UNIVERSIDAD NACIONAL DE INGENIERIA
FACULTAD DE INGENIERIA CIVIL

Centro Peruano Japonés de Investigaciones Sísmicas y Mitigación de Desastres

THE 1st JAPAN WORKSHOP ON ENHANCEMENT OF EARTHQUAKE AND TSUNAMI DISASTER MITIGACION TECHNOLOGY

LIMA, MARCH 15-16, 2010

THE OBLIGATORY OFFICIAL TECHNICAL AUDITS APPLIED DURING MORE THAN FIFTY YEARS FOR THE EARTHQUAKE SAFETY ON THE CONSTRUCTION OF SAN JUAN, ARGENTINA

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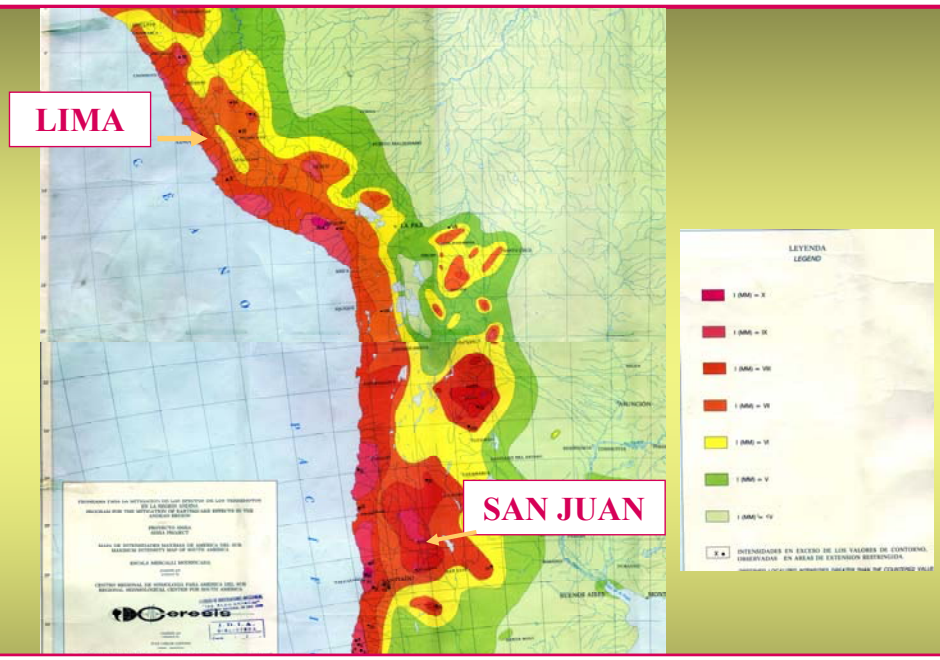
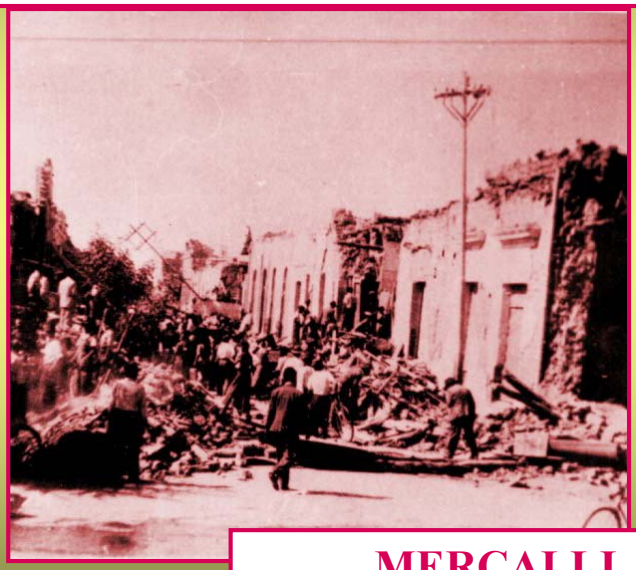
MAXIMUM SEISMIC INTENSITIES
CERESIS - 1985



