

5-2 Conclusion and recommendations

(1) Conclusion

The implementation of this project will greatly improve the fisheries condition, and heighten the expectations for progress and development in commercial fisheries. The following specific effects can be expected:

- 1) By constructing a jetty adjacent processing and storage facilities, the landing and handling of large fish such as tuna will become more efficient, the freshness of fish for export will be maintained, and profits from sales will be increased.
- 2) By securing processing and storage facilities of an appropriate scale for fresh fish for export, distribution and sales functions will be improved, exports will be promoted, foreign currency will be acquired, and the living standards of fishermen will be improved and more stable.
- 3) Ice will be supplied to fishermen, thereby improving the quality of fish after they are caught. This will revitalize the domestic fresh fish market.
- 4) In the fisheries environment in Grenada in which the catch fluctuates greatly depending on the season, the securing of domestic freezing and storage facilities will increase the willingness of fishermen to work during the busiest season, and thereby the fisheries industry will be promoted and the catch increased.
- 5) By effectively using the fisheries resources in the seas around Grenada, the increase in the catch will increase demand for domestically caught fish, contribute to the tourist industry, reduce imports of foodstuffs, and contribute to preventing foreign currency from being spent and the acquisition of more foreign currency.
- 6) From the above, this project will contribute not only to the living standards of fishermen, but it will also contribute to the living standards and economic stability of all Grenadians.

Therefore, we believe that Grant Aid provided by the Government of Japan for this project has great significant.

(2) Suggestions

1) Policies for improving operations

1993 to 1995

The existing facilities (Burns Point, Gouyave, Grenville) were constructed as the land based facilities for the Artisanal Fisheries Development Project and Coastal Fisheries Development Project. Trying to convert them into facilities

for the purchase and sales of fish for export, especially large fresh fish (tuna), is something which they were just not made for. In other words, the sticking point is that the landing, cleaning, processing and shipping process is not simple enough. If results are to be improved during these two years, then the following points should be considered.

- a) The repair, reorganization and improvement of the existing facilities. (At Gouyave, a water supply line for cleaning and repair of the roof of the processing plant is being started.)
- b) The efficient and planned use of cold storage and chilled storage facilities.
- c) Minimum required operation of facilities.
- d) Re-education of employees and workers. (In fish handling, the importance of quality control, facility functions, work processes based on sales plans, etc.)
- e) Gaining a grasp of the catch when landing the catch every day, and an organization which can cope flexibly. Especially the supply of ice and measures to maintain the freshness of fish at Burns Point.
- f) Management and education as a private company.
- g) Reduction of expenses with the above.

With the number of participants increasing in the export tuna market, all employees must be aware of the business aspects, reflect the trends in the work place, and make efforts to win in the competition with other companies.

1996 and after

When the facilities in this project are completed, it goes without saying that they will be the biggest fishing processing facilities in Grenada. In order to operate these facilities as the core of GCFL and the Grenada fisheries industry, the assignment of appropriate personnel must be added to the aforementioned points. When facilities are expanded in scale, there is a tendency to increase the scale of manpower, but in this case the project facilities only increase the scale of the processing area, and the other facilities are about the same size as the existing facilities. (Although chilled storage and cold storage capacity will increase, total capacity will not change that much.)

In regard to the assignment of personnel to the cleaning and processing processes, the prerequisite should be assistance (cooperation) from fishermen. The reasoning behind this is that under the current circumstances, fishermen are responsible for the cleaning of fish. Therefore, it is likely that fishermen would accept helping with cleaning at work benches. Instruction and promotion activities to this end should be started now.

In addition, it is desirable to create a quality inspection and control posture which will allow the organization to negotiate increases from the current sales prices with customers, in expectation of the freshness and quality created by the handling devices and forklifts used at the jetty.

2) Regarding the business activities

If the complex in this project is to be the main operations facility for GCFL, the current business format of "purchasing, cleaning, processing, packing and selling" should remain the basis. By keeping it the basis, it will be easier to understand the situation when considering future management situations. As was mentioned before, trial calculations were based on the difference in profits from the sales price and purchasing price.

Here, we have considered the possibilities for business formats other than the above, if GCFL is to play the role of the engine in the fisheries industry in Grenada.

① Processing business

This is business which was attempted in May and June 1993 with one client. The processing [cleaning, processing, packing] charges at the time were US \$1.0/lb (US \$2.2/kg). The contents of the processing charges were probably:

- a) Personnel cost
- b) Water and utilities costs
- c) Packing materials expenses
- d) Transportation expenses

In future profitability calculations, comparisons between the scales of the facilities in this project and the existing facilities, between the quantities which can be handled, and between the percentages of expenses must be considered. At the same time, the maintenance of freshness at [landing, and processing] will be increased dramatically, so that if negotiations to increase the processing charges because of the increase in the selling price of the fish are possible, then the possibility as a business will increase.

② Consigned sales business

In this case, the prerequisite is that Grenada's fish for export be concentrated at the facilities in this project. The reason for this is that at the present time, buyers purchase fish directly from fishermen at each of the landing areas. The quantity of consigned sales will determine if it is feasible as a business. Therefore, fish should be shipped from the landing areas to the project site, where they will be cleaned, processed, weighed, divided into grades (currently three grades are used), and packed. Then, buyers will purchase the fish under the supervision of

GCFL. GCFL will receive a percentage of the sales plus the processing charges from the fishermen.

This method will be effective as long as this complex is the only one in Grenada which can maintain the freshness of fish. If private companies should start to compete, however, this is no longer viable. Also, as we mentioned before, the fishermen and GCFL must have a sufficiently trustworthy relationship, so that all the fish are gathered at this complex, and GCFL must maintain the quality of fish from the viewpoint of nurturing and protecting fishermen. If the facts that there are only a few buyers and the catch of fish for export is limited to several hundred tons are considered, however, collecting fish for export at this complex, consigning GCFL to sell them, and introducing the auction and bidding methods of sales would provide the following advantages.

1. It would lead to an increase in the incomes of fishermen.
2. Because the quality of the fish caught is reflected in the price, fishermen would make greater efforts in the handling and processing of fish, and maintaining freshness.
3. GCFL sales risks could be avoided.

At the present time the fisheries cooperatives have not developed sufficiently and the AFDP-GCFL will still require some time before it can act as the fishermen's representative, so that we believe that it will take some time for this system to be feasible.

③ Leasing business (Real estate business)

This method involves the leasing of ice making machines, chilled storage (0°C) and processing plants and other facilities which are mainly export related. If the equipment at the project site is divided into export, domestic and management systems, then the electricity, water and other utilities charges for each system will be clear, so that this method of business would be fairly easy to consider.

The problems are that fisheries cooperatives and semi-public organizations such as a fisheries export enterprise cooperative are not yet functional, and that there are only five small and large companies in this market, so that the facilities can only be leased to one company. In this situation, the survival of companies which are not leasing the facilities might be threatened. At the same time, in a situation in which only purchasing fish for export is difficult, it might be difficult for GCFL to purchase only fish for the domestic market and leave exports to the leasing company.

If these problems are solved, however, GCFL's lease rates could be estimated from building repair expenses, depreciation of equipment with short depreciation periods such as ice making machines, maintenance and control expenses, labor expenses in the domestic department, utilities expenses, etc. If the lease rate seemed reasonable for a tuna buyer, then this type of business would be feasible and worthy of consideration.

Regardless whether format 1), 2) or 3) is taken in the future, healthy management by GCFL is desirable from the policy viewpoint of nurturing and protecting fishermen through cooperation with the Fisheries Division. In the future, when the commercial fisheries industry has matured and the fisheries condition is better, this project site should remain under the ownership of the government in order to further expand the fresh fish distribution market centered on North America. And in order to further increase the will of fishermen to work at that time, the operation of this complex should be transferred from GCFL to a semi-public organization, such as the Grenada Fisheries Cooperative, which will take the stance of the fishermen. Until that time comes, the government and GCFL should develop the current business format, and contribute to the development of a semipublic organization.

