0.0	29.0	0.0	29.0	0.0	0.0	0.0	.6	.3	.4	1.4
17	UP	0.0	0.0	34.1	0.0	0.0	34.1	35.6	55.3	0.0	38.0	0.0	38.0	.7	1.2	.7	0.0	0.0	0.0	1.4
17	LO	0.0	0.0	41.2	0.0	0.0	41.2	41.9	51.7	0.0	44.0	0.0	44.0	0.0	0.0	0.0	.4	.7	0.0	1.9
18	UP	0.0	0.0	36.3	0.0	0.0	36.3	36.7	51.3	0.0	35.8	0.0	35.8	0.0	0.0	1.9	0.0	0.0	0.0	1.3
18	LO	0.0	0.0	13.6	0.0	0.0	13.6	14.5	51.8	0.0	26.0	0.0	26.0	0.0	0.0	0.0	.4	1.1	0.0	1.2
19	UP	0.0	0.0	11.6	0.0	0.0	11.6	11.9	69.0	0.0	24.5	0.0	24.5	0.0	1.4	.3	1.0	0.0	0.0	.6
19	LO	0.0	0.0	51.4	0.0	0.0	51.4	52.5	62.4	0.0	51.0	0.0	51.0	0.0	0.0	1.2	.4	.3	.3	2.3
20	UP	0.0	0.0	21.4	0.0	0.0	21.4	23.5	39.6	0.0	23.5	0.0	23.5	1.4	.5	.3	1.1	.5	0.0	.8
20	LO	0.0	0.0	50.4	0.0	0.0	50.4	57.0	61.4	0.0	55.0	0.0	55.0	0.0	.7	.4	0.0	0.0	0.0	2.5
21	UP	0.0	0.0	37.1	0.0	0.0	37.1	38.3	52.6	0.0	38.5	0.0	38.5	0.0	0.0	0.0	0.0	0.0	0.0	1.8
21	LO	0.0	0.0	36.9	0.0	0.0	36.9	37.3	49.0	0.0	37.0	0.0	37.0	0.0	0.0	0.0	.5	0.0	0.0	1.5
22	UP	0.0	0.0	19.1	0.0	0.0	19.1	20.0	38.7	0.0	18.5	0.0	18.5	0.0	1.3	.8	.5	0.0	0.0	1.2
22	LO	0.0	0.0	40.3	0.0	0.0	40.3	40.4	61.4	0.0	43.0	0.0	43.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2
23	UP	0.0	0.0	48.2	0.0	0.0	48.2	48.5	63.4	0.0	41.0	0.0	41.0	0.0	0.0	0.0	1.5	0.0	0.0	2.1
23	LO	0.0	0.0	35.6	0.0	0.0	35.6	36.4	47.4	0.0	36.0	0.0	36.0	0.0	0.0	0.0	.5	0.0	0.0	1.4
24	UP	0.0	0.0	68.7	0.0	0.0	68.7	70.6	74.2	0.0	68.5	0.0	68.5	0.0	0.0	0.0	0.0	0.0	0.0	2.9
24	LO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.4	0.0	13.5	.9	14.4	0.0	0.0	1.9	4.8	1.0	1.6	.5
25	UP	0.0	0.0	31.6	0.0	0.0	31.6	32.1	38.3	0.0	33.5	0.0	33.5	0.0	1.2	.8	0.0	0.0	0.0	1.5
25	LO	0.0	0.0	34.5	0.0	0.0	34.5	34.9	50.0	0.0	37.0	0.0	37.0	0.0	0.0	0.0	2.0	.6	0.0	1.7

1) data for additional nuclei not unambiguously established

TABLE 3 DATA BEFORE EXPOSURE TO SALT SPRAY AS COMPARED TO THE MEASURED CRACK LENGTH

SPEC. CODE NR.1	LOC. CODE	PENETRANT MAIN INDICATIONS						PENETRANT ADD. NUCLEI		MEASURED CRACK LENGTH MAIN CRACKS				MEASURED CRACK LENGTH ADD. NUCLEI						MAX DEPTH
			LE	CE L	RI		TOTAL L	INNER	OUTER L	LE	CE L	RI	TOTAL L		LE	L		RI		D
26	UP	0.0	0.0	41.4	0.0	0.0	41.4		1)	0.0	46.5	0.0	46.5	0.0	0.0	.7	0.0	0.0	0.0	2.3
26	LO	0.0	0.0	30.8	0.0	0.0	30.8	32.7	49.8	0.0	20.5	0.0	20.5	.4	.4	1.7	.3	.7	0.0	1.6
27	UP	0.0	0.0	22.6	0.0	0.0	22.6	22.8	43.0	0.0	19.2	0.0	19.2	1.2	.7	.6	1.6	.6	0.0	.4
27	LO	0.0	0.0	19.6	0.0	0.0	19.6	20.4	38.7	0.0	21.8	0.0	21.8	0.0	0.0	0.0	.8	0.0	0.0	.6
28	UP	0.0	0.0	27.5	0.0	0.0	27.5	29.2	44.0	0.0	30.0	0.0	30.0	.3	.6	.5	.6	.5	0.0	1.4
28	LO	0.0	0.0	0.0	0.0	0.0	0.0	.2	30.5	0.0	6.0	4.0	10.0	2.1	.7	.4	.4	4.8	.4	.5
29	UP	0.0	0.0	42.6	0.0	0.0	42.6	43.2	54.4	0.0	41.8	0.0	41.8	0.0	1.8	.6	1.2	0.0	0.0	2.4
29	LO	0.0	0.0	13.1	0.0	0.0	13.1	13.3	50.0	0.0	16.8	0.0	16.8	0.0	0.0	3.0	0.0	0.0	0.0	.4
30	UP	0.0	0.0	16.5	0.0	0.0	16.5	16.8	40.6	0.0	11.1	0.0	11.1	0.0	0.0	4.0	1.3	0.0	0.0	.7
30	LO	0.0	0.0	15.7	0.0	0.0	15.7	15.9	33.5	0.0	15.5	0.0	15.5	0.0	0.0	0.0	0.0	0.0	0.0	.7
31	UP	0.0	0.0	25.6	0.0	0.0	25.6	26.4	48.6	0.0	26.5	0.0	26.5	0.0	0.0	0.0	1.2	0.0	0.0	1.0
31	LO	0.0	0.0	44.8	0.0	0.0	44.8	45.2	63.1	0.0	45.7	0.0	45.7	0.0	0.0	0.0	0.0	0.0	0.0	2.2
32	UP	0.0	0.0	6.8	2.7	7.4	16.9	18.0	42.7	0.0	27.0	0.0	27.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3
32	LO	0.0	0.0	38.0	0.0	0.0	38.0	38.8	53.0	0.0	37.5	0.0	37.5	0.0	0.0	0.0	0.0	0.0	0.0	2.0
