Attachment 2

REPORT ON DISASTER PREPAREDNESS

MISSION TO PERU

6 - 14 October 1980

by J. Tomblin, UNDRO, Geneva

1. Background

The mission described in this report was undertaken for three main reasons, namely that:

a) It represents part of the general policy of UNDRO to promote better disaster preparedness in those countries which from historical experience have been shown to be highly vulnerable. Peru falls clearly within this group: its per capita losses from natural disasters in historical time are among the highest in the world;

b) There has been appreciable concern among government authorities and the population of Peru over the prediction of a very large earthquake with origin close to Lima in August 1981. This prediction became public knowledge in Peru in January 1980, and since that date has been repeatedly mentioned in the news;

c) UNDRO has an interest not only in identifying those aspects of disaster prevention and preparedness for which it can provide, or help to co-ordinate external assistance for Peru, but also in learning, for application in preparedness planning in other parts of the world, the nature of the problems created by so specific a prediction of so large and potentially devastating an event. (The desirability of documenting the response to this prediction was indicated, for example, in the recommendation of the UNDRO-Unesco International Advisory Committee on Earthquake Risk at its Third Session in April 1980.)

It was originally intended that the writer's mission would be carried out

in company with two members of the United States Office of Foreign Disaster Assistance (OFDA) which had expressed interest in joining with UNDRO to support an enlarged programme of disaster preparedness in Peru. At the last minute, the OFDA staff had to postpone their visit until two weeks after the writer's. However, during the interval between his visit and theirs, the writer was able to meet with the OFDA staff and brief them verbally on the results of his mission.

2. Programme

During his stay of 9 days in Peru, the writer had four meetings with officials of the National Civil Defense Committee (CNDC), two meetings with the staff of the Geophysical Institute of Peru (IGP), and one meeting each with a newly-created assessment committee for the IGP, with staff of the Regional Seismological Centre for South America (CERESIS), the National University of Engineering (UNI), the World Health and Pan-American Health Organizations (OMS/OPS), the Peruvian Red Cross (CRP), with senior officials of the UNDP office, and with the UN Emergency Committee (responsible for the preparedness and relief of over 200 UN system employees and their 1,000 dependents in Peru). Discussions with these groups covered all types of natural disasters affecting the region, and dealt with issues relating to prevention, preparedness and relief.

3. Layout of the Report

The sequence followed in the remainder of this report will be to review the functions of, and the discussions with each of the different groups met by the writer in Peru. Following this, a number of projects will be outlined (Annex I) which emerged from these discussions as possible objectives which could be achieved with assistance from UNDRO and/or OFDA.

4. National Civil Defense Committee (CNDC)

The CNDC is the central element in disaster preparedness in Peru. It has a permanent staff of 97 people including 23 administrative and professional staff and 24 technical staff. It also currently employs on short-term contracts a further 46 staff including 20 professionals. The CNDC has the responsibility for carrying out or co-ordinating studies of vulnerability, risk analysis, the planning and implementation of protective measures prior to a disaster, and relief after it.

The writer learnt about these activities in the course of four meetings. The first of these consisted of formal presentations by the Director-in-Chief and by four of his senior staff, to a gathering including the entire UN System Emergency Committee as well as the writer. (This meeting had been planned independently of the writer's visit but was fixed to coincide with it so that it would form an appropriate briefing for him as well as for the UN Emergency Committee.) The presentations illustrated the nature and distribution of natural hazards in Peru (among which earthquakes predominate), the details of the specific prediction for 1981, and the current status of studies in vulnerability analysis. They reviewed methods of public education, gave examples of preventive measures and an inventory of expected requirements following a major disaster. This first meeting ended with a short review by the writer of the functions of UNDRO and the reasons for its present interest in Peru.

The remaining three meetings with the CNDC were round-table discussions, each one with between 6 and 10 of the administrative and professional staff. At the second meeting, the writer described a number of disaster scenarios, pointed out some of the practical problems which had been encountered, and invited the CNDC staff to consider whether they might face similar problems and what they would do to solve them. He also invited the staff to consider and propose at a later meeting how they thought UNDRO could be of service to them.

The purpose of the third meeting with the CNDC was for the writer to see the operations centre and telecommunications room, and to discuss operating procedures. The telecommunications room was very inadequately equipped: it lacked modern equipment, standby power, and the capacity to communicate on any frequencies other than the CNDC's own.