APPENDIX

Appendix-1: List of Study Members

(1) Basic Design Study Team

Team Leader	FUJITA HITOSHI	Chief Fisheries Officer, Office of the Overseas Fisheries Cooperation, Fisheries Agency, Ministry of Agriculture, Forestry and Fisheries
Grant Aid Planner	KIMURA HIDEO	Councilor, Kanagawa International Fisheries Training Center, Japan International Cooperation Agency (JICA)
Fisheries Development Planner	HIRASHIMA SATORU	Overseas Agro-Fisheries Consultants, Co., Ltd. (OAFIC)
Port Planner	NAMIKI MAMORU	Overseas Agro-Fisheries Consultants, Co., Ltd. (OAFIC)
Architect	OHDERA YASUO	Overseas Agro-Fisheries Consultants, Co., Ltd. (OAFIC)
Facilities Planner	MORI JUNICHIRO	Overseas Agro-Fisheries Consultants, Co., Ltd. (OAFIC)
Natural Condition Surveyor	TAKAHASHI AKIYOSHI	Overseas Agro-Fisheries Consultants, Co., Ltd. (OAFIC)

(2) Draft Report Explanation Team

Team Leader	ISHIYAMA YOSHIO	Second Basic Design Study Division Grant Aid Study & Design Department, Japan International Cooperation Agency (JICA)
Fisheries Development Planner	IKEZU HIROFUMI	Chief Fisheries Officer, Far Seas Fisheries Division, Fisheries Agency, Ministry of Agriculture, Forestry & Fisheries
Facilities Designer	HIRASHIMA SATORU	Overseas Agro-Fisheries Consultants, Co., Ltd. (OAFIC)
Architectural Planner	OHDERA YASUO	Overseas Agro-Fisheries Consultants, Co., Ltd. (OAFIC)

Appendix-2: Itinerary

(1) Basic Design Study Team

- Sept. 21 (Tue.) Departure for New York.
- 22 (Wed.) Leave New York for Grenada.
- 23 (Thu.) Courtesy call to the Prime Minister, Ministry of Finance, Ministry of Agriculture (submitting the inception report and the questionnaire, adjusting the survey schedule).
Survey of facilities of Grenada Commercial Fisheries Limited (GCFL).
- 24 (Fri.) Meeting with Fisheries Division.
Survey of St. George's Fish Market, Fisheries Centers of Gouyave and Grenvill (Japanese Grant Aid Facilities).
- 25 (Sat.) Survey of project site (Grand Mal).
- 26 (Sun.) Meeting among the Mission members and study of data and information.
- 27 (Mon.) Boring of project site, commence survey of the tide level and the current.
Discussion with GCFL and the Minister of Agriculture.
- 28 (Tue.) Preparation and discussion of the Minutes (draft) with GCFL.
Two consultants (port planning, facilities planning) arrive at Grenada.
- 29 (Wed.) Discussion of the Minutes (draft) with GCFL and Fisheries Division, hearing and survey of Finance Division.
- 30 (Thu.) Signing of the Minutes of Discussion.
Survey of Victoria Fisheries Center.
- Oct. 1 (Fri.) Two members leave Grenada for Trinidad and Tobago.
Visit to the Embassy of Japan in Trinidad and Tobago.
Discussion with Fisheries Division. Survey of the waterworks, harbor bureau, the periphery of the project site.
- 2 (Sat.) Two members move to New York.
Survey of the periphery and the offshore of the project site.
- 3 (Sun.) Two members leave New York.
Meeting among the Mission members and study of data and information.

- 4 (Mon.) Two members return to Tokyo.
Discussion with GCFL and Fisheries Division.
- 5 (Tue.) Discussion with Fisheries Division.
Study of data and information.
Survey of local construction condition.
One consultant (natural condition survey) departs Grenada.
- 6 (Wed.) Survey of private fish smoking plant, Meteorological Agency,
shipbuilding plant.
Discussion with GCFL, survey of electric power company.
- 7 (Thu.) Survey of Carriacou fishery/marketing condition.
Discussion with GCFL.
- 8 (Fri.) Survey of Petit Martinique
Survey of the private ice making plant, shipbuilding plant, pier, etc.
- 9 (Sta.) Meeting among the Mission members. Study of data and information.
- 10 (Sun.) Meeting among the Mission members. Study of data and information.
- 11 (Mon.) Collection of the information on the oil company, survey of port
condition.
- 12 (Tue.) Discussion with Waterworks Division, collection of information on
the Telephone Agency.
Discussion with the vice-minister of Ministry of Finance
- 13 (Wed.) Discussion with the vice-minister of Ministry of Finance and GCFL.
Discussion with Fisheries Division, collection of information on the
city planning division.
- 14 (Thu.) Discussion of the Supplement to Minutes with GCFL.
Discussion with Minister of Agriculture, signing of the Supplement to
Minutes.
- 15 (Fri.) Collection of information on private tuna import agencies.
Discussion with GCFL.
- 16 (Sat.) Detailed survey of Grand Mal and the shrimp nursery.
Discussion with the consulting company.
Discussion with the Minister of Agriculture.
- 17 (Sun.) Meeting among the Mission members. Study of data and information.
- 18 (Mon.) Four consultants leave Grenada for New York.
- 19 (Tue.) Leave New York.
- 20 (Wed.) Return to Tokyo.

(2) Draft Report Explanation Team

- Jan. 24 (Mon.) Departure for New York.
25 (Tue.) Leave New York for Grenada.
26 (Wed.) Courtesy call to Minister of Agriculture.
Visit to Fisheries Division and explanation of the draft final report.
27 (Thu.) Explanation and discussion of the draft final report.
28 (Fri.) Preparation of a draft Minutes of Discussions
29 (Sat.) Survey of project site, study of data and information.
30 (Sun.) Meeting among the Mission members.
31 (Mon.) Signing and exchange of the Minutes of Discussion.
- Feb. 1 (Tue.) Leave Grenada for Trinidad and Tobago.
Visit to the Embassy of Japan in Trinidad and Tobago.
2 (Wed.) Leave Trinidad and Tobago for New York.
3 (Thu.) Leave New York.
4 (Fri.) Return to Tokyo.

Appendix-3: List of Persons Met by the Mission

Grenada:

Prime Minister		Mr. Hon. Nicholas Brathwaite
Minister of Agriculture, Trade, Industry, Energy, and Production	Minister Permanent Vice-Minister	Mr. Hon. George I. Brizan Mr. William Joseph
Ministry of Agriculture	Technical Consultant	Dr. Keith Braveboy
Fisheries Division	Chief Fisheries Officer	Mr. James Finlay
	Fisheries Officer (Biology)	Mr. Paul Phillip
	Fisheries Officer (Biology)	Mr. Crafton J. Isac
	Fisheries Officer (Biology)	Mr. Justin A. Rennie
	Fisheries Officer (Carriacou)	Mr. Richard Gabriel
	Fisheries Officer	Mr. Johnson St. Louis
	JICA Expert	Kazuo Senga
	JICA Expert	Tomishige Kondo
Grenada Commercial Fisheries Limited (GCFL)	General Manager	Mr. Joseph. P. Burke
	Facilities Manger	Mr. Randolph McIntosh
	Technician	Mr. Venn
Grand Mal Fishermens Cooperations	Chairman	Mr. James Nicholas
Ministry of Finance	Permanent Secretary (Chairman of GCFL)	Dr. Carlyle Mitchell
	Assistant Director	Mr. Nolan Murray
	Budget Officer	Mr. Dennis Cornwall
Ministry of Communication & Works	Quantity Surveyor	Mr. Kenneth Moore
	Planning Officer	Mr. Swinton Lambert

Grenada Ports Authority	Marine Supervisor	Mr. Ronald A. Haywood
	Port Manager	Mr. Ian Evans
	Port Manager	Mr. Ambrose Phillip
	Senior Pilot	Mr. Michael T. Forshaw
	Officer	Mr. Anthony Belmar

National water & Sewerage Authority	Officer	Mr. D. Lewis
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Land Development & Management Authority	Officer	Mr. Glamtz
		Mr. Fredlic

Meteorological Station	Officer	
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Fire Office (Private corporations are omitted.)	Officer	
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Trinidad and Tobago:

Embassy of Japan

Ambassador	Mr. Takeshi Tsuruta
Councilor	Mr. Takashi Suzuki
Second Secretary (in charge of technical assistance)	Mr. Masami Moriyoshi

MINUTES OF DISCUSSIONS
BASIC DESIGN STUDY
ON
THE ST. GEORGE'S ARTISANAL FISHERIES COMPLEX PROJECT
IN GRENADA

In response to a request from the Government of Grenada, the Government of Japan decided to conduct a basic design study on the St. George's Artisanal Fisheries Complex Project (hereinafter referred to as "the Project"), and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Grenada a study team, which is headed by Mr. Hitoshi Fujita, Chief Fisheries Officer, Office of the Overseas Fisheries Cooperation, Fisheries Agency, and is scheduled to stay in the country from 22 September to 18 October 1993.

The team held discussions with the officials concerned of the Government of the Grenada and conducted a field survey in the study area.

In the course of discussions and field survey, both parties have confirmed the main items described on the attached sheets. The team will proceed with further works and prepare the basic design study report.

St. George's, 30 September, 1993



Mr. Hitoshi Fujita

Leader

Basic Design Study Team

JICA



Mr. Honourable George I. Brizan

Minister of Agriculture, Trade, Industry,
Energy and Production

ATTACHMENT

1. Objectives

The objective of the project are the establishment of artisanal fisheries complex in order to strengthen the commercial artisanal fishery which contributes to the increasing and securement of effectively demand for fish products from local and foreign markets, and generating new income earning opportunities for existing and potential fishermen in Grenada.

2. Project site

The project site is in Grand Mal as shown in Annex I.

3. Executing agency

Ministry of Agriculture, Trade, Industry, Energy and Production
Fisheries Division

4. Item requested by the Government of Grenada

After discussions with the basic design study team, the items listed in Annex II were finally requested by the Grenada side.

However, the final components of the Project will be decided after further studies.

5. Japan's Grant Aid system

- (1) The Government of Grenada has understood the system of Japanese Grant Aid explained by the study team.
- (2) The Government of Grenada will take necessary measures, described in Annex III for smooth implementation of the Project, on condition that the Grant Aid Assistance by the Government of Japan is extended to the Project.

6. Schedule of the study

- (1) The consultants will proceed to further studies in Grenada until 18 October 1993.
- (2) JICA will prepare the draft final report in English and dispatch a mission to explain its contents around January, 1994.

- (3) In case that the contents of the report is accepted in principle by the Grenada side, JICA will complete the final report and send it to the Government of Grenada by March, 1994.