33	UP	0.0	0.0	0.0	0.0	0.0	0.0	.1	34.9	0.0	2.2	0.0	2.2	0.0	2.2	1.3	.4	4.0	.3	.2
33	LO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.2	1.4	.6	0.0	2.0	.4	.2	1.5	1.2	.8	0.0	.2
34	UP	0.0	0.0	35.4	0.0	0.0	35.4	36.1	56.9	0.0	34.0	0.0	34.0	0.0	0.0	.6	.9	0.0	0.0	1.0
34	LO	0.0	0.0	15.4	0.0	0.0	15.4	15.8	42.9	0.0	18.0	0.0	18.0	0.0	0.0	0.0	2.4	0.0	0.0	.8
35	UP	0.0	0.0	35.4	0.0	0.0	35.4	36.5	55.1	0.0	33.0	0.0	33.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
35	LO	0.0	0.0	21.3	0.0	0.0	21.3	21.8	43.2	0.0	21.5	0.0	21.5	0.0	0.0	0.0	0.0	0.0	0.0	.9
36	UP	0.0	0.0	19.0	0.0	0.0	19.0	19.6	47.0	0.0	28.0	0.0	28.0	0.0	0.0	0.0	0.0	0.0	0.0	.9
36	LO	0.0	0.0	24.7	0.0	0.0	24.7	25.3	41.2	0.0	26.5	0.0	26.5	0.0	0.0	0.0	0.0	0.0	0.0	.5
37	UP	0.0	0.0	19.2	0.0	0.0	19.2	19.6	48.1	0.0	18.5	0.0	18.5	0.0	0.0	1.2	3.2	0.0	0.0	.9
37	LO	0.0	0.0	34.9	0.0	0.0	34.9	35.2	62.7	0.0	36.5	0.0	36.5	0.0	0.0	.7	.6	0.0	0.0	2.0
38	UP	0.0	0.0	19.4	0.0	0.0	19.4	20.4	37.3	0.0	15.0	0.0	15.0	0.0	.4	.5	0.0	0.0	0.0	.4
38	LO	0.0	0.0	43.9	0.0	0.0	43.9	44.3	58.8	0.0	46.5	0.0	46.5	0.0	0.0	0.0	2.7	0.0	0.0	1.8
39	UP	0.0	0.0	19.4	0.0	0.0	19.4	20.0	39.5	0.0	30.0	0.0	30.0	0.0	.5	.7	.5	0.0	0.0	.7
39	LO	0.0	0.0	14.9	0.0	0.0	14.9	15.2	49.7	0.0	23.0	0.0	23.0	0.0	0.0	.4	.7	0.0	0.0	.7
40	UP	0.0	0.0	21.3	0.0	0.0	21.3	22.6	41.6	0.0	14.5	0.0	14.5	1.8	1.4	1.7	.8	.7	.7	.4
40	LO	0.0	0.0	21.5	0.0	0.0	21.5	21.9	37.2	0.0	15.7	0.0	15.7	0.0	0.0	2.0	1.9	.4	0.0	.6
41	UP	0.0	0.0	5.8	6.7	0.0	12.5	13.2	42.3	0.0	25.0	0.0	25.0	0.0	.7	.4	0.0	0.0	0.0	.6
41	LO	0.0	0.0	22.4	0.0	0.0	22.4	22.8	49.8	0.0	28.5	0.0	28.5	0.0	0.0	2.6	0.0	0.0	0.0	.9
42	UP	0.0	0.0	16.9	0.0	0.0	16.9	17.1	49.2	0.0	23.7	0.0	23.7	0.0	0.0	1.1	5.0	1.5	0.0	.6
42	LO	0.0	0.0	21.0	0.0	0.0	21.0	31.9	53.7	0.0	32.2	0.0	32.2	0.0	0.0	.5	.4	0.0	0.0	1.5
43	UP	0.0	0.0	36.2	0.0	0.0	36.2	47.7	55.3	0.0	46.0	0.0	46.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3
43	LO	0.0	0.0	39.9	0.0	0.0	39.9	40.3	53.4	0.0	39.5	0.0	39.5	0.0	.2	.4	0.0	0.0	0.0	2.3
44	UP	0.0	0.0	18.5	0.0	0.0	18.5	19.2	46.7	0.0	30.5	0.0	30.5	0.0	0.0	0.0	0.0	0.0	0.0	1.1
44	LO	0.0	0.0	17.9	0.0	0.0	17.9	18.6	38.2	7.0	17.0	0.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	.8
45	UP	0.0	0.0	15.1	0.0	0.0	15.1	15.5	52.5	0.0	25.4	0.0	25.4	0.0	0.0	0.0	0.0	0.0	0.0	1.3
45	LO	0.0	0.0	52.2	0.0	0.0	52.2	53.0	61.4	0.0	58.0	0.0	58.0	0.0	0.0	0.0	.4	0.0	0.0	2.4
46	UP	0.0	0.0	58.9	0.0	0.0	58.9		1)	0.0	49.5	0.0	49.5	0.0	0.0	0.0	0.0	0.0	0.0	2.3
46	LO	0.0	0.0	27.4	0.0	0.0	27.4	27.7	51.4	0.0	16.0	0.0	16.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2
47	UP	0.0	0.0	25.4	0.0	0.0	25.4	25.6	37.2	0.0	32.0	0.0	32.0	0.0	.9	.3	0.0	0.0	0.0	1.4
47	LO	0.0	0.0	40.4	0.0	0.0	40.4	51.4	63.1	0.0	42.0	0.0	42.0	0.0	0.0	.8	0.0	0.0	0.0	2.2
48	UP	0.0	0.0	34.1	0.0	0.0	34.1	34.6	54.6	0.0	34.3	0.0	34.3	.5	.4	.7	.5	0.0	0.0	1.5
48	LO	0.0	0.0	39.0	0.0	0.0	39.0	39.4	60.8	0.0	40.5	0.0	40.5	1.6	.4	.3	.8	.7	.4	2.0
49	UP	0.0	0.0	33.8	0.0	0.0	33.8	35.5	46.8	0.0	26.5	0.0	26.5	0.0	0.0	0.0	1.3	3.5	0.0	1.3
49	LO	0.0	0.0	29.8	0.0	0.0	29.8	36.4	54.0	0.0	25.5	0.0	25.5	0.0	0.0	0.0	.4	0.0	0.0	1.2
50	UP	0.0	0.0	31.1	0.0	0.0	31.1		1)	0.0	30.5	0.0	30.5	0.0	0.0	1.3	1.1	.5	.4	1.0
50	LO	0.0	0.0	18.2	0.0	0.0	18.2	18.7	40.0	0.0	18.5	0.0	18.5	0.0	0.0	2.0	2.2	.4	0.0	.9