"WHERE IT FELT EARTHQUAKE, IT WILL BE FELT AGAIN THERE"
PLINIO THE OLD (roman naturalist, first century)

EARTHQUAKE January 15, 1944- M=7,2

GREAT DAMAGE ON THE CITY OF SAN JUAN, ARGENTINA,
8 a 10000 DEATHS , 15% OF ITS POPULATION
epicentral distance ≈ 30 km



MERCALLI INTENSITY: IX

EARTHQUAKE January 15, 1944- M=7,2

THE CATHEDRAL OF THE CITY OF SAN JUAN

epicentral distance ≈ 30 km

THE INTERIOR AFTER THE EARTHQUAKE

BEFORE THE EARTHQUAKE

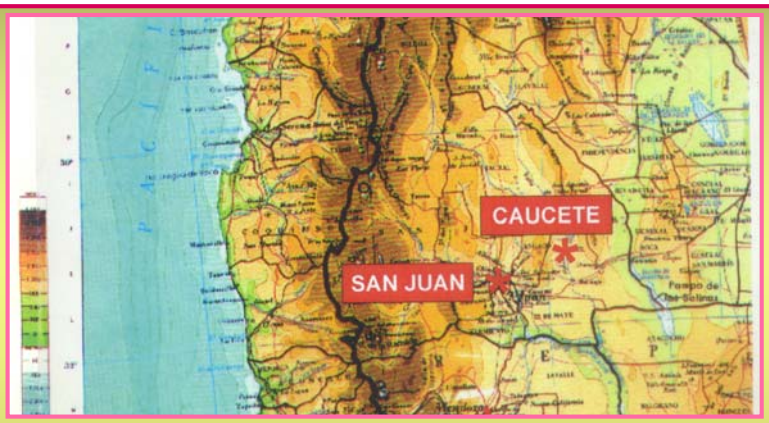
PARTIAL COLAPSE ON EXTERNAL WALL

AFTER THIS 1944 DISASTER, THE NATIONAL GOVERNMENT OF ARGENTINE CREATED THE COUNCIL FOR THE SAN JUAN RECONSTRUCTION

BEETWEEN ITS ACTIVITIES, WERE INCLUDED TO DICTATE A SEISMIC BUILDING CODE AND TO SUPERVISE ITS EFFECTIVE USE IN THE DESIGN AND BUILD STEPS OF ALL TYPES OF PRIVATE AND OFFICIAL CONSTRUCTIONS.

TO THIS PURPOSE, ONE SELECTED GROUP OF OFFICIAL PROFESSIONALS SUPERVISED THAT THE ASSUMPTIONS APPLIED ON THE DESIGN PLANS AND THE TECHNICS USED TO BUILD THE CONSTRUCTION, WERE IN CORRESPONDENCE WITH THE SEISMIC CODE.
THUS, THE OBLIGATORY OFFICIAL TECHNICAL AUDITS WERE IMPLEMENTED.

DURING NOVEMBER 1977, THE FULL-TEST OF THE EARTHQUAKE DISASTER MITIGATION TECHNOLOGY APPLIED IN SAN JUAN AFTER THE JANUARY 15, 1944 EARTHQUAKE, OCCURRED.



EARTHQUAKE November 23, 1977- M=7,4

SAN JUAN CITY, epicentral distance ≈ 60 km , IMM = VIII

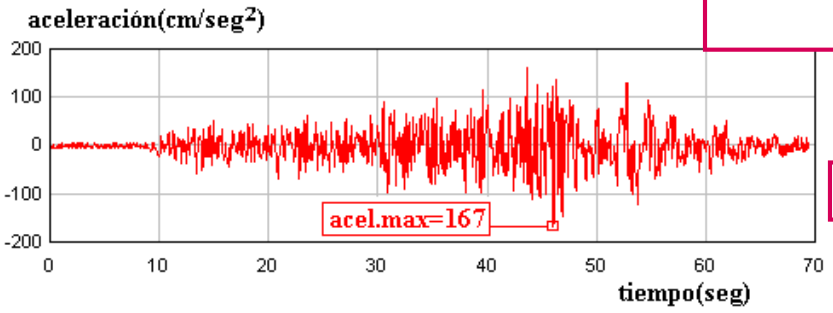
CAUCETE CITY, epicentral distance ≈ 30km , IMM = IX