7. The plans for operation, management, financing and proper use of facilities

- (1) Any facilities constructed under grant aid for Grenada by the Government of Japan including those through the former project, are to be the property of the Government of Grenada and these facilities should not be given as a security under any circumstances. In the case that these facilities are designated as assets of the Grenada Commercial Fisheries Limited(GCFL), the capital structure of the GCFL is to be composed of 100% government shares.
- (2) Ministry of Agriculture, Trade, Industry, Energy and Production is to be designated as an executing agency for the Project with GCFL as the operating organization.

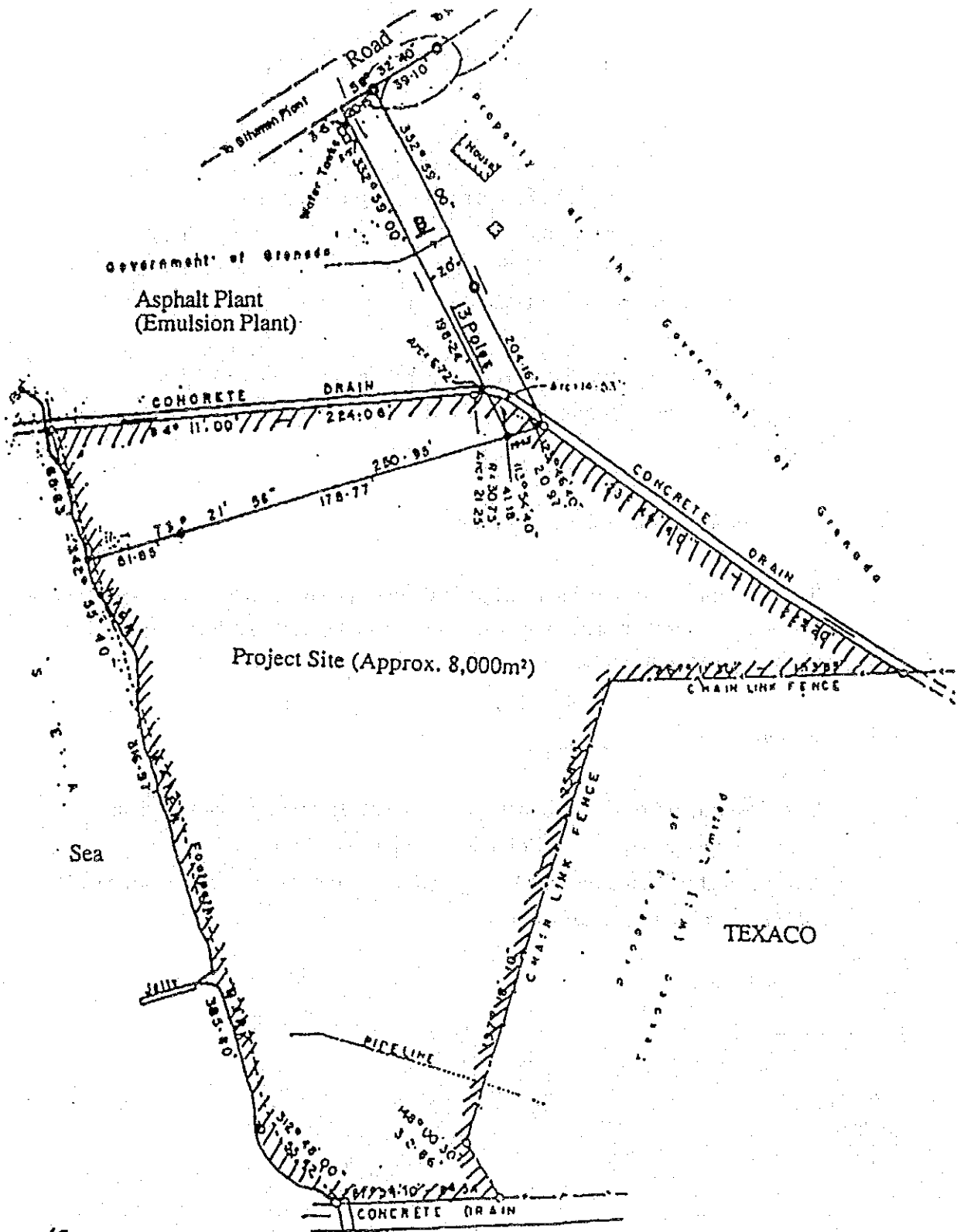
8. The reconfirmation of the project site

The Government of Grenada will provide the movement plan of the asphalt plant bounding the project site, to the Government of Japan through the diplomatic channel by March, 1994.

9. Report

The Government of Grenada will make an annual report about the project including the activities of GCFL and submit the report annually to the Government of Japan through the diplomatic channel after the exchange of Note between the both governments.

Annex I. Project site (Grand Mal)



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Annex II

Item Requested by The Government of Grenada. (in order of priority)

Artisanal fisheries complex in Grand Mal

1) Fish preservation and processing facilities

Ice making plant, Ice storage, Cold storage, Chilled storage, Processing quarter and equipment, Air blast freezer, Quality control laboratory, Stand-by generator

2) Fish landing facilities

Jetty

3) Fisheries extension and supporting facilities

Administration and management office, Conference room, Storage for spare parts and packing materials, Maintenance workshop, washroom and lockers

4) Utilities

Electricity, water, sewage and supply

5) Supporting equipment

1. Fish handling equipment

2. Equipment for fish preservation, processing and distribution, etc.

3. Maintenance tools

4. Vehicle

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Annex III

Necessary measures to be taken by the Government of Grenada in case Japan's Grant Aid is executed.

1. To secure the ownership and/or right of sites for the Project.
2. To clear and level the site prior to commencement of the Project.
3. To ensure that the sea area necessary for the construction of the facilities be freely accessible.
4. To secure yard for stocking material and constructing temporary facilities at the Project site.
5. To remove the asphalt plant and construct the access road to the Project site.
6. To provide necessary permissions, licenses and other authorizations for smooth implementation of the Project.
7. To provide facilities for distribution of electricity, water supply, drainage, telephone line and other incidental facilities.
8. To bear commissions to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement.
9. To exempt taxes and to take necessary measures for custom clearance of the materials and equipment brought for the project at the port of disembarkation.
10. To accord Japanese Nationals whose services may be required in connection with the supply of products and the services under the verified contract such facilities as may be necessary for their entry into Grenada and stay therein for the performance of their work.
11. To maintain and use properly and effectively the facilities constructed and equipment purchased under the Grant.
12. To bear all the expenses other than those to be borne by the Grant, necessary for construction of facilities as well as for the transportation and the installation of the equipment.
13. To coordinate and solve any matters which may arise with third party and inhabitants living in the Project area during implementation of the Project.

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MINUTES OF DISCUSSIONS
BASIC DESIGN STUDY
ON
THE ST. GEORGE'S ARTISANAL FISHERIES COMPLEX PROJECT
IN GRENADA

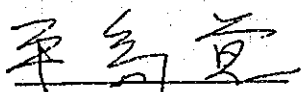
Regarding the request from the Government of Grenada, the basic design study team on the St. George's Artisanal Fisheries Complex Project (hereinafter referred to as "the Project"), held discussions with the pertinent officials of the Government of Grenada.

In the course of discussions and field survey, both parties have confirmed the following items in addition to MINUTES OF DISCUSSIONS signed September 30th, 1993, in case Japan's Grant Aid is executed.

Item :

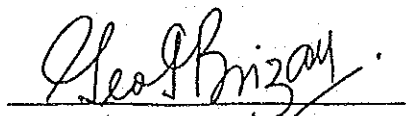
1. The Government of Grenada and Port Authority will ensure that the related sea area necessary for the construction and operation of the Project be freely accessible.
2. The Government of Grenada will take care of the necessary facilities and conditions to ensure the safety around the related sea area of the Project.

St. George's, 14 October, 1993



Mr. Satoru Hirashima

Member
Basic Design Study Team
JICA



Mr. Honourable George I. Brizan

Minister of Agriculture, Trade, Industry,
Energy and Production

MINUTES OF DISCUSSIONS

BASIC DESIGN STUDY

ON

THE ST. GEORGE'S ARTISANAL FISHERIES COMPLEX PROJECT

IN GRENADA

(CONSULTATION ON DRAFT REPORT)

In September 1993, the Japan International Cooperation Agency (JICA) dispatched a basic design study team on the St. George's Artisanal Fisheries Complex Project (hereinafter referred to as "the Project") to Grenada and through discussions, field survey, and technical examination of the results in Japan, has prepared the draft report of the study.

In order to explain and to consult Grenada on the components of the draft report, JICA sent to Grenada a study team, which is headed by Yoshio Ishiyama, Associate Specialist on Fisheries, Second Basic Design Study Division, Grant Aid Study & Design Department, JICA, and is schedule to stay in the country from 25 January to 1 February, 1994.

As a result of discussions, both parties confirmed the main items described on the attached sheets.

St. George's, 31 January, 1994.

石山 由夫

.....
Mr. Yoshio Ishiyama
Leader
Basic Design Study Team
JICA

George I. Brizan

.....
Hon. George I. Brizan
Minister of Agriculture, Trade,
Industry, Energy and Production.

ATTACHMENT

1. Components of draft report

The Government of Grenada has agreed and accepted in principle the components of the draft report proposed by the team.