1) idem

TABLE 3 DATA BEFORE EXPOSURE TO SALT SPRAY AS COMPARED TO THE MEASURED CRACK LENGTH

SPEC. CODE NR.1	LOC. CODE	PENETRANT: MAIN INDICATIONS						PENETRANT: ADD. NUCLEI		MEASURED CRACK LENGTH: MAIN CRACKS				MEASURED CRACK LENGTH: ADD. NUCLEI						MAX DEPTH
			LE	CE L	RI		TOTAL L	INNER	OUTER L	LE	CE L	RI	TOTAL L		LE	L		RI		D
51	UP	0.0	0.0	30.2	0.0	0.0	30.2	30.6	41.9	0.0	35.0	0.0	35.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3
51	LO	0.0	0.0	29.0	0.0	0.0	29.0		1)	0.0	24.5	0.0	24.5	0.0	0.0	0.0	0.0	0.0	0.0	.4
52	UP	0.0	0.0	31.3	0.0	0.0	31.3	31.7	45.1	0.0	35.0	0.0	35.0	0.0	0.0	0.0	.5	.9	0.0	1.7
52	LO	0.0	0.0	8.7	0.0	0.0	8.7		1)	0.0	24.0	0.0	24.0	0.0	0.0	0.0	1.6	1.4	0.0	.8
53	UP	0.0	3.7	14.6	0.0	0.0	18.3	19.7	41.4	0.0	20.5	0.0	20.5	0.0	0.0	0.0	1.1	1.6	.9	1.0
53	LO	1.6	4.8	6.7	0.0	0.0	13.1	14.0	32.5	0.0	8.0	0.0	8.0	0.0	0.0	4.5	1.5	0.0	0.0	.5
54	UP	0.0	0.0	34.6	0.0	0.0	34.6	34.9	55.6	0.0	35.0	0.0	35.0	0.0	0.0	0.0	.6	0.0	0.0	1.8
54	LO	0.0	0.0	26.1	0.0	0.0	26.1	26.4	41.8	0.0	31.0	0.0	31.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1
55	UP	99.9	99.9	199.8	99.9	99.9	599.4	0.0	0.0	0.0	26.0	0.0	26.0	0.0	.4	6.5	.7	.4	1.1	.6
55	LO	99.9	99.9	199.8	99.9	99.9	599.4	0.0	0.0	0.0	35.5	0.0	35.5	.4	.4	.7	0.0	0.0	0.0	1.4
56	UP	99.9	99.9	199.8	99.9	99.9	599.4	0.0	0.0	0.0	32.5	0.0	32.5	0.0	1.3	1.2	0.0	0.0	0.0	1.6
56	LO	99.9	99.9	199.8	99.9	99.9	599.4	0.0	0.0	0.0	11.5	0.0	11.5	0.0	0.0	0.0	1.1	.8	0.0	.4
57	UP	0.0	4.5	23.2	0.0	0.0	27.7	28.4	53.3	0.0	23.5	0.0	23.5	0.0	0.0	0.0	0.0	0.0	0.0	.7
57	LO	0.0	0.0	8.1	0.0	0.0	8.1	9.3	35.7	0.0	19.0	0.0	19.0	0.0	0.0	.9	.6	0.0	0.0	.4
58	UP	0.0	0.0	35.4	0.0	0.0	35.4	36.4	47.7	0.0	35.5	0.0	35.5	.6	.8	.2	1.0	.4	0.0	1.8
58	LO	0.0	0.0	24.9	0.0	0.0	24.9	28.1	45.3	0.0	24.5	0.0	24.5	0.0	0.0	0.0	.9	.4	.3	1.0
59	UP	0.0	0.0	26.4	0.0	0.0	26.4	27.4	45.8	0.0	25.3	0.0	25.3	0.0	0.0	0.0	0.0	0.0	0.0	.9
59	LO	0.0	0.0	12.2	0.0	0.0	12.2	13.0	41.1	0.0	20.2	0.0	20.2	0.0	.7	.9	.5	0.0	0.0	.4
60	UP	0.0	0.0	7.7	0.0	0.0	7.7	8.7	33.5	0.0	9.5	0.0	9.5	0.0	.6	.8	0.0	0.0	0.0	.4
60	LO	0.0	0.0	37.1	0.0	0.0	37.1	37.5	56.7	0.0	39.0	0.0	39.0	0.0	0.0	0.0	1.1	.7	1.2	1.4
61	UP	0.0	0.0	42.7	0.0	0.0	42.7	43.3	60.2	0.0	44.6	0.0	44.6	0.0	0.0	.5	0.0	0.0	0.0	1.6
61	LO	0.0	0.0	21.3	0.0	0.0	21.3	24.5	38.9	0.0	12.0	0.0	12.0	0.0	1.9	2.2	0.0	0.0	0.0	.4
62	UP	0.0	0.0	29.7	0.0	0.0	29.7	30.6	48.0	0.0	28.5	0.0	28.5	.4	1.7	2.0	.3	.4	0.0	.8
62	LO	0.0	0.0	31.3	0.0	0.0	31.3	32.1	52.8	0.0	35.0	0.0	35.0	0.0	0.0	0.0	1.3	0.0	0.0	1.5
63	UP	0.0	0.0	52.3	0.0	0.0	52.3	53.0	60.7	0.0	54.0	0.0	54.0	0.0	0.0	.5	0.0	0.0	0.0	2.5
63	LO	1.4	4.1	8.8	0.0	0.0	14.3	15.7	32.5	0.0	23.0	0.0	23.0	0.0	0.0	0.0	1.6	0.0	0.0	.4
64	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.1	0.0	6.8	0.0	6.8	0.0	0.0	.5	.7	0.0	0.0	.3
64	LO	0.0	0.0	41.2	0.0	0.0	41.2	42.2	49.0	0.0	41.8	0.0	41.8	0.0	0.0	.4	.5	.2	0.0	2.5
65	UP	0.0	0.0	26.5	0.0	0.0	26.5	27.6	46.9	0.0	28.0	0.0	28.0	2.2	.5	.3	0.0	0.0	0.0	1.2
65	LO	0.0	0.0	34.9	0.0	0.0	34.9	35.8	54.3	0.0	35.2	0.0	35.2	0.0	0.0	0.0	.6	.4	0.0	2.0
66	UP	0.0	0.0	7.6	0.0	0.0	7.6	8.6	30.8	0.0	12.5	0.0	12.5	.5	.6	.7	.8	.5	0.0	.2
66	LO	0.0	0.0	27.5	0.0	0.0	27.5	28.2	45.1	0.0	23.0	0.0	23.0	1.4	2.7	.4	3.7	1.0	0.0	1.3
67	UP	0.0	0.0	28.9	0.0	0.0	28.9	29.8	45.6	0.0	31.5	0.0	31.5	1.0	1.7	.7	0.0	0.0	0.0	1.4
67	LO	0.0	2.9	13.7	0.0	0.0	16.6	17.5	42.8	0.0	20.0	0.0	20.0	0.0	0.0	0.0	1.0	0.0	0.0	.6
68	UP	0.0	0.0	4.6	5.9	0.0	10.5	10.9	45.9	0.0	17.0	0.0	17.0	0.0	0.0	1.0	2.7	0.0	0.0	.7
68	LO	0.0	0.0	22.5	0.0	0.0	22.5	23.0	43.4	0.0	18.0	0.0	18.0	0.0	0.0	0.0	3.6	.6	.3	.4
69	UP	0.0	0.0	21.5	0.0	0.0	21.5	21.7	46.0	0.0	26.5	0.0	26.5	0.0	1.2	.9	0.0	0.0	0.0	.8
69	LO	0.0	0.0	12.7	0.0	0.0	12.7	13.1	30.7	0.0	13.0	0.0	13.0	1.8	2.5	1.3	0.0	0.0	0.0	.9
70	UP	0.0	0.0	9.4	0.0	0.0	9.4	10.7	54.1	0.0	25.5	0.0	25.5	.4	5.0	.8	0.0	0.0	0.0	.3
70	LO	0.0	0.0	0.0	0.0	0.0	0.0	.5	38.0	0.0	16.3	0.0	16.3	0.0	0.0	0.0	0.0	0.0	0.0	.2
71	UP	0.0	0.0	15.8	0.0	0.0	15.8	19.0	29.2	0.0	19.5	0.0	19.5	.5	.4	1.2	.4	0.0	0.0	.9
71	LO	0.0	0.0	36.1	0.0	0.0	36.1	37.0	51.3	0.0	35.5	1.7	37.2	0.0	0.0	.6	.7	.7	.8	1.8
72	UP	0.0	0.0	22.9	0.0	0.0	22.9	23.5	41.3	0.0	23.5	0.0	23.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0
72	LO	0.0	0.0	27.9	0.0	0.0	27.9	28.6	43.1	0.0	25.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3
73	UP	0.0	0.0	12.9	22.5	0.0	35.4	29.8	48.9	0.0	32.5	0.0	32.5	0.0	0.0	0.0	0.0	0.0	0.0	1.5
73	LO	0.0	0.0	43.5	0.0	0.0	43.5	45.8	61.8	0.0	45.5	0.0	45.5	0.0	0.0	.7	1.1	0.0	0.0	2.1
74	UP	0.0	0.0	18.1	6.3	0.0	24.4	24.8	43.6	0.0	29.0	0.0	29.0	0.0	0.0	0.0	1.2	0.0	0.0	1.1
74	LO	0.0	0.0	17.3	0.0	0.0	17.3	17.7	40.2	0.0	26.0	0.0	26.0	0.0	0.0	0.0	.6	.8	.8	.8
75	UP	0.0	0.0	12.8	7.9	0.0	20.7	22.2	42.8	0.0	25.0	0.0	25.0	0.0	0.0	1.7	0.0	0.0	0.0	1.3
75	LO	0.0	0.0	30.2	0.0	0.0	30.2	30.8	51.8	0.0	28.3	0.0	28.3	0.0	0.0	0.0	0.0	0.0	0.0	2.0