EARTHQUAKE November 23, 1977- M=7,4

CITY OF SAN JUAN (epicentral distance ≈ 60 km , IMM=VIII)
NEITHER BUILDING COLAPSED NOR DEATHS OCCURRED

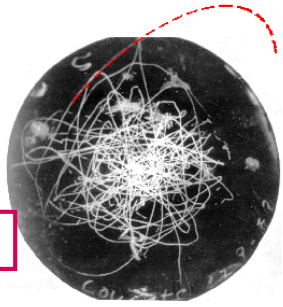
EARTHQUAKE November 23, 1977- M=7,4

SISMO CAUCETE 23-XI-1977
ACELEROGRAMA IDIA77-EO



SEISMOSCOPE IN I.D.I.A.
SA= 0,26g

CITY OF SAN JUAN



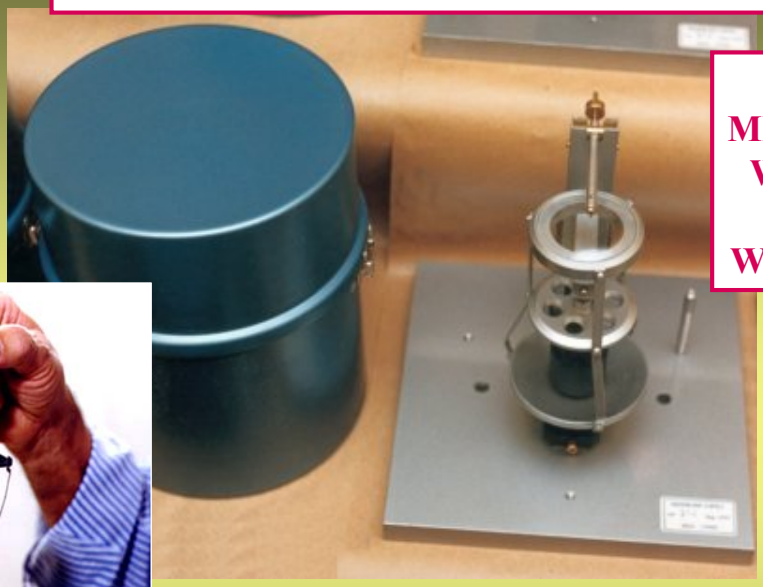
SISMO CAUCETE 23-NOV-1977

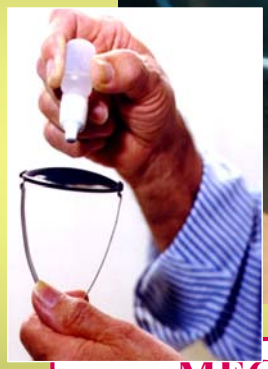
ESCUELA VIEYTES - CAUCETE

SISMOSCOPIO TIPO WILMOT
PERIODO 0,7seg , AM=10%
SA = 0,75 a 0,80 g

CAUCETE

WILMOT TYPE SEISMOSCOPE





EQUIVALENCE OF MERCALLI INTENSITY WITH AMPLITUDE OF THE RECORD ON WILMOT SEISMOSCOPE

IMM	SA(SisW)
VI	0,08g
VII	0,15g
VIII	0,30g
IX	0,60g
X	1,20g