2. Japan's Grant Aid System

1. The Government of Grenada has understood the system of the Japanese Grant Aid explained by the Team.

2. The Government of Grenada reconfirmed the measures to be taken by the Grenada side for the realization of the Project as agreed upon in the Minutes of Discussions dated 30 September, 1993.

3. Further schedule

The team will make the final report in accordance with the confirmed items, and send it to the Government of Grenada by around April, 1994.

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Appendix - 5: Date related to Fishery

Annual haul per type of fish

Local name	Unit: Pound												
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Pelagic fish													
Great barracuda	40,362	23,760	34,491	48,279	48,342	54,208	43,783	67,673	94,451	74,424	55,829	47,536	83,589
Common dolphin fish	68,278	48,533	100,069	209,883	66,504	80,930	149,450	102,085	157,127	119,585	302,538	340,802	346,889
Spanish mackerel	1,666	1,894	597	2,849	649	3,992	17,322	989	448	1,386	4,235	347	284
Moon fish	0	0	0	0	214	288	1,496	100	781	175	452	284	149
Southern snonnet	0	0	0	0	2,198	970	322	1,300	0	1,024	413	457	0
Wahoo	47,170	40,100	69,475	154,649	73,490	57,285	85,591	119,121	172,506	72,072	68,220	96,299	131,016
Yellow fin tuna	929,728	110,047	98,322	280,760	213,397	190,183	524,871	469,229	474,670	518,158	667,730	781,349	749,536
Atlantic sailfish	57,708	61,924	45,455	61,649	96,684	183,559	218,971	229,248	250,283	245,665	274,369	367,605	300,541
Black fin tuna	137,730	144,162	238,086	166,952	341,149	217,018	265,659	369,680	276,553	169,125	369,191	245,401	183,911
Skipjack tuna	16,266	2,125	1,817	24,544	18,233	8,465	9,735	10,568	48,269	25,363	28,543	31,514	37,888
Blue merlin	1,888	1,132	20,750	9,135	12,122	12,299	37,245	50,932	46,266	50,437	65,979	80,476	65,249
Rainbow runner	0	0	0	0	9,958	33,653	39,856	72,466	33,087	28,343	66,532	31,897	24,469
Keeltail needle fish	10,029	15,223	13,199	58,305	8,675	5,681	3,353	4,914	5,369	6,046	4,597	2,277	3,042
Round scad	25,720	47,535	198,657	205,123	196,816	239,094	185,358	171,666	245,469	261,931	150,920	138,157	226,214
Bigsye scad	720,984	245,774	128,105	316,248	882,973	127,416	250,791	508,667	437,288	187,570	644,089	514,579	714,149
Ballyhoo halfbeak	5,905	37,580	32,645	6,123	14,833	11,235	11,358	9,364	3,938	12,618	17,323	18,221	11,484
Common snook	0	0	0	0	1,433	600	14	6,921	8,642	0	504	1,300	1,719
Flying fish	325,290	108,283	133,236	133,044	230,689	114,273	74,009	123,538	76,255	18,814	25,398	62,316	163,669
Faise herrings	852	5,136	13,094	6,092	50,314	7,695	1,225	2,196	8,269	1,943	3,701	1,531	0
Atlantic thread herring	2,590	614	1,715	250,191	1,488	613	700	490	283	4,284	7,056	1,050	592
Brazilian sardine	0	0	0	0	57,645	2,713	37,546	166,149	700	21,621	54,282	64,617	9,121
Jack	53,039	50,414	71,582	42,966	34,524	35,589	26,905	36,134	45,616	22,923	19,107	15,316	17,210
Sword fish	0	0	0	0	0	0	0	0	122,371	11,289	1,178	2,522	3,920
Bigsye tuna	0	0	0	0	0	0	0	0	0	0	0	81,624	31,462
Shark	13,503	21,572	18,452	32,286	19,217	22,395	30,091	37,174	39,053	19,588	17,029	17,042	16,107
Porpoise	0	0	0	0	611	2,741	1,122	1,955	504	928	172	0	0
Subtotal for pelagic fish	2,458,708	965,838	1,219,747	2,068,878	2,351,288	1,412,895	2,016,773	2,442,649	2,547,188	1,845,492	2,849,507	2,974,579	3,212,210

Unit: Pound

Local name	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Bottom fish													
Grouper	3,203	7,327	9,406	46,435	15,475	18,317	9,557	25,610	49,574	18,195	17,542	19,954	9,424
Snapper	37,636	45,351	42,254	70,810	73,690	61,961	53,260	100,482	99,461	58,997	79,637	70,210	71,124
Squirrel fish	0	0	0	2,161	2,545	4,016	5,339	9,097	21,656	3,747	2,555	2,851	1,150
Parrot fish	0	0	0	6,636	60	116	0	1,692	1,465	726	285	6,468	1,346
Sandtile fish	0	0	0	2,468	3,239	835	518	7,751	12,709	4,550	4,158	5,892	4,046
Grunt	0	0	0	0	329	802	1,017	18	326	1,036	2,238	1,771	4,302
Goat fish	0	0	0	0	530	221	0	0	0	0	0	0	0
Red hind	36,388	38,040	78,043	142,965	165,401	198,819	268,235	286,686	278,315	88,092	178,269	185,512	98,278
Queen trigger fish	0	0	0	0	338	26	0	1,874	7,847	254	1,393	546	214
Doctor fish	0	0	0	611	0	404	922	2,368	3,996	2,098	0	0	357
Concy	3,505	5,681	3,010	22,139	3,549	6,823	3,085	15,318	25,092	13,559	13,984	11,456	12,362
Subtotal for bottom fish	80,732	156,399	132,713	294,225	265,146	292,340	341,993	447,895	500,411	191,254	300,121	304,660	202,603
Crustaceans and mollusks													
Conch	7,350	25,316	43,517	6,339	32,477	4,366	15,181	56,317	69,394	53,676	16,590	33,458	591
Lobster	5,180	15,768	8,517	9,643	2,583	3,301	2,417	14,190	15,764	29,899	4,538	21,180	49,156
Turtle	7,936	7,467	4,513	998	6,424	11,674	9,674	18,076	14,551	12,045	9,030	17,598	23,667
Sea urchin	0	0	0	0	0	0	0	0	2,518	0	0	10,224	1,428
Squid	0	0	0	0	0	0	0	0	0	2,275	0	0	0
Subtotal	20,466	48,551	56,547	16,980	41,484	19,341	27,272	88,583	102,217	97,895	30,158	82,460	74,752
Others	220,137	264,383	510,932	566,738	855,713	1,443,251	2,269,650	1,900,902	1,258,161	1,634,440	752,149	1,026,659	1,040,166
Total	2,780,043	1,435,171	1,919,939	2,946,821	3,513,601	3,167,827	4,655,628	4,880,030	4,407,977	3,769,081	3,931,935	4,388,358	4,529,671
In kg	1,261,005	650,982	870,869	1,336,654	1,593,741	1,436,901	2,111,756	2,213,543	1,969,423	1,769,625	1,783,494	1,990,524	2,054,623

Annual haul per type of fish

Unit: EC \$

Local name	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Pelagic fish													
Great barracuda	96,869	57,024	82,778	115,870	116,021	130,099	105,079	162,415	259,740	204,666	153,530	130,862	229,870
Common dolphin fish	163,867	116,551	240,165	503,239	159,610	194,376	358,680	245,004	432,099	328,859	831,990	937,206	953,945
Spanish mackerel	3,998	4,546	1,433	6,838	1,558	9,581	41,573	2,374	1,232	3,812	11,811	954	781
Moon fish	0	0	0	0	514	643	3,590	240	1,953	438	1,243	735	410
Southern sennet	0	0	0	0	5,275	2,328	773	3,336	0	3,311	1,136	1,257	0
Yahoo	113,208	96,240	166,740	371,158	176,376	137,436	205,418	285,890	474,392	198,198	187,605	264,822	360,294
Yellow fin tuna	1,998,915	236,601	211,392	603,634	458,804	408,893	1,128,473	879,842	1,305,343	1,424,935	1,836,258	2,148,710	2,061,224
Atlantic sailfish	124,074	133,137	97,728	132,545	207,871	394,652	470,788	492,883	625,708	539,163	685,923	994,013	976,353
Black fin tuna	281,070	309,948	511,885	358,947	733,471	466,589	571,167	665,812	760,518	465,094	1,015,275	674,853	459,778
Skipjack tuna	34,972	4,569	3,907	52,770	39,201	16,200	20,930	22,721	120,673	63,408	71,358	78,785	94,720
Blue marlin	4,059	2,434	44,613	19,640	26,063	26,443	80,077	109,504	113,165	126,093	164,948	201,190	163,123
Rainbow runner	0	0	0	0	19,475	72,354	85,090	155,302	82,718	70,858	166,330	79,743	61,173
Keeltail needle fish	24,502	32,729	28,378	125,356	18,651	12,214	7,209	10,561	13,423	15,115	11,493	5,693	7,605
Round scad	30,864	57,042	238,398	318,147	236,179	286,913	222,430	205,992	466,391	392,897	226,390	207,236	339,321
Bigeye scad	865,181	294,929	153,726	379,498	423,568	152,899	300,949	610,400	830,847	281,355	966,134	771,869	1,071,224
Ballyho halfbeak	5,905	37,580	32,645	6,123	14,833	11,235	11,358	9,394	3,938	12,618	17,323	18,221	11,484
Common snook	0	0	0	0	1,433	600	14	6,921	17,284	0	1,008	2,600	3,438
Flying fish	325,290	108,283	133,236	133,044	230,689	114,273	74,009	123,538	76,255	18,814	25,398	62,316	163,699
Faise herring	426	2,568	6,547	3,046	25,157	3,848	613	1,098	6,202	1,457	2,821	1,148	0
Atlantic thread herring	1,295	307	858	125,095	744	307	350	245	197	3,213	5,292	788	444
Brazilian sardine	0	0	0	0	28,823	1,357	18,773	83,075	525	16,216	40,712	48,463	6,841
Jack	127,294	120,994	171,797	103,118	82,858	85,366	64,572	86,722	125,444	57,308	52,544	38,290	43,025
Sword fish	0	0	0	0	0	0	0	0	336,520	56,445	3,240	6,938	15,680
Bigeye tuna	0	0	0	0	0	0	0	0	0	0	0	224,466	78,655
Shark	13,603	21,572	16,452	32,286	19,217	22,395	30,091	37,174	58,580	24,485	21,286	21,303	24,161
Porpoise	0	0	0	0	1,314	5,893	2,412	4,203	1,008	1,392	344	0	0
Subtotal for pelagic fish	4,212,350	1,637,054	2,144,669	3,390,365	3,027,705	2,558,894	3,805,018	4,205,116	6,114,185	4,310,150	6,501,372	6,922,459	7,127,248