1) idem

TABLE 3 DATA BEFORE EXPOSURE TO SALT SPRAY AS COMPARED TO THE MEASURED CRACK LENGTH

SPEC. CODE NR.1	LOC. CODE	PENETRANT: MAIN INDICATIONS	LE	CE L	RI		TOTAL L	ADD. NUCLEI INNER	OUTER L	MEASURED CRACK LENGTH: MAIN CRACKS LE	CE L	RI	TOTAL L	ADD. NUCLEI LE		L		RI		MAX DEPTH D
76	UP	0.0	0.0	31.9	0.0	0.0	31.9	32.9	46.4	0.0	33.9	0.0	33.9	0.0	0.0	2.5	0.0	0.0	0.0	1.5
76	LO	0.0	0.0	35.2	0.0	0.0	35.2	35.6	49.4	0.0	27.7	0.0	27.7	0.0	0.0	.8	0.0	0.0	0.0	1.4
77	UP	0.0	0.0	22.3	0.0	0.0	22.3	22.7	49.1	0.0	24.5	0.0	24.5	.2	1.8	.8	2.2	.2	0.0	.6
77	LO	0.0	0.0	3.2	0.0	0.0	3.2	3.7	38.0	1.9	.8	0.0	2.7	.6	.4	.5	2.3	1.8	1.4	.2
78	UP	0.0	0.0	34.7	0.0	0.0	34.7	35.2	59.3	0.0	35.5	0.0	35.5	0.0	0.0	0.0	0.0	0.0	0.0	1.4
78	LO	0.0	0.0	32.5	0.0	0.0	32.5	32.8	48.2	0.0	37.5	0.0	37.5	0.0	.2	.4	.4	0.0	0.0	1.3
79	UP	0.0	0.0	20.5	0.0	0.0	20.5	21.2	46.4	0.0	20.0	0.0	20.0	.9	1.5	1.1	.4	1.6	1.0	.6
79	LO	0.0	0.0	25.9	0.0	0.0	25.9	26.4	48.8	0.0	25.0	0.0	25.0	0.0	0.0	.8	.4	0.0	0.0	.7
80	UP	0.0	0.0	37.9	0.0	0.0	37.9	38.2	53.2	0.0	37.1	0.0	37.1	0.0	0.0	.7	1.6	0.0	0.0	1.1
80	LO	0.0	0.0	28.1	0.0	0.0	28.1	28.4	51.2	0.0	27.4	0.0	27.4	0.0	0.0	0.0	.8	0.0	0.0	.9
81	UP	0.0	0.0	18.5	0.0	0.0	18.5	19.3	42.1	0.0	18.0	0.0	18.0	0.0	5.4	.9	0.0	0.0	0.0	.5
81	LO	0.0	0.0	6.7	8.1	0.0	14.8	15.6	38.8	0.0	21.4	0.0	21.4	0.0	0.0	0.0	.6	0.0	0.0	.3
82	UP	0.0	0.0	34.0	0.0	0.0	34.0	34.8	54.5	0.0	34.0	0.0	34.0	.3	.2	2.6	.7	.6	.4	1.4
82	LO	0.0	0.0	27.8	0.0	0.0	27.8	28.1	48.4	0.0	30.5	0.0	30.5	0.0	.3	.4	.4	0.0	0.0	.7
83	UP	0.0	0.0	35.5	0.0	0.0	35.5	45.7	50.5	0.0	42.5	0.0	42.5	0.0	0.0	.8	1.8	0.0	0.0	2.3
83	LO	0.0	0.0	26.8	0.0	0.0	26.8	28.1	48.7	0.0	29.5	0.0	29.5	0.0	0.0	.2	2.6	1.2	1.5	.5
84	UP	0.0	0.0	34.2	0.0	0.0	34.2	34.8	53.2	0.0	34.0	0.0	34.0	.3	.5	.4	.6	.2	0.0	1.4
84	LO	0.0	0.0	31.1	0.0	0.0	31.1	31.6	49.1	0.0	28.0	0.0	28.0	0.0	0.0	0.0	0.0	0.0	0.0	.7
85	UP	0.0	0.0	26.8	0.0	0.0	26.8	27.5	48.6	0.0	27.0	0.0	27.0	2.0	1.8	1.0	0.0	0.0	0.0	.9
85	LO	0.0	0.0	42.9	0.0	0.0	42.9	43.3	56.0	0.0	38.5	0.0	38.5	.6	.2	1.0	0.0	0.0	0.0	1.8
86	UP	0.0	0.0	33.0	0.0	0.0	33.0	33.6	62.2	0.0	29.5	0.0	29.5	0.0	0.0	0.0	0.0	0.0	0.0	1.2
86	LO	0.0	0.0	49.0	0.0	0.0	49.0	49.7	74.2	0.0	45.5	0.0	45.5	0.0	0.0	0.0	2.5	1.6	0.0	1.3
87	UP	0.0	0.0	38.4	0.0	0.0	38.4	39.3	50.5	0.0	38.0	0.0	38.0	0.0	0.0	0.0	0.0	0.0	0.0	.9
87	LO	0.0	0.0	24.7	0.0	0.0	24.7	25.2	48.2	0.0	31.5	0.0	31.5	0.0	0.0	0.0	.3	0.0	0.0	.9
88	UP	0.0	0.0	28.6	0.0	0.0	28.6	29.4	56.9	0.0	28.5	0.0	28.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0
88	LO	0.0	0.0	29.9	0.0	0.0	29.9	31.2	50.7	0.0	31.5	0.0	31.5	0.0	0.0	0.0	0.0	0.0	0.0	.9
89	UP	0.0	0.0	47.8	0.0	0.0	47.8	48.4	57.2	0.0	48.5	0.0	48.5	0.0	1.0	.4	1.0	0.0	0.0	2.6
89	LO	0.0	0.0	27.8	0.0	0.0	27.8	28.2	52.6	0.0	32.0	0.0	32.0	.5	1.0	.4	.6	0.0	0.0	1.3
90	UP	0.0	0.0	30.2	0.0	0.0	30.2	30.5	49.4	0.0	30.5	0.0	30.5	0.0	0.0	0.0	0.0	0.0	0.0	.9
90	LO	0.0	0.0	44.3	0.0	0.0	44.3	45.0	60.7	0.0	39.0	0.0	39.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7
91	UP	0.0	0.0	60.3	0.0	0.0	60.3	61.2	72.7	0.0	62.5	0.0	62.5	0.0	0.0	0.0	0.0	0.0	0.0	2.7
91	LO	0.0	0.0	30.5	0.0	0.0	30.5	30.9	57.5	0.0	27.0	0.0	27.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1
92	UP	0.0	0.0	37.0	0.0	0.0	37.0	37.7	51.9	0.0	34.5	0.0	34.5	0.0	0.0	0.0	0.0	0.0	0.0	1.4
92	LO	0.0	0.0	47.5	0.0	0.0	47.5	47.7	57.4	0.0	55.5	0.0	55.5	0.0	0.0	0.0	0.0	0.0	0.0	2.8
93	UP	0.0	0.0	26.4	0.0	0.0	26.4	27.0	48.8	0.0	23.0	0.0	23.0	1.2	.7	2.1	3.2	.6	.4	.8
93	LO	0.0	0.0	35.7	0.0	0.0	35.7	36.2	59.5	0.0	38.0	0.0	38.0	0.0	0.0	1.4	3.2	.2	.7	1.6
94	UP	0.0	0.0	15.6	0.0	0.0	15.6	16.0	46.7	0.0	17.0	0.0	17.0	0.0	0.0	0.0	.8	0.0	0.0	.6
94	LO	0.0	0.0	10.0	0.0	0.0	10.0		1)	0.0	17.5	0.0	17.5	0.0	0.0	1.4	0.0	0.0	0.0	.2
95	UP	0.0	0.0	24.7	0.0	0.0	24.7	28.5	47.4	0.0	22.5	0.0	22.5	0.0	0.0	.5	0.0	0.0	0.0	1.2
95	LO	0.0	0.0	31.0	0.0	0.0	31.0	31.7	44.1	0.0	28.0	0.0	28.0	0.0	0.0	0.0	1.5	0.0	0.0	1.1
96	UP	0.0	0.0	25.4	0.0	0.0	25.4	26.3	52.1	0.0	27.0	0.0	27.0	0.0	0.0	0.0	.8	0.0	0.0	.6
96	LO	0.0	0.0	16.1	0.0	0.0	16.1	16.5	44.7	0.0	16.5	0.0	16.5	0.0	.4	.7	.7	.6	0.0	.9
97	UP	0.0	0.0	49.2	0.0	0.0	49.2	49.4	69.2	0.0	46.5	0.0	46.5	0.0	0.0	.5	0.0	0.0	0.0	1.3
97	LO	0.0	0.0	37.8	0.0	0.0	37.8	38.2	58.5	0.0	36.0	0.0	36.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6
98	UP	0.0	0.0	34.5	0.0	0.0	34.5	35.8	48.6	0.0	34.5	0.0	34.5	0.0	0.0	0.0	0.0	0.0	0.0	1.2
98	LO	0.0	0.0	35.0	0.0	0.0	35.0	35.4	51.8	0.0	37.3	0.0	37.3	0.0	0.0	0.0	0.0	0.0	0.0	1.1
99	UP	0.0	0.0	31.7	0.0	0.0	31.7	32.3	48.7	0.0	33.5	0.0	33.5	0.0	.8	1.0	0.0	0.0	0.0	1.4
99	LO	0.0	0.0	27.7	0.0	0.0	27.7	27.9	48.3	0.0	31.5	0.0	31.5	0.0	0.0	.8	.6	1.3	.5	1.1
100	UP	0.0	0.0	36.8	0.0	0.0	36.8	37.1	53.1	0.0	39.0	0.0	39.0	.9	.3	.3	1.1	0.0	0.0	2.0
100	LO	0.0	0.0	24.8	0.0	0.0	24.8	25.1	45.4	0.0	27.0	0.0	27.0	0.0	0.0	.4	.4	1.6	0.0	.7

1) idem

TABLE 3

DATA BEFORE EXPOSURE TO SALT SPRAY AS COMPARED TO THE MEASURED CRACK LENGTH

SPEC. CODE NR.1	LOC. CODE	PENETRANT								MEASURED CRACK LENGTH										
		MAIN INDICATIONS						ADD. NUCLEI		MAIN CRACKS				ADD. NUCLEI						MAX
			LE	CE L	RI		TOTAL L	INNER	OUTER L	LE	CE L	RI	TOTAL L		LE	L		RI		DEPTH D
101	UP	0.0	0.0	28.9	0.0	0.0	28.9	29.6	51.6	0.0	33.5	0.0	33.5	1.1	.6	1.0	1.4	0.0	0.0	1.4
101	LO	0.0	0.0	28.9	0.0	0.0	28.9	29.2	46.3	0.0	29.5	0.0	29.5	1.5	.2	.5	.5	0.0	0.0	.8
102	UP	0.0	12.4	28.8	0.0	0.0	41.2	42.8	54.5	0.0	34.5	0.0	34.5	0.0	0.0	6.0	0.0	0.0	0.0	1.5
102	LO	0.0	0.0	30.1	0.0	0.0	30.1	30.9	59.4	0.0	31.5	0.0	31.5	0.0	0.0	.8	0.0	0.0	0.0	.8
111	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.5	0.0	54.5	0.0	54.5	0.0	0.0	0.0	0.0	0.0	0.0	3.2
111	LO	0.0	0.0	55.7	0.0	0.0	55.7	55.7	55.7	0.0	56.5	0.0	56.5	0.0	0.0	0.0	0.0	0.0	0.0	3.2
112	UP	0.0	0.0	25.6	0.0	0.0	25.6	27.0	34.0	0.0	26.0	0.0	26.0	0.0	0.0	0.0	5.3	0.0	0.0	2.1
112	LO	0.0	6.1	41.7	0.0	0.0	47.8	47.8	47.8	0.0	62.0	0.0	62.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2
117	UP	0.0	0.0	8.7	0.0	0.0	8.7		1)	8.5	2.1	4.9	15.5	0.0	0.0	0.0	1.0	0.0	0.0	1.9
117	LO	0.0	0.0	0.0	0.0	0.0	0.0		1)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1) idem