MECHANICAL VIBRATORY LINEAL SYSTEM
PERIOD: 0,7 seg. ; 10% DAMPING

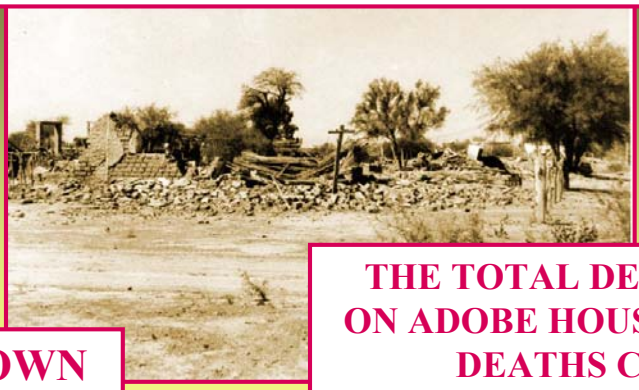
EARTHQUAKE November 23, 1977- M=7,4

CITY OF SAN JUAN - ENET Nº4 BUILDING SCHOOL
FIRST FLOOR WITHOUT WALLS - IMPORTANT DAMAGE ON COLUMNS

epicentral distance ≈ 60 km , IMM = VIII

LESSON LEARNED AND THEN INCLUDED ITS CONSIDERATION IN THE CODE

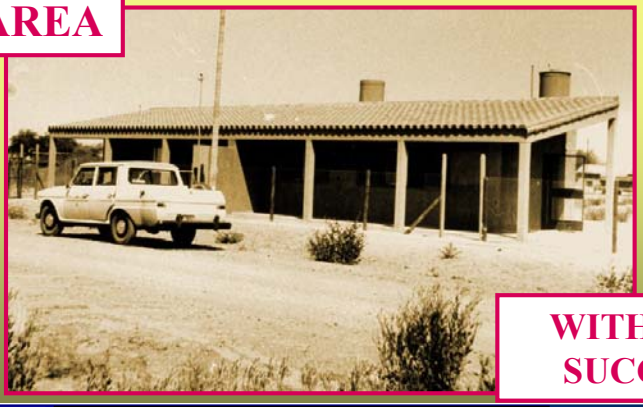
EARTHQUAKE November 23, 1977- M=7,4



THE TOTAL DESTRUCTION ON ADOBE HOUSES SEVERAL DEATHS CAUSED

BERMEJO TOWN
EPICENTRAL AREA

IMM ≈ IX - X



WITHOUT DAMAGE, SUCCESSFUL TEST

EARTHQUAKE November 23, 1977- M=7,4

CRISTO REY CHURCH

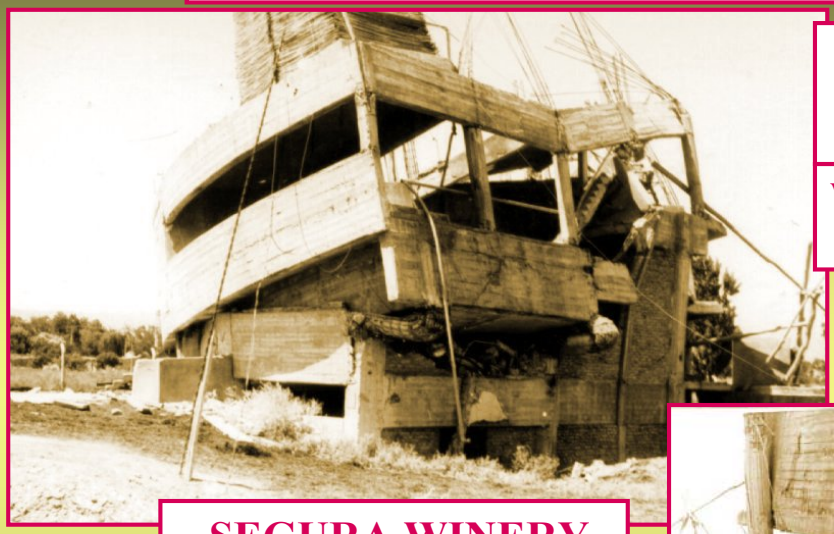
CAUCETE CITY
epicentral distance ≈30km
IMM = IX