Unit: Pound

Local name	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Bottom fish													
Grouper	7,687	17,585	22,574	111,444	37,140	43,961	22,937	61,464	136,329	50,036	48,241	54,874	25,916
Snapper	90,326	108,842	101,410	169,944	176,832	148,706	127,824	241,157	273,518	162,242	219,002	193,078	195,591
Squirrel fish	0	0	0	4,646	5,472	8,634	11,479	19,559	54,140	9,368	6,388	7,128	2,875
Parrot fish	0	0	0	14,267	129	249	0	3,638	3,662	1,816	784	16,170	3,365
Sandtile fish	0	0	0	5,305	6,964	1,795	1,114	16,665	31,773	11,375	10,395	14,730	10,115
Grunt	0	0	0	0	707	1,724	2,187	39	815	2,590	5,745	4,428	10,755
Goat fish	0	0	0	0	1,140	475	0	0	0	0	0	0	0
Red hind	78,234	210,786	162,792	307,375	355,612	427,461	576,705	609,925	695,788	220,230	445,673	463,780	245,695
Queen trigger fish	0	0	0	0	338	26	0	1,874	15,694	381	2,786	1,062	428
Doctor fish	0	0	0	611	0	404	922	2,368	7,932	5,245	0	0	714
Coney	7,536	12,214	6,472	47,599	7,630	14,669	6,633	32,934	62,730	33,898	34,960	28,940	30,905
Subtotal for bottom fish	183,783	349,427	233,248	661,192	591,964	648,104	749,801	989,623	1,282,381	497,181	773,974	783,920	526,359
Crustaceans and mollusks													
Conch	25,725	88,606	152,310	22,187	113,670	15,281	53,134	197,110	312,228	214,304	74,655	150,561	2,255
Lobster	41,440	126,144	68,136	77,144	20,664	26,408	19,336	119,280	141,876	269,091	40,842	190,620	442,404
Turtle	23,808	22,401	13,539	2,994	19,272	35,022	29,022	54,228	58,204	36,135	27,090	52,794	71,001
Sea urchin	0	0	0	0	0	0	0	0	12,590	0	0	51,120	7,140
Squid	0	0	0	0	0	0	0	0	0	4,550	0	0	0
Subtotal	90,973	237,151	233,985	102,325	153,606	76,711	101,492	370,618	524,898	524,080	142,587	445,095	522,800
Others	440,274	528,766	1,021,864	1,133,476	2,139,283	3,608,128	5,674,125	4,752,225	3,145,403	4,086,100	2,068,410	2,823,312	2,860,292
Total	4,927,380	2,752,398	3,693,766	5,287,348	5,912,558	6,891,837	10,330,436	10,317,582	11,065,867	9,417,511	9,485,343	10,974,786	11,036,699

Monthly haul in quantity and price caught by the seven ships built using Japanese Grand Aid Assistance (by location)

Year /month	BACAVE BAY		CONFERENCE BAY		DUQUESNE BAY		FLAMINGO BAY		GRAND BAY		IRVINGS BAY		MILLET BAY		TOTAL	
	Quantity (lb)	Price (ESS)	Quantity (lb)	Price (ESS)	Quantity (lb)	Price (ESS)	Quantity (lb)	Price (ESS)	Quantity (lb)	Price (ESS)	Quantity (lb)	Price (ESS)	Quantity (lb)	Price (ESS)	Quantity (lb)	Price (ESS)
1992 4	492	1,619	387	1,074	3,419	10,271	513	1,572	-	-	2,614	7,210	3,588	10,499	11,023	32,244
5	5,375	13,781	938	2,791	2,013	5,514	3,153	7,149	769	1,212	1,218	3,477	1,325	3,603	14,791	37,526
6	237	465	243	549	764	2,121	273	528	166	505	-	-	357	800	2,040	5,000
7	194	533	245	674	479	1,301	-	-	-	-	826	2,272	218	545	1,992	5,325
8	1,333	4,275	1,252	4,123	1,244	3,804	1,000	4,974	946	2,939	1,246	2,900	-	-	7,021	23,105
9	2,070	6,790	208	624	577	1,640	2,070	6,041	108	351	1,371	4,049	114	437	6,518	19,932
10	3,440	9,665	1,650	4,278	988	3,014	2,733	6,783	2,300	8,037	1,450	3,747	1,131	3,228	13,792	38,752
11	1,691	4,169	1,758	4,630	830	2,371	1,523	4,182	-	-	1,014	2,555	1,902	5,469	8,718	23,376
12	1,933	5,641	2,334	5,445	285	727	237	527	-	-	713	1,285	1,386	3,641	6,888	17,266
1993 1	1,115	2,586	1,175	2,971	1,054	3,256	1,004	1,906	-	-	1,252	3,683	1,246	2,832	7,119	17,325
2	285	582	765	2,068	908	2,754	1,179	3,227	-	-	957	3,000	2,186	4,833	6,238	16,464
3	2,634	7,361	1,939	6,053	-	-	1,672	5,520	48	144	1,549	5,634	1,900	5,958	9,802	30,670
Total	20,799	57,498	12,954	35,280	12,571	36,773	15,375	42,459	4,397	13,218	14,483	39,872	15,423	41,845	95,972	266,985

Monthly haul in quantity and price caught by the seven ships built using Japanese Grand Aid Assistance (by fish species)

Unit: lb for quantity and ESS for price

Year/month	SWORD FISH		Y. F. TUNA		O. GAR		KING FISH		DOLPHIN		SHARK		B. MARLIN		B. F. TUNA		OTHER		TOTAL	
	Quantity	Price	Quantity	Price	Quantity	Price	Quantity	Price	Quantity	Price	Quantity	Price	Quantity	Price	Quantity	Price	Quantity	Price	Quantity	Price
1992 4	119	734	9,049	27,510	1,123	2,041	103	283	385	1,058	-	-	247	518	-	-	-	-	11,023	32,244
5	-	-	10,541	30,076	1,764	2,645	278	765	772	2,118	1,111	1,111	305	762	20	50	-	-	14,791	37,527
6	7	42	1,113	3,104	598	1,011	50	137	66	181	-	-	171	428	35	96	-	-	2,040	5,000
7	-	-	328	902	282	705	-	-	-	-	-	-	-	-	-	-	1,352	3,718	1,992	5,325
8	1,289	6,929	4,288	13,310	147	327	68	187	-	-	500	500	671	1,677	58	174	-	-	7,021	23,105
9	869	3,846	4,047	12,620	172	395	117	335	-	-	500	500	813	2,236	-	-	-	-	6,518	19,932
10	940	4,107	7,773	23,645	1,851	3,272	33	91	163	448	370	437	2,376	5,967	21	58	265	727	13,792	38,752
11	667	3,033	4,049	12,172	1,606	2,810	-	-	58	160	681	852	828	2,070	640	1,760	189	520	8,718	23,376
12	758	3,025	2,598	8,618	645	918	69	190	108	297	1,253	1,253	1,320	2,690	15	30	122	244	6,888	17,266
1993 1	479	1,819	3,731	11,332	1,574	1,972	44	121	335	1,004	386	386	196	435	-	-	349	256	7,119	17,325
2	407	1,832	2,991	9,768	651	826	126	346	300	825	1,074	1,100	614	1,517	-	-	125	250	6,238	16,463
3	942	4,239	6,597	23,102	736	920	65	179	266	731	1,065	1,153	55	137	-	-	76	209	9,802	30,670
Total	6,472	29,607	57,102	176,159	11,159	17,842	953	2,634	2,483	6,822	6,940	7,291	7,595	18,537	789	2,168	2,478	5,924	95,972	266,985