The fourth and final round-table meeting was attended by Professor J. Kuroiwa (Engineer at the UNI and member of the CNDC Scientific Advisory Committee) as well as by senior CNDC staff. The purpose of this meeting was for the CNDC staff and Professor Kuroiwa to submit proposals or ideas for the improvement of disaster preparedness. The proposal outlines presented as Projects 1 to 5 in Annex I of this report were all identified and discussed. Particular importance was given to Project 2 which was judged to be a high-priority and relatively simple problem resulting in preparedness measures which, in the event of a major tsunami alert, would definitely need to be applied. High priority was also given to the proposal to improve CNDC's telecommunications, although the writer suggested that it was unlikely that any foreign funding

source would provide for the purchase of new equipment on so large a scale as had been requested (170 radio transceivers to regional, departmental and provincial communication, plus 49 to link the districts of Lima and 32 for an inter-hospital network).

5. Geophysical Institute of Peru (IGP)

The IGP has the main responsibility for scientific monitoring of phenomena related to natural disasters in Peru. The whole office, which is part of the Ministry of Education, employs some 230 staff, of whom about 40 belong to the seismology section, with responsibility for the monitoring and location of earthquakes, the estimation of magnitudes and recurrence and the construction of hazard maps. The IGP is also responsible for receiving and forwarding warnings on Pacific tsunamis. It needs more seismograph stations, and especially more radio linked stations so that abnormal activity can be detected and interpreted more promptly in Lima. The IGP has received recently a substantial capital grant from the Government of Peru with which to improve its seismograph network and to diversify the types of monitoring to include at least ground deformation measurements. It may need help in establishing the techniques for interpretation of ground deformation, but this will probably be available from the U.S. Geological Survey which has already provided a consultant to advise on ways of increasing the variety and effectiveness of monitoring systems in Peru.

The IGP sends its raw data for processing by the U.S. Geological Survey, and maintains close contact with the U.S. scientists who made, or are interested in, the prediction for 1981 and its postulated precursors.

6. IGP: Technical Advisory Committee

A high-level Technical Advisory Committee for the IGP has recently been formed to examine possible changes of emphasis in the work programme of the Institute, with special reference to its responsibilities for earthquake prediction. The writer was invited to a meeting of this committee to discuss what action should be taken in response to the earthquake prediction for August 1981.

There was a lengthy discussion of the validity of the prediction: the general opinion was that there was no scientific basis for making so specific a prediction, but that the IGP needed to reinforce its capacity to make and

interpret scientific measurements of the various phenomena which represent possible earthquake precursors in order to develop a more reliable basis for confirming or rejecting any future prediction.

The writer, when invited to comment, gave the opinion that the most important issue was to develop a methodology for hazard assessment, involving:

a) the need to illustrate that each type of hazard has a certain mean level which will be offset whenever abnormal phenomena are observed which represent potential precursors to a destructive event;

b) a search for methods of quantifying, at least crudely, the factor by which the mean hazard is amplified by various types and levels of potential precursor;

c) the preservation of an impersonal and unified scientific evaluation of the hazard in all communications to government authorities and the public.

7. Universidad Nacional de Ingenieria (UNI)

The writer spent an afternoon in discussion with Professor Kuroiwa, who is a Civil Engineer at the UNI and is also a member of the CNDC Scientific Advisory Committee. Professor Kuroiwa has supervised several tens of post-graduate theses on subjects related to vulnerability assessment in the event of natural disaster, and is a well-known and highly active specialist in this field in Peru. The writer sought Professor Kuroiwa's views on possible future projects in disaster prevention and preparedness, including the engineering and vulnerability aspects of Projects 1 to 4 outlined in Annex I of this report.

Professor Kuroiwa's long experience and keen interest in promoting vulnerability studies related to disaster prevention and preparedness in Peru, and his active participation in CNDC and IGP project, place him in a key position to act as a local organizer of projects in this field.

8. World Health and Pan-American Health Organizations (OMS/OPS)

In a visit to the regional office of OMS/OPS, the writer met the Area Representative Dr. Philippe Cavalié, and the Administrative and Planning Officer Dr. G. Mendizabal. Current activities related to disaster preparedness included

a three-day seminar (26-28 November 1980) in Bogota on health needs in the event of disasters. Dr. Cavalié stated that Swedish funds had been provided for a regional adviser on disaster-related health needs, to be based permanently in Lima. The OMS/OPS is planning to organize training and educational activities related to disaster preparedness in Peru, but to date has had little liaison with the CNDC or the Peruvian Red Cross. It would be desirable for the CNDC to involve the OMS/OPS in disaster scenarios to identify, in advance of any emergency, the role which could be played by the considerable body of expertise which exists within the OMS/OPS and how the staff of this office could be deployed most effectively in relief activities following any future disaster.