TABLE 4 DATA AFTER EXPOSURE TO SALT SPRAY AS COMPARED TO THE MEASURED CRACK LENGTH

SPEC. CODE NR.1	SPEC. CODE NR.2	LOC. CODE	PENETRANT MAIN INDICATIONS						PENETRANT ADD. NUCLEI		MEASURED CRACK LENGTH MAIN CRACKS				MEASURED CRACK LENGTH ADD. NUCLEI						MAX DEPTH
				LE	CE L	RI		TOTAL L	INNER	OUTER L	LE	CE L	RI	TOTAL L		LE	L		RI		D
1	63	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	63	LO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	47	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	47	LO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	42	UP	0.0	2.5	12.0	0.0	0.0	14.5	14.6	17.2	3.2	25.0	0.0	28.2	.4	.2	.5	0.0	0.0	0.0	.8
3	42	LO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.0	0.0	42.0	0.0	0.0	0.0	.3	0.0	0.0	.7
4	18	UP	0.0	4.9	3.0	6.7	0.0	14.6	17.5	27.5	0.0	31.0	0.0	31.0	.4	2.0	.4	3.4	0.0	0.0	1.1
4	18	LO	0.0	0.0	13.0	0.0	0.0	13.0	15.2	33.9	0.0	32.0	0.0	32.0	0.0	0.0	.2	4.0	2.2	0.0	1.2
5	30	UP	0.0	0.0	3.3	13.1	1.2	17.6	17.6	17.6	0.0	44.5	0.0	44.5	0.0	0.0	.9	0.0	0.0	0.0	2.4
5	30	LO	0.0	0.0	0.0	0.0	0.0	0.0	3.2	18.5	0.0	20.5	0.0	20.5	0.0	0.0	5.1	0.0	0.0	0.0	.6
6	45	UP	0.0	3.5	7.0	0.0	0.0	10.5	10.5	10.5	0.0	21.8	0.0	21.8	0.0	.5	1.2	0.0	0.0	0.0	1.9
6	45	LO	0.0	1.8	7.7	4.9	0.0	14.4	18.6	21.3	0.0	39.5	0.0	39.5	0.0	.5	1.0	.4	.5	.5	1.9
7	57	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.5	0.0	.5	0.0	0.0	0.0	0.0	0.0	0.0	.2
7	57	LO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	28	UP	0.0	0.0	78.5	0.0	0.0	78.5	78.5	78.5	0.0	79.3	0.0	79.3	0.0	0.0	0.0	0.0	0.0	0.0	3.3
8	28	LO	0.0	0.0	14.4	0.0	0.0	14.4	16.0	48.7	0.0	24.5	0.0	24.5	0.0	0.0	0.0	.5	.9	.6	1.0
9	52	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.5	3.5	9.2	7.9	20.6	0.0	.4	4.0	1.5	0.0	0.0	.3
9	52	LO	0.0	0.0	16.0	15.0	1.8	32.8	32.8	32.8	0.0	32.0	0.0	32.0	0.0	1.1	.8	1.6	.4	0.0	1.5
10	69	UP	0.0	0.0	43.5	0.0	0.0	43.5	47.9	48.5	0.0	45.5	0.0	45.5	0.0	0.0	0.0	0.0	0.0	0.0	2.3
10	69	LO	0.0	0.0	5.5	0.0	0.0	5.5	12.5	20.5	0.0	31.8	0.0	31.8	0.0	0.0	0.0	0.0	0.0	0.0	1.3
11	70	UP	0.0	0.0	47.8	3.0	0.0	50.8	50.8	50.8	0.0	47.5	0.0	47.5	0.0	0.0	0.0	1.2	0.0	0.0	2.5
11	70	LO	0.0	0.0	20.5	0.0	0.0	20.5	21.2	31.7	0.0	24.3	0.0	24.3	0.0	0.0	0.0	1.3	0.0	0.0	1.1
12	79	UP	0.0	0.0	14.4	3.2	0.0	17.6	17.6	17.6	0.0	22.0	0.0	22.0	0.0	0.0	0.0	0.0	0.0	0.0	.9
12	79	LO	0.0	0.0	43.5	0.0	0.0	43.5	43.5	43.5	0.0	43.3	0.0	43.3	0.0	0.0	0.0	.8	0.0	0.0	2.3
13	97	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.5	0.0	21.5	0.0	0.0	0.0	0.0	0.0	0.0	.6
13	97	LO	0.0	0.0	44.8	0.0	0.0	44.8	45.3	46.3	0.0	45.0	0.0	45.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0
14	9	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.5	0.0	10.5	0.0	2.2	.5	.5	0.0	0.0	.6
14	9	LO	0.0	0.0	7.5	0.0	0.0	7.5		1)	0.0	37.0	0.0	37.0	.4	.3	.2	1.3	1.0	0.0	1.8
15	66	UP	0.0	4.7	17.9	2.3	2.3	27.2	27.2	27.2	0.0	28.0	0.0	28.0	0.0	0.0	2.2	.2	0.0	0.0	1.2
15	66	LO	0.0	8.0	22.4	0.0	0.0	30.4		1)	0.0	49.0	0.0	49.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4
16	56	UP	0.0	24.0	30.0	0.0	0.0	54.0	54.0	54.0	0.0	54.0	0.0	54.0	0.0	0.0	.8	0.0	0.0	0.0	2.4
16	56	LO	0.0	0.0	13.0	0.0	0.0	13.0	13.5	26.0	0.0	29.0	0.0	29.0	0.0	0.0	0.0	.6	.3	.4	1.4
17	72	UP	0.0	15.0	9.3	5.0	0.0	29.3	30.5	39.3	0.0	38.0	0.0	38.0	.7	1.2	.7	0.0	0.0	0.0	1.4
17	72	LO	0.0	0.0	44.8	0.0	0.0	44.8	44.8	44.8	0.0	44.0	0.0	44.0	0.0	0.0	0.0	.4	.7	0.0	1.9
18	46	UP	0.0	0.0	11.2	0.0	0.0	11.2	11.2	11.2	0.0	35.8	0.0	35.8	0.0	0.0	1.9	0.0	0.0	0.0	1.3
18	46	LO	0.0	0.0	26.5	0.0	0.0	26.5	26.5	26.5	0.0	26.0	0.0	26.0	0.0	0.0	0.0	.4	1.1	0.0	1.2
19	60	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.5	0.0	24.5	0.0	1.4	.3	1.0	0.0	0.0	.6
19	60	LO	0.0	18.2	25.6	0.0	0.0	43.8	44.0	47.4	0.0	51.0	0.0	51.0	0.0	0.0	1.2	.4	.3	.3	2.3
20	55	UP	0.0	8.5	11.7	0.0	0.0	20.2	20.2	20.2	0.0	23.5	0.0	23.5	1.4	.5	.3	1.1	.5	0.0	.8
20	55	LO	0.0	0.0	43.0	0.0	0.0	43.0	43.0	43.0	0.0	55.0	0.0	55.0	0.0	.7	.4	0.0	0.0	0.0	2.5
21	71	UP	0.0	0.0	26.0	9.0	0.0	35.0	36.5	45.5	0.0	38.5	0.0	38.5	0.0	0.0	0.0	0.0	0.0	0.0	1.8
21	71	LO	0.0	0.0	34.6	0.0	0.0	34.6	35.8	38.8	0.0	37.0	0.0	37.0	0.0	0.0	0.0	.5	0.0	0.0	1.5
22	15	UP	6.0	1.5	2.5	0.0	0.0	10.0	10.0	10.0	0.0	18.5	0.0	18.5	0.0	1.3	.8	.5	0.0	0.0	1.2
22	15	LO	1.8	1.8	21.0	0.0	0.0	24.6	24.6	24.6	0.0	43.0	0.0	43.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2
23	33	UP	0.0	0.0	44.1	3.4	0.0	47.5	48.8	49.7	0.0	41.0	0.0	41.0	0.0	0.0	0.0	1.5	0.0	0.0	2.1
23	33	LO	2.5	3.5	25.0	0.0	0.0	31.0	31.0	31.0	0.0	36.0	0.0	36.0	0.0	0.0	0.0	.5	0.0	0.0	1.4
24	59	UP	0.0	2.7	29.3	3.7	0.0	35.7	35.7	35.7	0.0	68.5	0.0	68.5	0.0	0.0	0.0	0.0	0.0	0.0	2.9
24	59	LO	0.0	0.0	0.0	0.0	0.0	0.0	2.8	15.5	0.0	13.5	.9	14.4	0.0	0.0	1.9	4.8	1.0	1.6	.5
25	3	UP	0.0	0.0	30.9	2.2	0.0	33.1	34.1	35.6	0.0	33.5	0.0	33.5	0.0	1.2	.8	0.0	0.0	0.0	1.5
25	3	LO	0.0	0.0	34.5	0.0	0.0	34.5	34.5	34.5	0.0	37.0	0.0	37.0	0.0	0.0	0.0	2.0	.6	0.0	1.7