Breakdown of annual exports per type of fish

Type of fish	1988		1989		1990		1991		1992	
	Quantity (lb)	Price (ES\$)	Quantity (lb)	Price (ES\$)	Quantity (lb)	Price (ES\$)	Quantity (lb)	Price (ES\$)	Quantity (lb)	Price (ES\$)
Sword fish	69,926	1,258,668	38,313	613,008	994	3,946	1,058	8,362	2,850	21,142
Yellow fin tuna	46,692	322,175	75,792	454,752	96,133	447,018	189,395	895,645	215,394	1,261,860
Shark	1,629	4,349	85	88	0	0	2,405	6,346	644	2,304
Sail fish	8,006	24,018	24,561	98,244	16,921	59,562	53,419	154,520	2,234	4,750
Lobster	3,744	44,928	15,558	186,696	4,426	64,620	8,689	129,435	20,245	258,952
Snappers	1,409	8,454	6,230	37,377	5,674	29,505	3,627	18,628	5,553	29,222
Red hind	4,469	26,814	60	360	13,839	53,142	17,035	88,115	7,187	41,227
Sea urchin	1,439	11,512	0	0	0	0	7,382	59,056	816	8,160
Conch	37,488	299,904	26,634	213,072	16,590	97,881	19,119	152,785	214	1,518
Dolphin fish	111	666	783	4,698	17,539	37,533	19,529	75,594	29,559	99,619
Rainbow runner	-	-	5	30	3,171	12,684	0	0	0	0
Flying fish	-	-	395	1,185	0	0	0	0	116	900
Wahoo	-	-	700	4,200	72	288	828	4,952	3,502	17,095
Coney	-	-	-	-	86	330	200	1,200	0	0
Cavally	-	-	-	-	331	1,324	0	0	0	0
Groupers	-	-	-	-	219	1,329	1,871	9,857	1,531	7,609
Blue marlin	-	-	-	-	3,406	10,865	6,559	17,247	2,002	7,663
Spanish mackerel	-	-	-	-	19	76	0	0	0	0
Big eye scad	-	-	-	-	18,520	109,268	0	0	0	0
Barracuda	-	-	-	-	-	-	367	2,142	0	0
Squirrel fish	-	-	-	-	-	-	13	78	0	0
Parrot fish	-	-	-	-	-	-	31	186	0	0
Unclassifieds	702,484	3,512,420	791,313	3,956,565	730,424	3,652,120	571,995	3,362,869	579,131	3,474,788
Total	877,397	5,513,998	980,429	5,570,275	928,364	4,581,491	903,412	4,987,017	870,978	5,236,808

Annual exports

Fiscal year	Exports (lb)	Export price (ES\$)
1984	471,100	2,355,500
1985	797,060	3,985,300
1986	1,278,730	6,393,650
1987	1,062,960	5,314,800
1988	877,397	5,513,908
1989	980,429	5,570,275
1990	928,364	4,581,491
1991	903,412	4,987,017
1992	870,978	5,236,808

Exports and domestic consumption of catch by the seven ships
built using Japanese Grand Aid Assistance

Unit: lb for quantity and ES\$ for price

Type of fish	Category	1992										1993			Total
		Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.		
SWORD FISH	Do.	Qty	-	-	7	-	-	93	-	48	12	153	-	-	313
		Price	-	-	42	-	-	372	-	144	42	536	-	-	1,136
	Ex.	Qty	119	-	-	-	1,289	776	949	619	746	321	407	942	6,159
		Price	734	-	-	-	6,929	3,474	4,107	2,889	2,984	1,284	1,831	4,239	28,471
Y.F. TUNA	Do.	Qty	3,598	4,020	666	328	-	234	2,183	1,975	351	1,391	842	568	16,156
		Price	9,745	10,208	1,763	902	-	685	6,003	5,431	754	3,142	2,105	1,420	42,158
	Ex.	Qty	5,448	6,521	447	-	4,288	3,813	5,590	2,074	2,247	2,340	2,149	6,029	40,946
		Price	17,766	19,868	1,341	-	13,310	11,936	17,642	6,741	7,864	8,190	7,662	21,682	134,002
O.GAR	Do.	Qty	1,123	1,764	598	282	147	172	1,851	1,606	645	1,574	661	736	11,159
		Price	2,041	2,645	1,011	705	327	395	3,272	2,810	918	1,972	826	920	17,842
	Ex.	Qty	-	-	-	-	-	-	-	-	-	-	-	-	-
		Price	-	-	-	-	-	-	-	-	-	-	-	-	-
KING FISH	Do.	Qty	72	181	50	-	68	85	33	-	12	-	75	43	619
		Price	198	498	138	-	187	255	91	-	33	-	206	118	1,724
	Ex.	Qty	31	97	-	-	-	32	-	-	57	44	51	22	334
		Price	85	267	-	-	-	80	-	-	157	121	140	61	911
DOLPHIN	Do.	Qty	252	503	66	-	-	-	98	31	63	245	198	156	1,612
		Price	693	1,378	182	-	-	-	270	85	173	674	544	429	4,428
	Ex.	Qty	133	269	-	-	-	-	65	27	45	120	102	110	871
		Price	365	740	-	-	-	-	179	74	124	330	281	392	2,395
SHARK	Do.	Qty	-	1,111	-	-	500	500	370	681	1,253	386	1,074	1,065	6,940
		Price	-	1,111	-	-	500	500	437	851	1,253	386	1,101	1,153	7,291
	Ex.	Qty	-	-	-	-	-	-	-	-	-	-	-	-	-
		Price	-	-	-	-	-	-	-	-	-	-	-	-	-
B. MARLIN	Do.	Qty	247	305	171	-	671	813	2,376	828	1,320	196	614	55	7,596
		Price	618	763	427	-	1,678	2,236	5,967	2,070	2,690	435	1,517	137	18,537
	Ex.	Qty	-	-	-	-	-	-	-	-	-	-	-	-	-
		Price	-	-	-	-	-	-	-	-	-	-	-	-	-
B.F. TUNA	Do.	Qty	-	20	35	-	58	-	21	640	15	-	-	-	789
		Price	-	50	96	-	174	-	53	1,760	30	-	-	-	2,168
	Ex.	Qty	-	-	-	-	-	-	-	-	-	-	-	-	-
		Price	-	-	-	-	-	-	-	-	-	-	-	-	-
OTHER	Do.	Qty	-	-	-	1,352	-	-	265	189	122	349	125	76	2,478
		Price	-	-	-	3,718	-	-	728	520	244	256	250	209	5,924
	Ex.	Qty	-	-	-	-	-	-	-	-	-	-	-	-	-
		Price	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	Do.	Qty	5,292	7,904	1,593	1,962	1,444	1,897	7,197	5,998	3,793	4,294	3,589	2,699	47,662
		Price	13,294	16,652	3,659	5,325	2,866	4,443	16,824	13,672	6,137	7,400	6,549	4,387	101,207
	Ex.	Qty	5,731	6,887	447	-	5,577	4,621	6,595	2,720	3,095	2,825	2,709	7,103	48,310
		Price	18,950	20,875	1,341	-	20,239	15,489	21,928	9,704	11,129	9,925	9,915	26,284	165,778
Grand total	Qty	11,023	14,791	2,040	1,962	7,021	6,518	13,792	8,718	6,888	7,119	6,298	9,802	95,972	
	Price	32,244	37,527	5,000	5,325	23,105	19,932	38,752	23,376	17,266	17,325	16,464	30,670	266,985	