9. Regional Centre for Seismology for South America (CERESIS)

The writer visited the Headquarters of CERESIS, which are located in Lima. The objectives of this office are to promote regional co-operation in the study of earthquakes and earthquake hazard assessment, and also to co-ordinate mutual help between countries of the region in the event of a major disaster, primarily for the purpose of carrying out seismological and engineering studies. The results of two such studies under contract with Unesco, on the Lima earthquake of 30 October 1974, and on the Guatemala earthquake of 4 February 1976, have just been published.

CERESIS has also recently obtained funds from USAID for a regional project in seismic risk analysis and mitigation. It maintains close contact with the ICP, and its staff have been active in advising on earthquake and tsunami hazards in Peru.

10. Peruvian Red Cross (CRP)

In a visit to the Central Committee of the Peruvian Red Cross in Lima, the writer met the Secretary General, Sr. Filomeno Garcia, and the Director of the recently established Sector for Disaster Relief, Sr. Korngold Timerman. Both men expressed their interest in receiving more information about UNDRO, including copies of its publications. Recent preparedness activities by the CRP had included a 15-day training course for 20 volunteers, and a second, similar course was due to take place in the city of Arequipa beginning 13 November 1980.

11. UN System Disaster Relief Committee

Numerous regional offices of the UN system are located in Lima, and the UN System Disaster Relief Committee in Lima consists of some 20 members, responsible (by geographic subdivision) for over 200 UN employees and their family members (over 1,000) living in Lima. At the request of the UN Resident Representative, the writer met with this committee and led a 2-hour seminar and discussion on a typical earthquake scenario and on practical issues related to disaster relief.

12. Conclusions and Recommendations

The CNDC, which has the primary responsibility for disaster preparedness and planning in Peru, has developed a broad organizational structure and philosophy. Within this general framework, there is now a need for more detailed practical planning of specific disaster situations, especially those resulting from earthquakes and tsunamis which are the most serious natural hazards in Peru. The most immediate needs are for detailed planning a) for the management of a short-term, high-probability earthquake prediction for Lima, and b) for response to different levels and types of tsunami warning. It would be appropriate and desirable for UNDRO to provide immediate support for the initiation of both of these projects. Specifically, it is suggested that UNDRO provide:

a) the cost of sending a consultant for six weeks to initiate a project on earthquake prediction management for Lima (Annex I, Project 1) and

b) the operating costs of the tsunami preparedness project (Annex III, Item 5.2).

A copy of the official request from the Government of Peru for this assistance is attached at Annex II. For the project on earthquake risk management, UNDRO is actively searching for candidates who have the necessary qualifications and would be available for appointment in the early future.

In both of the above projects, the methodologies developed would be widely applicable, and would serve as a model for similar projects elsewhere in Peru, and in other Andean countries.

Possible projects for UNDRO and/or OFDA support

From the discussions held with the various groups concerned, it was concluded that it would be best to develop a number of separate projects of modest size, each of which could be initiated independently and achieved in a relatively short space of time (preferably one year and a maximum of two). Six such projects are outlined below:

Project 1: Evacuation plan for central Lima in response to imminent earthquake prediction

This project would have two main objectives, namely:

1) The identification of areas of highest vulnerability, of evacuation routes and of safe assembly areas. Studies of this kind have been carried out by the Civil Defense in conjunction with the Universidad Nacional de Ingenieria, and it appears that most of the appropriate maps already exist;

2) The formulation of criteria for taking decisions to evacuate, or to implement other protective measures which represent a disruption of normal social or commercial activities. There is a need to identify the chain of information, assessment and command leading to such decisions. The CNDC should take the responsibility for co-ordinating a detailed study of:

   a) how the hazard can be quantified by scientists in terms which are meaningful to government authorities;
   b) what will be the social and economic disadvantages of various sizes and lengths of evacuation;
   c) who will be responsible for weighing the arguments for and against evacuation, and for issuing decisions on the various degrees of evacuation which might be contemplated;
   d) how quickly the above process can be achieved during a rapidly escalating emergency, what will be the main sources of delay and how these can be reduced to a minimum;
   e) in what form public warnings will be issued;
   f) how the decisions to call the various possible levels of evacuation will be implemented in detail.