ONLY MINOR DAMAGE

WILMOT SEISMOSCOPE
SA= 0, 55g

DESIGNED WITH HORIZONTAL FORCES FROM Cs= 0,15

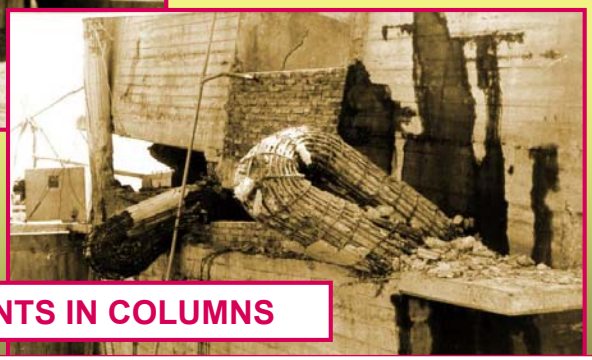
EARTHQUAKE November 23, 1977- M=7,4



CAUCETE CITY
epicentral distance ≈30km
IMM = IX

WILMOT SEISMOSCOPE
SA= 0, 55g

SEGURA WINERY COLAPSED



HIGH DENSITY OF STEEL REINFORCEMENTS IN COLUMNS

LESSON LEARNED AND THEN INCLUDED ITS CONSIDERATION IN THE CODE

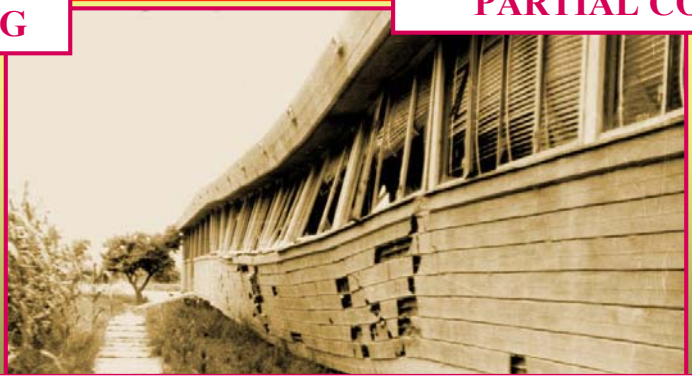
EARTHQUAKE November 23, 1977- M=7,4

CAUCETE CITY
epicentral distance ≈30km
IMM= IX

WILMOT SEISMOSCOPE
SA= 0, 55g

GREAT DAMAGE WITH PARTIAL COLAPSES

"ESCUELA NORMAL" SCHOOL BUILDING



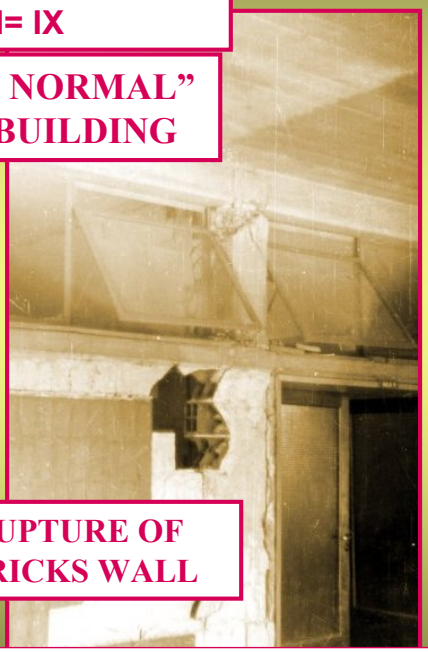
BUILDING WITHOUT THE OBLIGATORY OFFICIAL TECHNICAL AUDITS

EARTHQUAKE November 23, 1977- M=7,4

CAUCETE CITY
epicentral distance ≈30km
IMM= IX

WILMOT SEISMOSCOPE
SA= 0, 55g

"ESCUELA NORMAL" SCHOOL BUILDING



BRITTLE RUPTURE OF HOLLOW BRICKS WALL

SHORT COLUMN EFFECT

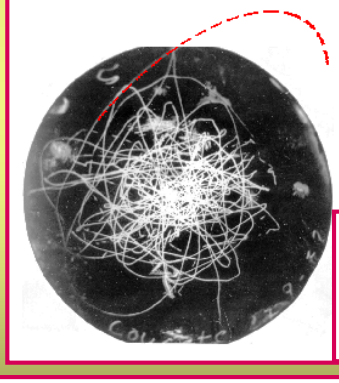
LESSON LEARNED AND THEN INCLUDED ITS CONSIDERATION IN THE CODE