1) data for additional nuclei not unambiguously established

TABLE 4 DATA AFTER EXPOSURE TO SALT SPRAY AS COMPARED TO THE MEASURED CRACK LENGTH

SPEC. CODE NR.1	SPEC. CODE NR.2	LOC. CODE	PENETRANT MAIN INDICATIONS LE		CE L	RI		TOTAL L	PENETRANT ADD. NUCLEI INNER	OUTER L	MEASURED CRACK LENGTH MAIN CRACKS LE	CE L	RI	TOTAL L	MEASURED CRACK LENGTH ADD. NUCLEI LE		L		RI		MAX DEPTH D
26	43	UP	0.0	0.0	30.7	0.0	0.0	30.7	41.2	45.7	0.0	46.5	0.0	46.5	0.0	0.0	.7	0.0	0.0	0.0	2.3
26	43	LO	0.0	0.0	31.3	0.0	0.0	31.3	31.9	34.0	0.0	20.5	0.0	20.5	.4	.4	1.7	.3	.7	0.0	1.6
27	49	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.4	0.0	19.2	0.0	19.2	1.2	.7	.6	1.6	.6	0.0	.4
27	49	LO	0.0	0.0	0.0	0.0	0.0	0.0	4.3	14.0	0.0	21.8	0.0	21.8	0.0	0.0	0.0	.8	0.0	0.0	.6
28	32	UP	0.0	0.0	26.5	0.0	0.0	26.5	26.5	26.5	0.0	30.0	0.0	30.0	.3	.6	.5	.6	.5	0.0	1.4
28	32	LO	0.0	0.0	9.8	0.0	0.0	9.8	14.0	29.3	0.0	6.0	4.0	10.0	2.1	.7	.4	.4	4.8	.4	.5
29	50	UP	0.0	22.7	22.0	0.0	0.0	44.7	44.7	44.7	0.0	41.8	0.0	41.8	0.0	1.8	.6	1.2	0.0	0.0	2.4
29	50	LO	0.0	2.0	10.9	3.4	0.0	16.3	17.5	38.5	0.0	16.8	0.0	16.8	0.0	0.0	3.0	0.0	0.0	0.0	.4
30	44	UP	0.0	0.0	3.5	0.0	0.0	3.5	3.5	3.5	0.0	11.1	0.0	11.1	0.0	0.0	4.0	1.3	0.0	0.0	.7
30	44	LO	0.0	0.0	5.2	0.0	0.0	5.2	5.2	7.2	0.0	15.5	0.0	15.5	0.0	0.0	0.0	0.0	0.0	0.0	.7
31	64	UP	0.0	16.0	12.4	.4	0.0	28.8	28.8	28.8	0.0	26.5	0.0	26.5	0.0	0.0	0.0	1.2	0.0	0.0	1.0
31	64	LO	0.0	0.0	27.7	0.0	0.0	27.7		1)	0.0	45.7	0.0	45.7	0.0	0.0	0.0	0.0	0.0	0.0	2.2
32	21	UP	0.0	2.5	2.0	0.0	0.0	4.5	4.5	4.5	0.0	27.0	0.0	27.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3
32	21	LO	0.0	0.0	38.0	0.0	0.0	38.0	40.0	44.0	0.0	37.5	0.0	37.5	0.0	0.0	0.0	0.0	0.0	0.0	2.0
33	86	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	2.2	0.0	2.2	1.3	.4	4.0	.3	.2
33	86	LO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	.6	0.0	2.0	.4	.2	1.5	1.2	.8	0.0	.2
34	80	UP	0.0	0.0	18.5	0.0	0.0	18.5	18.5	18.5	0.0	34.0	0.0	34.0	0.0	0.0	.6	.9	0.0	0.0	1.0
34	80	LO	0.0	0.0	18.8	0.0	0.0	18.8	18.8	18.8	0.0	18.0	0.0	18.0	0.0	0.0	0.0	2.4	0.0	0.0	.8
35	75	UP	0.0	0.0	26.2	0.0	0.0	26.2	26.5	33.0	0.0	33.0	0.0	33.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
35	75	LO	0.0	0.0	11.5	0.0	0.0	11.5	11.5	17.5	0.0	21.5	0.0	21.5	0.0	0.0	0.0	0.0	0.0	0.0	.9
36	2	UP	0.0	0.0	7.5	0.0	0.0	7.5	7.5	7.5	0.0	28.0	0.0	28.0	0.0	0.0	0.0	0.0	0.0	0.0	.9
36	2	LO	0.0	0.0	5.0	0.0	0.0	5.0	5.0	5.0	0.0	26.5	0.0	26.5	0.0	0.0	0.0	0.0	0.0	0.0	.5
37	25	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.5	0.0	18.5	0.0	0.0	1.2	3.2	0.0	0.0	.9
37	25	LO	0.0	0.0	35.7	0.0	0.0	35.7	36.0	37.7	0.0	36.5	0.0	36.5	0.0	0.0	.7	.6	0.0	0.0	2.0
38	11	UP	0.0	0.0	35.3	0.0	0.0	35.3	35.3	35.3	0.0	15.0	0.0	15.0	0.0	.4	.5	0.0	0.0	0.0	.4
38	11	LO	0.0	0.0	9.0	9.5	0.0	18.5		1)	0.0	46.5	0.0	46.5	0.0	0.0	0.0	2.7	0.0	0.0	1.8
39	36	UP	0.0	0.0	25.8	0.0	0.0	25.8	32.3	42.7	0.0	30.0	0.0	30.0	0.0	.5	.7	.5	0.0	0.0	.7
39	36	LO	0.0	.7	7.7	0.0	0.0	8.4	9.4	26.5	0.0	23.0	0.0	23.0	0.0	0.0	.4	.7	0.0	0.0	.7
40	14	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.5	0.0	14.5	1.8	1.4	1.7	.8	.7	.7	.4
40	14	LO	0.0	.7	3.4	0.0	0.0	4.1	13.0	35.2	0.0	15.7	0.0	15.7	0.0	0.0	2.0	1.9	.4	0.0	.6
41	37	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	25.0	0.0	.7	.4	0.0	0.0	0.0	.6
41	37	LO	0.0	0.0	25.2	0.0	0.0	25.2	27.7	29.7	0.0	28.5	0.0	28.5	0.0	0.0	2.6	0.0	0.0	0.0	.9
42	99	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.5	0.0	23.7	0.0	23.7	0.0	0.0	1.1	5.0	1.5	0.0	.6
42	99	LO	0.0	0.0	31.7	0.0	0.0	31.7	31.7	31.7	0.0	32.2	0.0	32.2	0.0	0.0	.5	.4	0.0	0.0	1.5
43	5	UP	0.0	9.1	12.0	6.0	0.0	27.1		1)	0.0	46.0	0.0	46.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3
43	5	LO	0.0	0.0	41.2	0.0	0.0	41.2	41.3	43.8	0.0	39.5	0.0	39.5	0.0	.2	.4	0.0	0.0	0.0	2.3
44	23	UP	3.8	7.0	5.0	0.0	0.0	15.8		1)	0.0	30.5	0.0	30.5	0.0	0.0	0.0	0.0	0.0	0.0	1.1
44	23	LO	0.0	0.0	20.6	0.0	0.0	20.6	20.7	26.3	7.0	17.0	0.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	.8
45	74	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.4	0.0	25.4	0.0	0.0	0.0	0.0	0.0	0.0	1.3
45	74	LO	0.0	0.0	45.0	0.0	0.0	45.0	50.0	52.5	0.0	58.0	0.0	58.0	0.0	0.0	0.0	.4	0.0	0.0	2.4
46	1	UP	0.0	0.0	43.0	0.0	0.0	43.0	43.0	43.0	0.0	49.5	0.0	49.5	0.0	0.0	0.0	0.0	0.0	0.0	2.3
46	1	LO	0.0	0.0	22.5	1.2	0.0	23.7	23.7	23.7	0.0	16.0	0.0	16.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2
47	67	UP	0.0	0.0	8.5	0.0	0.0	8.5	8.5	8.5	0.0	32.0	0.0	32.0	0.0	.9	.3	0.0	0.0	0.0	1.4
47	67	LO	0.0	0.0	30.0	0.0	0.0	30.0	32.0	42.0	0.0	42.0	0.0	42.0	0.0	0.0	.8	0.0	0.0	0.0	2.2
48	68	UP	0.0	0.0	33.5	0.0	0.0	33.5	33.5	33.5	0.0	34.3	0.0	34.3	.5	.4	.7	.5	0.0	0.0	1.5
48	68	LO	0.0	6.0	21.0	8.5	0.0	35.5	35.5	35.5	0.0	40.5	0.0	40.5	1.6	.4	.3	.8	.7	.4	2.0
49	73	UP	0.0	0.0	6.0	0.0	0.0	6.0	6.0	6.0	0.0	26.5	0.0	26.5	0.0	0.0	0.0	1.3	3.5	0.0	1.3
49	73	LO	0.0	0.0	31.0	0.0	0.0	31.0	36.8	38.8	0.0	25.5	0.0	25.5	0.0	0.0	0.0	.4	0.0	0.0	1.2
50	35	UP	0.0	0.0	24.3	0.0	0.0	24.3	24.8	33.3	0.0	30.5	0.0	30.5	0.0	0.0	1.3	1.1	.5	.4	1.0
50	35	LO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.5	0.0	18.5	0.0	0.0	2.0	2.2	.4	0.0	.9