Although the prospect of accurate prediction (to within a day or two) of the time of occurrence of a devastating earthquake remains low, the fact that a specific prediction of this kind already exists for Peru and that stronger evidence of its validity may possibly accumulate, means that the consideration of having to manage a partial evaluation of Lima (no matter whether the evacuation has been called officially or is undertaken spontaneously by the population) needs to be given serious attention. It is recommended that several different scenarios involving high-level earthquake hazard situations be drawn up and enacted by the CNDC in conjunction with the scientists and decision-making authorities who would be involved.

The CNDC expressed a wish to obtain the services of a consultant to advise on emergency planning and management methods, with special reference to earthquakes and tsunamis (see Annex II), and this seems to the writer to be one of the most urgent of present needs relating to disaster preparedness in Peru.

Project 2: Tsunami risk analysis and emergency preparedness

Objectives

a) To construct tsunami hazard zoning maps.
b) To carry out vulnerability studies within the identified hazard zones.
c) To make specific plans for the evacuation of the threatened areas.

Hazard maps

The construction of hazard maps is essentially a scientific and hydraulic engineering problem, involving the analysis of offshore and onshore topography in coastal areas where there is a population at risk. Some general studies of this kind have been made by Professor Kuroiwa of the Universidad Nacional de Ingenieria, but these have not resulted in the production of a specific maps showing areas likely to be affected as a direct function, for example, of the magnitude of a major earthquake of regional origin (off the coast of Peru), or alternatively as a function of the combined earthquake magnitude and tsunami wave heights reported for an event with origin in a distant area of the Pacific Ocean. Professor Kuroiwa has indicated his willingness to lead a new project, with some of his post-graduate students, to collect the relevant data and draw the appropriate hazard maps. In addition to existing data available from the Tsunami Centre in Hawaii, and the literature describing historical tsunamis in

Peru, it is possible that relevant new data will be available from a series of modelling studies for Pacific tsunamis which may be commissioned in the near future by the U.S. Office of Foreign Disaster Assistance.

Vulnerability studies

Vulnerability studies require the joint participation of engineers to evaluate the extent to which existing structures are likely to be damaged in each hazard zone, together with planning and census authorities who can provide the numbers of population at risk and which in emergency would need to be evacuated.

Emergency plans

Emergency planning, which is the responsibility of the CNDC, will require the identification of protective measures, such as evacuation methods and routes, and also the establishment of the criteria for calling an evacuation. It should be noted that two different types of plan will be needed, the first corresponding to tsunamis of near origin with advance warning of a few tens of minutes, and the second corresponding to those of distant origin involving a warning period of 5-15 hours.

It is also worth noting that although the overall probability of loss from tsunamis in Peru is lower than that from direct earthquake shaking, the chances of issuing an imminent tsunami warning and of successfully achieving an evacuation prior to a destructive event are so much higher that the potential for saving lives is correspondingly enhanced.

Proposal

A preliminary proposal, primarily for hazard and vulnerability studies related to the above project, was submitted by Professor Kuroiwa for discussion at the final meeting which the writer attended at the CNDC. This is attached in Annex III.

Project 3: Composite risk studies in Arequipa

Objectives

The objective of this study would be to carry out an exercise in establishing the extent of vulnerability of a given population centre to the whole range of applicable natural hazards. The city of Arequipa seems to be the best candidate for such a study because:

a) it has already been the object of a detailed earthquake damage survey following an event in November 1979. This survey was sponsored by the Civil Defense and carried out jointly by the Instituto Geofisico del Peru and the Universidad Nacional de Ingenieria;
b) it lies at the foot of a volcano capable of future large-scale eruptions;
c) it is subject to a variety of lesser hazards including flash floods, mudflows, etc.

Project 4: Water supply in Lima

The public water supply in Lima was identified as a possible subject for vulnerability analysis and the prescription of preventive as well as post-disaster relief measures. The fragility of this water supply was illustrated during the week of the writer's stay in Lima, when heavy rains in the mountains caused a doubling of the normal water flow down the River Rimac, and a considerable increase in turbidity, resulting in the temporary failure of the water treatment plant which normally produces about 40 % of the city's supply. A major earthquake would be likely both to damage the water treatment installations and to cause landslides or slumps and hence strong turbidity in the water of the River Rimac.