EARTHQUAKE November 23, 1977- M=7,4

CAUCETE CITY
epicentral distance ≈30km
IMM= IX- X

"ESCUELA VIEYTES" SCHOOL BUILDING

PARTIAL COLAPSED



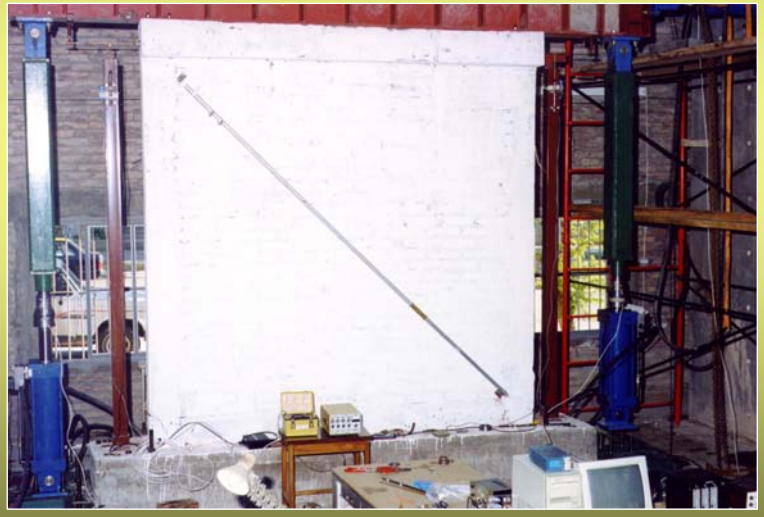
WILMOT SEISMOSCOPE
SA= 0,75-0,80g

SHORT COLUMN EFFECT – SCARCE STIRRUP

LESSON LEARNED AND THEN INCLUDED ITS CONSIDERATION IN THE CODE

ENSAYOS EN MURO REACTIVO
PANELES DE MAMPOSTERIA EN ESCALA NATURAL
APLICACIÓN DE FUERZAS HORIZONTALES ALTERNATIVAS

INSTITUTO DE INVESTIGACIONES ANTISISMICAS
UNIVERSIDAD NACIONAL DE SAN JUAN



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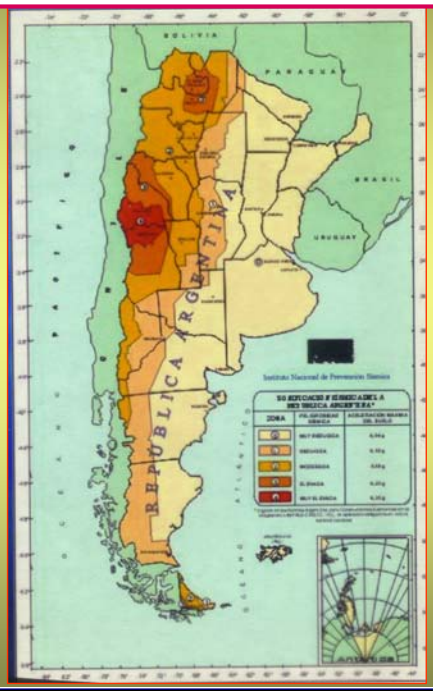
WITH THE LESSONS LEARNED AND OTHER STUDIES

EARTHQUAKE BUILDING CODE OF ARGENTINA INPRES-CIRSOC 103



SEISMIC ZONES

UP TO THE DATE, THE EARTHQUAKES ARE NOT PREDICTABLES AND THEY OCCUR SUDDENLY.

IF AN EARTHQUAKE OCCURS, IT IS IMPOSSIBLE TO AVOID INMEDIATLY THEIR DESTRUCTIVE EFFECTS.