1) idem

TABLE 4 DATA AFTER EXPOSURE TO SALT SPRAY AS COMPARED TO THE MEASURED CRACK LENGTH

SPEC. CODE NR.1	SPEC. CODE NR.2	LOC. CODE	PENETRANT								MEASURED CRACK LENGTH										MAX DEPTH D
			MAIN INDICATIONS						ADD. NUCLEI		MAIN CRACKS				ADD. NUCLEI						
				LE	CE L	RI		TOTAL L	INNER	OUTER L	LE	CE L	RI	TOTAL L		LE	L		RI		
51	26	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.0	0.0	35.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3
51	26	LO	0.0	0.0	19.8	6.1	2.2	28.1	28.1	28.1	0.0	24.5	0.0	24.5	0.0	0.0	0.0	0.0	0.0	0.0	.4
52	27	UP	.5	17.3	16.5	3.5	0.0	37.8	37.8	37.8	0.0	35.0	0.0	35.0	0.0	0.0	0.0	.5	.9	0.0	1.7
52	27	LO	0.0	0.0	24.7	0.0	0.0	24.7	25.4	33.4	0.0	24.0	0.0	24.0	0.0	0.0	0.0	1.6	1.4	0.0	.8
53	22	UP	0.0	0.0	8.5	1.5	0.0	10.0	10.0	10.0	0.0	20.5	0.0	20.5	0.0	0.0	0.0	1.1	1.6	.9	1.0
53	22	LO	0.0	0.0	4.5	0.0	0.0	4.5	7.5	27.0	0.0	8.0	0.0	8.0	0.0	0.0	4.5	1.5	0.0	0.0	.5
54	20	UP	0.0	0.0	31.0	0.0	0.0	31.0	32.5	45.0	0.0	35.0	0.0	35.0	0.0	0.0	0.0	.6	0.0	0.0	1.8
54	20	LO	0.0	0.0	6.8	10.9	0.0	17.7	18.5	26.1	0.0	31.0	0.0	31.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1
55	8	UP	5.4	7.7	11.0	0.0	0.0	24.1	24.6	28.3	0.0	26.0	0.0	26.0	0.0	.4	6.5	.7	.4	1.1	.6
55	8	LO	0.0	2.0	2.0	0.0	0.0	4.0	4.0	4.0	0.0	35.5	0.0	35.5	.4	.4	.7	0.0	0.0	0.0	1.4
56	76	UP	0.0	0.0	1.2	0.0	0.0	1.2	1.2	1.2	0.0	32.5	0.0	32.5	0.0	1.3	1.2	0.0	0.0	0.0	1.6
56	76	LO	0.0	0.0	12.0	2.3	0.0	14.3	14.3	14.3	0.0	11.5	0.0	11.5	0.0	0.0	0.0	1.1	.8	0.0	.4
57	39	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.5	0.0	23.5	0.0	0.0	0.0	0.0	0.0	0.0	.7
57	39	LO	1.0	4.0	6.8	0.0	0.0	11.8	13.1	27.6	0.0	19.0	0.0	19.0	0.0	0.0	.9	.6	0.0	0.0	.4
58	58	UP	0.0	0.0	32.3	1.5	0.0	33.8	33.8	33.8	0.0	35.5	0.0	35.5	.6	.8	.2	1.0	.4	0.0	1.8
58	58	LO	0.0	0.0	5.5	2.0	0.0	7.5	7.5	7.5	0.0	24.5	0.0	24.5	0.0	0.0	0.0	.9	.4	.3	1.0
59	4	UP	0.0	0.0	18.6	2.5	0.0	21.1	21.1	21.1	0.0	25.3	0.0	25.3	0.0	0.0	0.0	0.0	0.0	0.0	.9
59	4	LO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.2	0.0	20.2	0.0	.7	.9	.5	0.0	0.0	.4
60	10	UP	0.0	0.0	5.2	0.0	0.0	5.2	10.5	25.5	0.0	9.5	0.0	9.5	0.0	.6	.8	0.0	0.0	0.0	.4
60	10	LO	0.0	0.0	39.3	0.0	0.0	39.3	39.3	44.5	0.0	39.0	0.0	39.0	0.0	0.0	0.0	1.1	.7	1.2	1.4
61	38	UP	0.0	0.0	28.8	19.0	0.0	47.8	47.8	47.8	0.0	44.6	0.0	44.6	0.0	0.0	.5	0.0	0.0	0.0	1.6
61	38	LO	0.0	0.0	12.0	15.3	0.0	27.3	27.3	27.3	0.0	12.0	0.0	12.0	0.0	1.9	2.2	0.0	0.0	0.0	.4
62	101	UP	0.0	0.0	21.0	2.4	0.0	23.4	23.4	23.4	0.0	28.5	0.0	28.5	.4	1.7	2.0	.3	.4	0.0	.8
62	101	LO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.7	0.0	35.0	0.0	35.0	0.0	0.0	0.0	1.3	0.0	0.0	1.5
63	12	UP	0.0	0.0	24.3	0.0	0.0	24.3	24.3	33.3	0.0	54.0	0.0	54.0	0.0	0.0	.5	0.0	0.0	0.0	2.5
63	12	LO	0.0	0.0	3.0	10.6	0.0	13.6	16.6	25.6	0.0	23.0	0.0	23.0	0.0	0.0	0.0	1.6	0.0	0.0	.4
64	90	UP	0.0	0.0	9.0	0.0	0.0	9.0	9.5	15.0	0.0	6.8	0.0	6.8	0.0	0.0	.5	.7	0.0	0.0	.3
64	90	LO	0.0	0.0	29.0	0.0	0.0	29.0	29.0	29.0	0.0	41.8	0.0	41.8	0.0	0.0	.4	.5	.2	0.0	2.5
65	19	UP	0.0	13.3	12.2	2.7	0.0	28.2	28.2	28.2	0.0	28.0	0.0	28.0	2.2	.5	.3	0.0	0.0	0.0	1.2
65	19	LO	0.0	0.0	35.2	1.6	0.0	36.8	36.8	36.8	0.0	35.2	0.0	35.2	0.0	0.0	0.0	.6	.4	0.0	2.0
66	95	UP	0.0	0.0	2.0	0.0	0.0	2.0	2.0	2.0	0.0	12.5	0.0	12.5	.5	.6	.7	.8	.5	0.0	.2
66	95	LO	0.0	0.0	5.5	0.0	0.0	5.5	5.5	5.5	0.0	23.0	0.0	23.0	1.4	2.7	.4	3.7	1.0	0.0	1.3
67	84	UP	9.0	1.1	11.0	0.0	0.0	21.1	67.5	73.5	0.0	31.5	0.0	31.5	1.0	1.7	.7	0.0	0.0	0.0	1.4
67	84	LO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	20.0	0.0	0.0	0.0	1.0	0.0	0.0	.6
68	88	UP	0.0	.8	8.7	0.0	0.0	9.5	9.5	9.5	0.0	17.0	0.0	17.0	0.0	0.0	1.0	2.7	0.0	0.0	.7
68	88	LO	0.0	0.0	18.5	0.0	0.0	18.5	18.5	18.5	0.0	18.0	0.0	18.0	0.0	0.0	0.0	3.6	.6	.3	.4
69	98	UP	0.0	4.5	5.3	2.6	3.0	15.4	16.4	21.3	0.0	26.5	0.0	26.5	0.0	1.2	.9	0.0	0.0	0.0	.8
69	98	LO	0.0	0.0	13.0	3.5	0.0	16.5	16.5	16.5	0.0	13.0	0.0	13.0	1.8	2.5	1.3	0.0	0.0	0.0	.9
70	13	UP	0.0	0.0	4.0	0.0	0.0	4.0	4.0	4.0	0.0	25.5	0.0	25.5	.4	5.0	.8	0.0	0.0	0.0	.3
70	13	LO	0.0	0.0	7.0	6.5	0.0	13.5	13.5	13.5	0.0	16.3	0.0	16.3	0.0	0.0	0.0	0.0	0.0	0.0	.2
71	16	UP	0.0	0.0	14.5	0.0	0.0	14.5	14.5	14.5	0.0	19.5	0.0	19.5	.5	.4	1.2	.4	0.0	0.0	.9
71	16	LO	0.0	0.0	42.0	0.0	0.0	42.0	42.0	42.0	0.0	35.5	1.7	37.2	0.0	0.0	.6	.7	.7	.8	1.8
72	31	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.5	0.0	23.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0
72	31	LO	0.0	0.0	26.0	2.7	0.0	28.7	30.0	36.7	0.0	25.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3
73	29	UP	0.0	0.0	0.0	0.0	0.0	0.0	7.5	20.0	0.0	32.5	0.0	32.5	0.0	0.0	0.0	0.0	0.0	0.0	1.5
73	29	LO	0.0	0.0	30.3	0.0	0.0	30.3	42.5	49.8	0.0	45.5	0.0	45.5	0.0	0.0	.7	1.1	0.0	0.0	2.1
74	87	UP	0.0	0.0	9.5	0.0	0.0	9.5	9.5	12.0	0.0	29.0	0.0	29.0	0.0	0.0	0.0	1.2	0.0	0.0	1.1
74	87	LO	0.0	0.0	23.3	2.0	0.0	25.3	25.3	25.3	0.0	26.0	0.0	26.0	0.0	0.0	0.0	.6	.8	.8	.8
75	94	UP	0.0	0.0	21.2	0.0	0.0	21.2	21.5	28.5	0.0	25.0	0.0	25.0	0.0	0.0	1.7	0.0	0.0	0.0	1.3
75	94	LO	0.0	0.0	23.2	0.0	0.0	23.2	23.2	23.2	0.0	28.3	0.0	28.3	0.0	0.0	0.0	0.0	0.0	0.0	2.0