A further, highly vulnerable aspect of the water supply system is the way in which water storage tanks are placed on the flat roofs of modern apartment blocks in Lima. Many of these tanks are made of reinforced concrete and stand on unbraced columns some 2 metres high. Numerous of these columns show evidence of having cracked, presumably during the relatively minor, 1974 earthquake, and some tanks apparently fell during this event. The low strength of these tank supports not only prejudices the survival of important emergency drinking water supplies following a disaster, but also represents a significant risk to life and property where tanks might fall through the roof. Existing

tank supports could be easily reinforced at low cost, and the design of future supports should be better regulated.

Project 5: Communications equipment

The capacity of the CNDC to maintain communications during an emergency is extremely limited. If it is to play an active part in managing a disaster, it must have effective communications equipment which has been put into use, and with which the CNDC staff are fully familiar, prior to the occurrence of a disaster. The most urgent needs are for:

a) modern transceivers for routine and emergency communication with regional offices;
b) standby (autonomous) power supplies;
c) portable and mobile radios for senior staff and their vehicles;
d) equipment at CNDC Headquarters for communicating on a wide range of frequencies (e.g. other government frequencies and amateur bands) during an emergency.

Project 6: Training and consultant services

This request involved the provision of training for two or three CNDC staff members, e.g. by attending courses abroad, in various relevant aspects of preparedness planning. The services were also requested of an expert in general aspects of preparedness, with special reference to earthquakes and tsunamis (see Projects 1 and 2), who could spend three months in Peru to review current operations of the CNDC and prescribe the most appropriate future emergency planning and management methods.

PROYECTO DE SOLICITUD PEDIDO DEL GOBIERNO DEL PERU

A LA

OFICINA DEL COORDINADOR DE LAS NACIONES UNIDAS

PARA EL SOCORRO EN CASOS DE DESASTRE

(UNDRO)

ASUNTO: Necesidad de Expertos en las siguientes disciplinas:

Planeamiento para Desastres.

Duración: Tres meses.

Fecha Requerida: Requerimiento inmediato.

Tareas: Bajo la supervisión de la División Planeamiento y de Prevensión de UNDRO, el experto proporcionará al Gobierno del Perú servicios consultivos para la Modernización e implementación de la organización para desastres a los diferentes niveles de Gobierno.

En particular, el experto deberá asesorar en:

a) Identificación de las áreas amenazadas por los desastres, recomendaciones para la decisión de medidas preventivas, muy en especial en casos de sismos y tsunamis.

b) Elaboración de una doctrina adaptada a las características propias de las regiones naturales del Perú.

c) Mejoramiento de los planes de emergencia existentes y métodos de elaboración de los planes de socorro a todos los niveles y para cada clase de desastre.

d) Mejoramiento de los mecanismos de coordinación existentes entre las autoridades del Sistema Nacional de Defensa Civil y los Ministerios y otras Instituciones del Sector Público y Privado, a los diferentes niveles.

e) Elaboración de una metodología de análisis y evaluación de vulnerabilidad de los proyectos en ejecución y de los que se encuentran sometidos a estudio.

f) Asistencia en el mejoramiento de las técnicas de los organismos básicos con Fuerzas Armadas, Fuerzas Policiales, Cuerpo de Bomberos, Cruz Roja y otras Agencias de Socorro.

g) Planificación de la Ayuda Internacional en casos de desastres de gran magnitud.

Lengua: Español.

PROPUESTA DE INVESTIGACION

"PROTECCION Y PLANES DE EVACUACION DE LAS ZONAS BAJAS DEL CALLAO AMENAZADAS POR TSUNAMIS"

por Julio Kuroiwa*

1. ANTECEDENTES

Callao es el principal puerto peruano por donde se exporta e importa más del 50% del comercio exterior del país.

El puerto ha sido atacado varias veces por maremotos desde que se conoce la historia escrita de estas tierras (1)°, sin embargo, el peor de todos es el que sucedió en la noche del 28 de Octubre de 1746, cuando el Callao fue barrido por un tsunami de origen cercano destruyéndolo completamente y causando la muerte de sus 5.000 habitantes, excepto 200, que lograron salvarse de manera providencial flotando en troncos y varados en Chorrillos y otras playas cercanas (2)°.