ONE OF THE BEST TOOLS TO MITIGATE THE EARTHQUAKE EFFECTS, IS TO APPLIED THE OBLIGATORY OFFICIAL TECHNICAL AUDITS TO THE DESIGN AND CONSTRUCTION OF THE BUILDINGS ON SEISMIC AREAS.

A LAS DISTINGUIDAS AUTORIDADES de la UNIVERSIDAD NACIONAL DE INGENIERIA, de su FACULTAD DE INGENIERIA CIVIL y del CISMID

MUY HONRADO POR VUESTRA INVITACION Y NUESTROS MEJORES AUGURIOS PARA ESTA NUEVA ETAPA DE ACTIVIDADES DEL CISMID !!!

marzo del 2010

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LIMA, MARCH 15-16, 2010

LIMA – PERU – junio de 1960

II SIMPOSIO PANAMERICANO DE ESTRUCTURAS
UNIVERSIDAD NACIONAL DE INGENIERIA
LIMA-PERU-enero de 1964

PALACIO DE PIZARRO
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LIMA – PERU – junio de 2007

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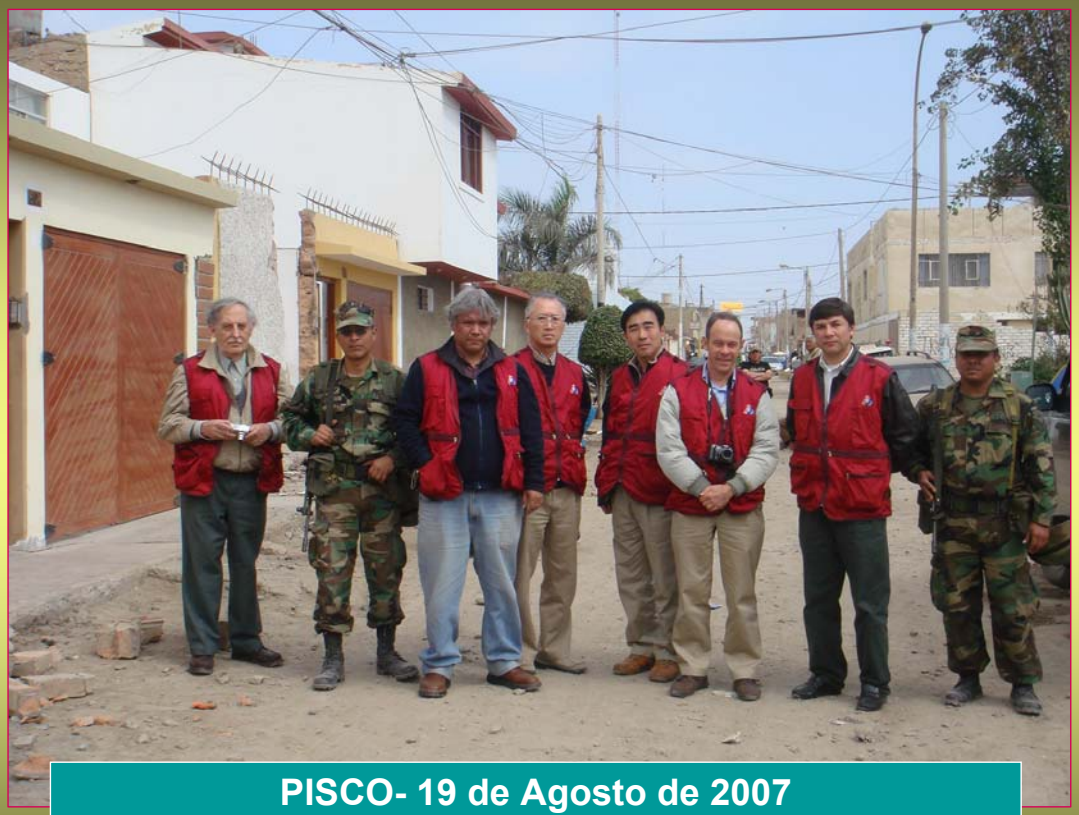

PISCO- 19 de Agosto de 2007

ESTIMADOS COLEGAS
MUCHAS GRACIAS POR SU PACIENCIA !!!