Do. : Domestic
Ex. : Export

Appendix - 6: Investigation Result on Natural Conditions

6-1 Cyclone list

TROPICAL CYCLONES (1886 - 1989) PASSING WITHIN 75 N. MI. OF GRENADA

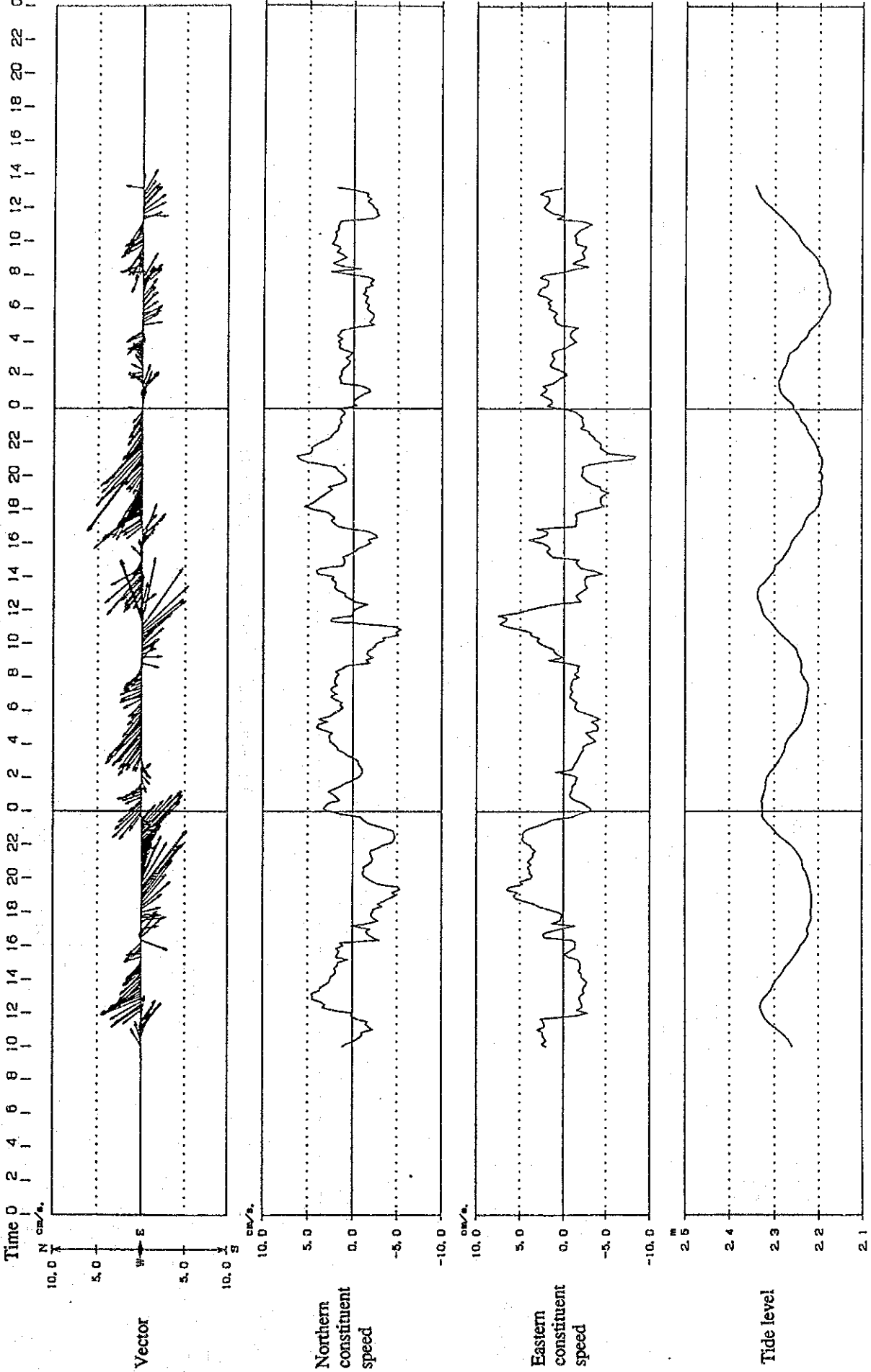
STORM INDEX NUMBER	STORM NAME	YEAR	MONTH	DAY (GMT)	STORM NUMBER FOR YEAR	MAXIMUM WIND (KTS) NEAR STORM CNTR AT CLOSEST PT. OF APPROACH	CLOSEST POINT OF APPROACH (CPA) N. MI.	STORM HEADING (DESS) AT CPA	STORM FORWARD SPEED AT CPA(KTS)
1	NOT NAMED	1886	AUG	12	5	67	6	292	15.9
2	NOT NAMED	1886	AUG	16	6	55	7	275	11.8
3	NOT NAMED	1887	JUL	20	2	53	20	279	26.7
4	NOT NAMED	1887	AUG	2	3	45	70	296	9.7
5	NOT NAMED	1887	DEC	8	17	40	60	279	9.9
6	NOT NAMED	1888	NOV	1	8	35	71	318	14.7
7	NOT NAMED	1891	OCT	12	10	35	34	328	13.0
8	NOT NAMED	1892	OCT	6	7	68	60	270	10.8
9	NOT NAMED	1895	OCT	15	5	100	54	278	13.8
10	NOT NAMED	1897	OCT	9	4	40	18	275	8.9
11	NOT NAMED	1898	OCT	3	8	50	60	285	11.1
12	NOT NAMED	1901	JUL	2	2	35	55	270	16.6
13	NOT NAMED	1909	JUL	13	3	35	12	271	14.7
14	NOT NAMED	1909	JUL	29	4	35	48	289	9.3
15	NOT NAMED	1910	AUG	20	1	35	36	282	12.5
16	NOT NAMED	1916	OCT	7	12	35	67	300	7.9
17	NOT NAMED	1918	AUG	1	1	35	34	271	9.8
18	NOT NAMED	1918	AUG	22	2	64	23	279	11.9
19	NOT NAMED	1921	SEP	9	3	70	70	305	14.9
20	NOT NAMED	1928	AUG	3	1	35	9	306	17.0
21	NOT NAMED	1928	AUG	7	2	35	64	303	9.3
22	NOT NAMED	1931	SEP	6	5	35	38	273	17.6
23	NOT NAMED	1933	AUG	12	6	35	41	292	27.4
24	NOT NAMED	1933	AUG	17	7	35	6	287	12.3
25	NOT NAMED	1933	SEP	17	15	40	27	285	11.1
26	NOT NAMED	1938	AUG	10	2	43	14	285	23.3
27	NOT NAMED	1944	JUL	24	2	47	22	285	21.1
28	NOT NAMED	1944	AUG	17	4	53	58	283	14.0
29	HAZEL	1954	OCT	5	9	73	45	276	9.8
30	JANET	1955	SEP	23	10	98	16	281	10.9
31	ANNA	1961	JUL	20	1	43	26	277	21.7
32	FLORA	1963	SEP	30	7	109	34	287	13.4
33	GERTRUDE	1974	OCT	2	10	34	31	276	8.8
34	CORA	1978	AUG	11	4	40	11	270	18.6
35	DANIELLE	1986	SEP	8	4	50	31	285	18.3
36	EMILY	1987	SEP	21	6	45	64	291	17.8
37	JOAN	1988	OCT	15	11	45	1	272	12.7

CHART 1

6-2 Investigation result on tidal current and tide

Country : GRENADA Measurement point : Grenada observation layer : -1.4

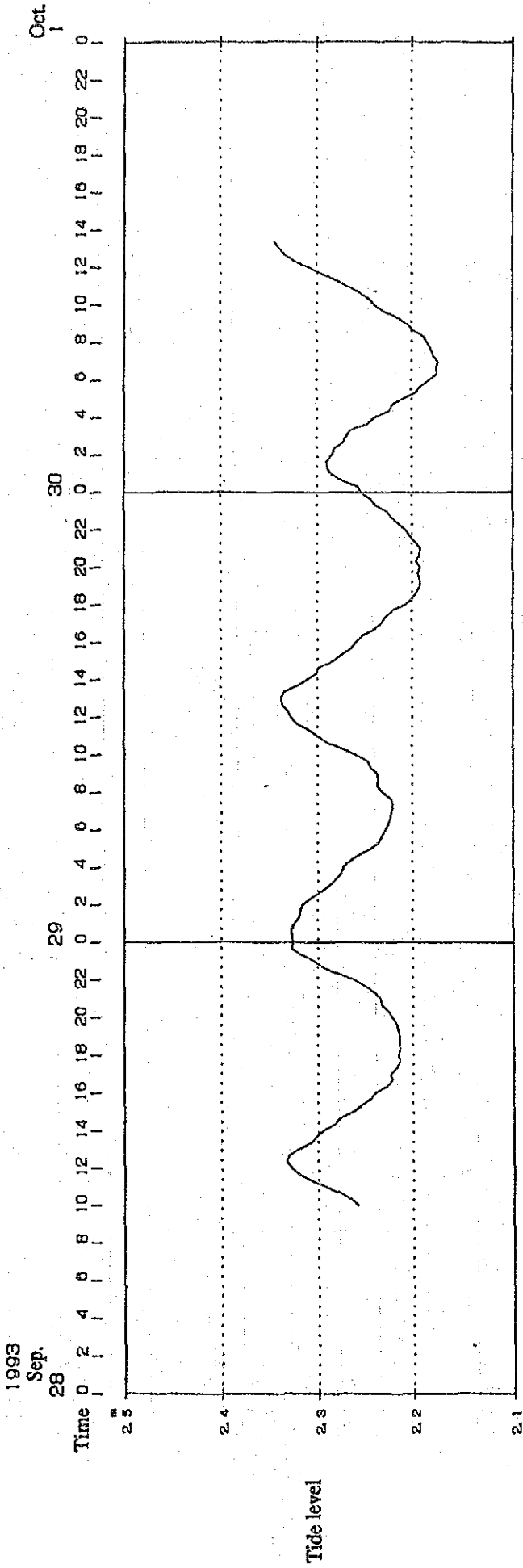
1993
Sep. 28 0 2 4 6 8 10 12 14 16 18 20 22 0 2 4 6 8 10 12 14 16 18 20 22 0 2 4 6 8 10 12 14 16 18 20 22 0 2 4 6 8 10 12 14 16 18 20 22 0



Time-based changes in observation data

Country : GRENADA

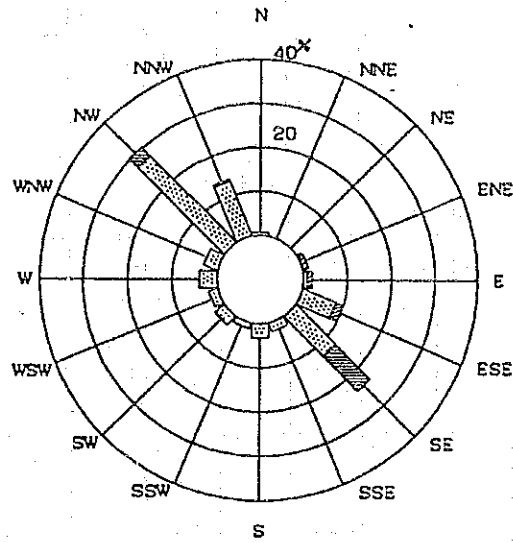
Measurement point : Grenada observation layer : -2.6