2. NECESIDAD DE EFECTUAR ESTUDIOS DE PROTECCION DE LA POBLACION Y DE TRATAR DE MINIMIZAR LOS EFECTOS DESTRUCTIVOS DE UN MAREMOTO EN EL CALLAO

Tal como ya se ha mencionado, a través del Callao se realiza el mayor porcentaje del comercio exterior del Perú y en la actualidad viven, en las zonas inundables por tsunamis, centenares de miles de personas y en la zona portuaria del Callao se encuentra depositado permanentemente un gran volumen de carga de un valor muy alto.

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* Profesor Principal, Universidad Nacional de Ingeniería - Lima. Miembro del Comité Científico - Comité de Defensa Civil del Perú.

° Referencias

A pesar de este hecho, no se tienen planes para proteger bienes ni personas en el Callao y solo se cuenta con un estudio preliminar de los posibles efectos de un Tsunami en dicho puerto realizado en la Universidad Nacional de Ingeniería con los auspicios del Comité Nacional de Defensa Civil (3).

3. PROGRAMA DE INVESTIGACION

Las investigaciones por efectuarse tienen por objetivo principal proteger a la población, meta que se puede alcanzar sin mucha dificultad si se estudia, planifica, programa y se ensaya la evacuación, pues los tsunamis de origen cercano llegan a las costas unas pocas decenas de minutos después de que se produce el terremoto que lo origina. Como segundo objetivo importante se trata de minimizar las pérdidas materiales que puedan producirse adoptando planes a ejecutarse de inmediato (de emergencia) y a mediano y largo plazo.

Los puntos que comprenderán las investigaciones serán:

- Determinación de la magnitud del tsunami más probable (altura de olas, presión del agua, etc.) y tiempo de llegada de un tsunami de origen cercano.
- Delimitación de las zonas inundables.
- Efectos del tsunami en las zonas inundables.
- Determinación de zonas de refugios y rutas de escape.
- Planificación y diseño de los refugios.
- Determinación de medidas a tomar para minimizar las pérdidas materiales
- Preparación de un informe que incluya los resultados de las investigaciones.
- Preparación de un folleto explicativo con textos y figuras muy simples para ser distribuído entre la población.

4. PERSONAL A CARGO DE LOS ESTUDIOS

Director del Proyecto: Julio Kuroiwa, Profesor de la UNI, Miembro

del Comité Científico de Defensa Civil.

Coordinador del Proyecto: Designado por Defensa Civil.

Asesoría Nacional: Hidrografía y Navegación de la Marina del Perú e Instituto Geofísico del Perú.

Bachilleres de Ingeniería Civil (3) y un bachiller de Arquitectura quienes desarrollarán sus tesis de grado.

ASESORIA INTERNACIONAL: Proporcionada por UNDRO.

5. NECESIDADES

5.1 Sueldos y facilidades proporcionadas por el Perú

- Dirección del Proyecto cuyo sueldo será pagado por la Universidad Nacional de Ingeniería (UNI) (1/3 tiempo x 18 meses).
- Sueldo del coordinador del proyecto, pagado por Defensa Civil del Perú ($\frac{1}{2}$ tiempo x 18 meses).
- Asesoría de la Marina del Perú y del Instituto Geofísico proporcionado por estas Instituciones, cuando se requiera.
- Facilidades de espacio proporcionados por la UNI y Defensa Civil.

5.2 Gastos de Operación

- Movilidad Director del Proyecto

US$ $\frac{50}{\text{mes}}$ x 18 meses = US$ 900

- Movilidad Coordinador del Proyecto

US$ 50 x 18 meses = 900

- Secretaria (1/4 tiempo)

US$ 50 x 18 meses = 900

- Movilidad bachilleres

4 x 12 meses x $\frac{50}{mes}$	=	US$	2,400

- Preparación Tesis Ing. Civil

(3) x 500	=		1,500

- Preparación Tesis Arquitectura

(1) x 850	=		850

- Preparación del Informe Resumen	=		1,700
- Preparación del Folleto	=		2,400
- Utiles de escritorio, compra de planos fotografía, dibujo	=		2,000
	TOTAL	US$	13,500

5.3 Gastos de Asesoría Internacional

(Pagado por UNDRO) .....

5.4 Gastos de Viaje de Estudio a Hawai

(Pagado por UNDRO) .....

TOTAL US$ .....

NOTA: El estudio durará en total 18 meses. El experto en Tsunamis con experiencia en aplicaciones prácticas será requerido en Lima a los 2 meses de iniciados los estudios por un período de 2 a 3 semanas.

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