TABLE 4 DATA AFTER EXPOSURE TO SALT SPRAY AS COMPARED TO THE MEASURED CRACK LENGTH

SPEC. CODE NR.1	SPEC. CODE NR.2	LOC. CODE	PENETRANT								MEASURED CRACK LENGTH										
			MAIN INDICATIONS						ADD. NUCLEI		MAIN CRACKS				ADD. NUCLEI						MAX
				LE	CE L	RI		TOTAL L	INNER	OUTER L	LE	CE L	RI	TOTAL L		LE	L		RI		DEPTH D
76	102	UP	0.0	0.0	0.0	0.0	0.0	0.0	2.0	11.0	0.0	33.9	0.0	33.9	0.0	0.0	2.5	0.0	0.0	0.0	1.5
76	102	LO	0.0	0.0	10.5	1.1	0.0	11.6	15.1	25.6	0.0	27.7	0.0	27.7	0.0	0.0	.8	0.0	0.0	0.0	1.4
77	92	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.5	0.0	24.5	.2	1.8	.8	2.2	.2	0.0	.6
77	92	LO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	.8	0.0	2.7	.6	.4	.5	2.3	1.8	1.4	.2
78	61	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.5	0.0	35.5	0.0	0.0	0.0	0.0	0.0	0.0	1.4
78	61	LO	0.0	0.0	5.9	0.0	0.0	5.9	12.5	14.8	0.0	37.5	0.0	37.5	0.0	.2	.4	.4	0.0	0.0	1.3
79	96	UP	0.0	0.0	0.0	0.0	0.0	0.0	4.5	17.0	0.0	20.0	0.0	20.0	.9	1.5	1.1	.4	1.6	1.0	.6
79	96	LO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	25.0	0.0	0.0	.8	.4	0.0	0.0	.7
80	6	UP	0.0	0.0	14.5	0.0	0.0	14.5		1)	0.0	37.1	0.0	37.1	0.0	0.0	.7	1.6	0.0	0.0	1.1
80	6	LO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.5	0.0	27.4	0.0	27.4	0.0	0.0	0.0	.8	0.0	0.0	.9
81	85	UP	0.0	0.0	12.8	0.0	0.0	12.8	13.0	17.0	0.0	18.0	0.0	18.0	0.0	5.4	.9	0.0	0.0	0.0	.5
81	85	LO	0.0	0.0	0.0	0.0	0.0	0.0	6.5	10.5	0.0	21.4	0.0	21.4	0.0	0.0	0.0	.6	0.0	0.0	.3
82	48	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.0	0.0	34.0	.3	.2	2.6	.7	.6	.4	1.4
82	48	LO	0.0	9.3	6.5	10.5	0.0	26.3	26.3	26.3	0.0	30.5	0.0	30.5	0.0	.3	.4	.4	0.0	0.0	.7
83	82	UP	0.0	0.0	5.6	0.0	0.0	5.6	12.1	19.4	0.0	42.5	0.0	42.5	0.0	0.0	.8	1.8	0.0	0.0	2.3
83	82	LO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.5	0.0	29.5	0.0	0.0	.2	2.6	1.2	1.5	.5
84	51	UP	0.0	0.0	20.0	4.0	0.0	24.0	27.5	34.5	0.0	34.0	0.0	34.0	.3	.5	.4	.6	.2	0.0	1.4
84	51	LO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.0	0.0	28.0	0.0	0.0	0.0	0.0	0.0	0.0	.7
85	41	UP	0.0	0.0	7.5	0.0	0.0	7.5	15.0	20.5	0.0	27.0	0.0	27.0	2.0	1.8	1.0	0.0	0.0	0.0	.9
85	41	LO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.5	0.0	38.5	.6	.2	1.0	0.0	0.0	0.0	1.8
86	53	UP	0.0	0.0	5.5	0.0	0.0	5.5	8.5	13.0	0.0	29.5	0.0	29.5	0.0	0.0	0.0	0.0	0.0	0.0	1.2
86	53	LO	5.0	6.8	8.0	7.5	0.0	27.3	27.3	27.3	0.0	45.5	0.0	45.5	0.0	0.0	0.0	2.5	1.6	0.0	1.3
87	54	UP	0.0	7.3	7.0	2.5	0.0	16.8	16.8	16.8	0.0	38.0	0.0	38.0	0.0	0.0	0.0	0.0	0.0	0.0	.9
87	54	LO	0.0	4.8	1.0	.5	0.0	6.3	6.3	6.3	0.0	31.5	0.0	31.5	0.0	0.0	0.0	.3	0.0	0.0	.9
88	93	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.5	0.0	28.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0
88	93	LO	0.0	0.0	22.9	0.0	0.0	22.9	22.9	22.9	0.0	31.5	0.0	31.5	0.0	0.0	0.0	0.0	0.0	0.0	.9
89	100	UP	0.0	0.0	33.3	0.0	0.0	33.3	33.8	39.8	0.0	48.5	0.0	48.5	0.0	1.0	.4	1.0	0.0	0.0	2.6
89	100	LO	0.0	0.0	5.5	6.0	0.0	11.5	11.5	11.5	0.0	32.0	0.0	32.0	.5	1.0	.4	.6	0.0	0.0	1.3
90	65	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.5	0.0	30.5	0.0	0.0	0.0	0.0	0.0	0.0	.9
90	65	LO	0.0	5.8	20.6	0.0	0.0	26.4		1)	0.0	39.0	0.0	39.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7
91	40	UP	0.0	0.0	62.6	0.0	0.0	62.6	62.6	62.6	0.0	62.5	0.0	62.5	0.0	0.0	0.0	0.0	0.0	0.0	2.7
91	40	LO	0.0	0.0	8.2	0.0	0.0	8.2	8.2	17.2	0.0	27.0	0.0	27.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1
92	34	UP	0.0	0.0	1.5	0.0	0.0	1.5	3.5	8.5	0.0	34.5	0.0	34.5	0.0	0.0	0.0	0.0	0.0	0.0	1.4
92	34	LO	0.0	0.0	55.6	0.0	0.0	55.6	55.6	55.6	0.0	55.5	0.0	55.5	0.0	0.0	0.0	0.0	0.0	0.0	2.8
93	89	UP	0.0	6.0	2.5	0.0	0.0	8.5	12.0	21.2	0.0	23.0	0.0	23.0	1.2	.7	2.1	3.2	.6	.4	.8
93	89	LO	0.0	0.0	30.0	0.0	0.0	30.0	31.6	41.0	0.0	38.0	0.0	38.0	0.0	0.0	1.4	3.2	.2	.7	1.6
94	83	UP	0.0	0.0	5.9	0.0	0.0	5.9	11.7	16.7	0.0	17.0	0.0	17.0	0.0	0.0	0.0	.8	0.0	0.0	.6
94	83	LO	0.0	0.0	2.0	0.0	0.0	2.0	2.0	2.0	0.0	17.5	0.0	17.5	0.0	0.0	1.4	0.0	0.0	0.0	.2
95	24	UP	0.0	0.0	5.3	0.0	0.0	5.3		1)	0.0	22.5	0.0	22.5	0.0	0.0	.5	0.0	0.0	0.0	1.2
95	24	LO	0.0	0.0	16.4	0.0	0.0	16.4	17.0	25.6	0.0	28.0	0.0	28.0	0.0	0.0	0.0	1.5	0.0	0.0	1.1
96	91	UP	0.0	.8	7.0	0.0	0.0	7.8	10.7	23.9	0.0	27.0	0.0	27.0	0.0	0.0	0.0	.8	0.0	0.0	.6
96	91	LO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.5	0.0	16.5	0.0	.4	.7	.7	.6	0.0	.9
97	81	UP	11.5	5.5	3.7	7.0	0.0	27.7	27.7	27.7	0.0	46.5	0.0	46.5	0.0	0.0	.5	0.0	0.0	0.0	1.3
97	81	LO	0.0	0.0	11.6	8.4	0.0	20.0	20.0	20.0	0.0	36.0	0.0	36.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6
98	78	UP	0.0	0.0	5.2	0.0	0.0	5.2	5.2	5.2	0.0	34.5	0.0	34.5	0.0	0.0	0.0	0.0	0.0	0.0	1.2
98	78	LO	0.0	0.0	0.0	0.0	0.0	0.0	6.0	8.0	0.0	37.3	0.0	37.3	0.0	0.0	0.0	0.0	0.0	0.0	1.1
99	62	UP	0.0	0.0	2.2	0.0	0.0	2.2	2.2	2.2	0.0	33.5	0.0	33.5	0.0	.8	1.0	0.0	0.0	0.0	1.4
99	62	LO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.5	0.0	31.5	0.0	0.0	.8	.6	1.3	.5	1.1
100	17	UP	0.0	0.0	14.0	0.0	0.0	14.0	21.3	34.0	0.0	39.0	0.0	39.0	.9	.3	.3	1.1	0.0	0.0	2.0
100	17	LO	3.0	0.0	0.0	0.0	0.0	3.0	6.3	8.3	0.0	27.0	0.0	27.0	0.0	0.0	.4	.4	1.6	0.0	.7

1) idem

TABLE 4 DATA AFTER EXPOSURE TO SALT SPRAY AS COMPARED TO THE MEASURED CRACK LENGTH

SPEC. CODE NR.1	SPEC. CODE NR.2	LOC. CODE	PENETRANT: MAIN INDICATIONS								MEASURED CRACK LENGTH: MAIN CRACKS										
				LE	CE	RI		TOTAL	ADD. NUCLEI INNER	ADD. NUCLEI OUTER	LE	CE	RI	TOTAL	ADD. NUCLEI LE				RI		MAX DEPTH
					L			L		L		L		L			L				D
101	7	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.5	0.0	33.5	1.1	.6	1.0	1.4	0.0	0.0	1.4
101	7	LO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.5	0.0	29.5	1.5	.2	.5	.5	0.0	0.0	.8
102	77	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.5	0.0	34.5	0.0	34.5	0.0	0.0	6.0	0.0	0.0	0.0	1.5
102	77	LO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.5	0.0	31.5	0.0	0.0	.8	0.0	0.0	0.0	.8
111	163	UP	16.0	1.0	24.5	3.0	4.0	48.5	48.5	48.5	0.0	54.5	0.0	54.5	0.0	0.0	0.0	0.0	0.0	0.0	3.2
111	163	LO	0.0	20.0	30.5	0.0	0.0	50.5	52.7	55.8	0.0	56.5	0.0	56.5	0.0	0.0	0.0	0.0	0.0	0.0	3.2
112	147	UP	0.0	5.5	7.6	0.0	0.0	13.1	13.1	13.1	0.0	26.0	0.0	26.0	0.0	0.0	0.0	5.3	0.0	0.0	2.1
112	147	LO	0.0	0.0	55.9	0.0	0.0	55.9	55.9	55.9	0.0	62.0	0.0	62.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2
117	157	UP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.5	2.1	4.9	15.5	0.0	0.0	0.0	1.0	0.0	0.0	1.9
117	157	LO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0