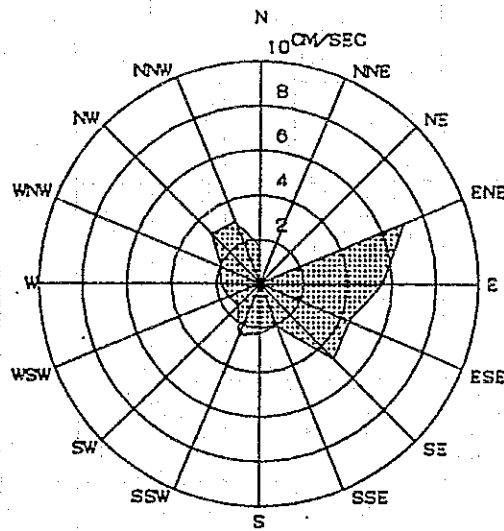
Time-based changes in observation data

ST. GRANDMAL -1.4M
 Sep. 28-29, 1993

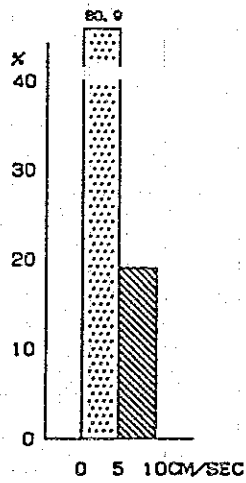
Current direction
 frequency diagram



Average current velocity
 occurrence diagram



Frequency diagram
 per current velocity



Current situation diagram

GRENADA

Frequency of current direction and velocity occurrence

Sea area : GRENADA
 Measurement point : GRANDMAL
 Observation layer : -1.4m
 Observation date : Sep. 28-29, 1993

Unit: Time (%)

Current direction Current velocity, cm/sec.	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0.0																	
0.1 ~ 5.0	1 (0.7)				1 (0.7)	12 (7.9)	19 (12.5)	3 (2.0)	5 (3.3)	2 (1.3)	4 (2.6)	3 (2.0)	6 (3.9)	5 (3.3)	42 (27.6)	20 (13.2)	123 (80.9)
5.1 ~ 10.0				2 (1.3)	2 (1.3)	3 (2.0)	17 (11.2)								4 (2.6)	1 (0.7)	29 (19.1)
10.1 ~ 15.0																	
15.1 ~ 20.0																	
20.1 ~ 25.0																	
25.1 ~ 30.0																	
30.1 ~ 35.0																	
35.1 ~ 40.0																	
40.1 ~ 45.0																	
45.1 ~ 50.0																	
50.1 Over																	
Total	1 (0.7)			2 (1.3)	3 (2.0)	15 (9.9)	36 (23.7)	3 (2.0)	5 (3.3)	2 (1.3)	4 (2.6)	3 (2.0)	6 (3.9)	5 (3.3)	46 (30.3)	21 (13.8)	152 (100.0)
Average current velocity	1.7			7.1	5.6	4.4	4.8	2.1	2.3	2.5	1.4	1.6	1.8	2.0	3.1	3.0	3.5

Analysis table of 24-hour harmonic tide

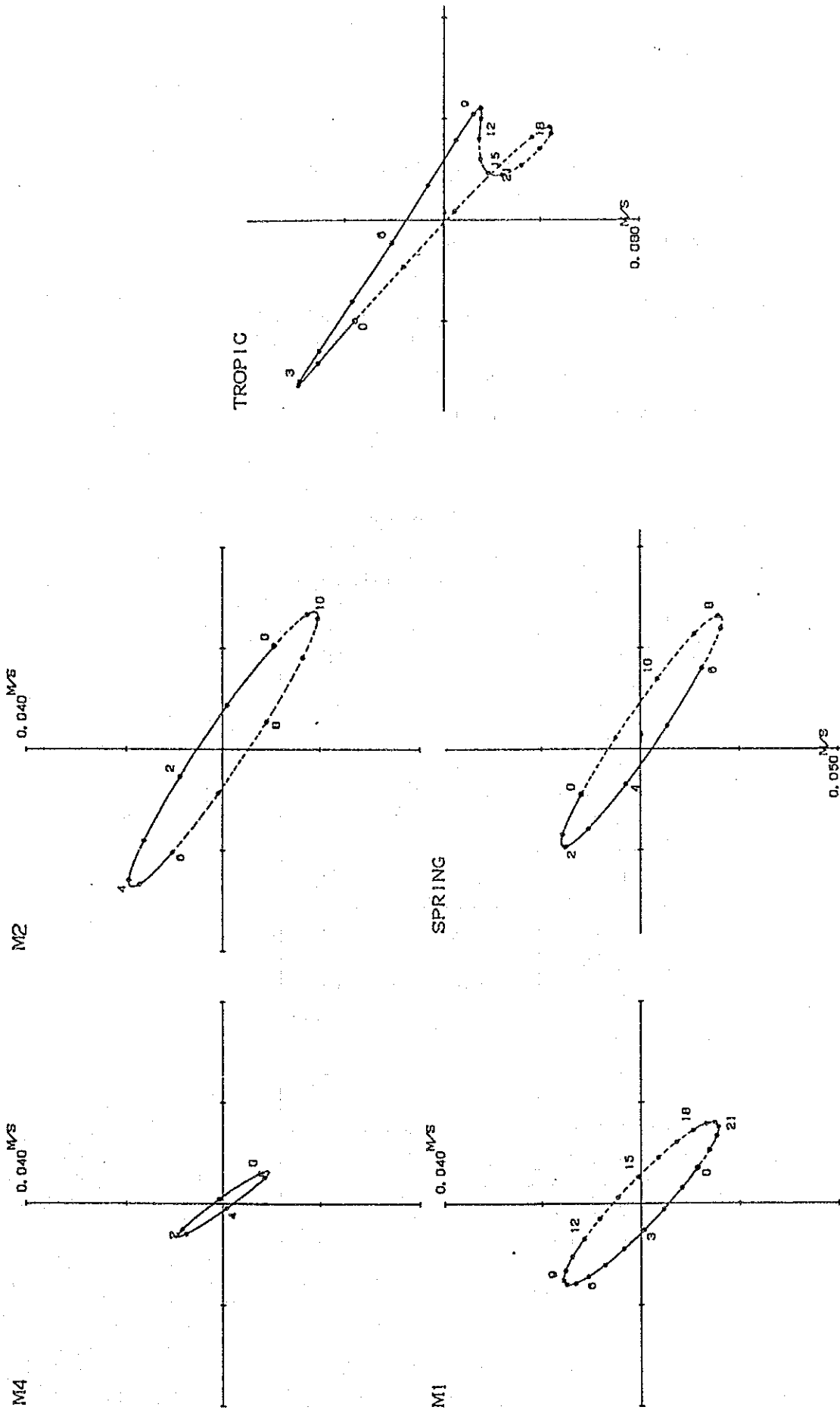
Country : GRENADA
 Measurement point : GRANDMAL
 Location : East longitude 61° 45' 6"
 North latitude 12° 4' 36"
 Observation layer : -1.4m
 Observation date : Sep. 28-29, 1993
 Measurement apparatus : ANDELER current velocity meter (ROM-7)

Tide constituent	Northern constituent		Eastern constituent		Elliptical element						Main current direction 311°	
	Current velocity, cm/sec.	Delay angle	Current velocity, cm/sec.	Delay angle	Major axis			Minor axis			Current velocity, cm/sec.	Delay angle
					direction	Current velocity, cm/sec.	Delay angle	direction	Current velocity, cm/sec.	Delay angle		
M2	1.4	106	1.9	301	305	2.3	116	35	0.3	26	2.3	115
S2	0.7	134	1.0	330	305	1.2	144	35	0.2	54	1.2	144
K2	0.4	134	0.6	330	305	0.7	144	35	0.1	54	0.7	144
N2												
K1	2.2	261	2.3	60	314	3.1	250	44	0.6	340	3.1	250
O1	1.9	252	2.0	50	314	2.7	241	44	0.5	331	2.7	240
P1	0.7	261	0.8	60	314	1.0	250	44	0.2	340	1.0	250
Q1												
M4												
MS4												
A0	0.0		0.4		0.4			94			-0.3	

Table of elliptical element of tide (24-hour data)

GRENADA

Measurement point and observation layer	Observation data and age of the moon	Axis	M 1			M 2			M 4			Constant	
			θ	V cm/s	H h	θ	V cm/s	H h	θ	V cm/s	H h	θ	V cm/s
GRANDMAL -1.4	Sep. 28-29, 1993 13.0	L	314	2.2	8.4	305	3.3	4.4	325	1.1	2.5	94	0.4
		S	44	0.4	14.4	35	0.4	1.4	55	0.1	1.0		
		S/L		0.19			0.13			0.10			



Am 0:00 of the tidal current ellipse represents the moment when the meridian line of the moon is passed.

AM 0:00 of the SPRING represents the high tide at St. George's HA.
 AM 0:00 of the TROPIC represents the highest tide at St. George's HA.
 Observation date : Sep. 38-29, 1993

Tidal current ellipse diagram

GRENADA

GRANDMAL -1.4M

Analysis table of 24-hour harmonic tide

Country : Grenada
 Measurement point : Grandmal
 Location : East longitude 60° 45' 6"
 North latitude 12° 4' 36"
 Observation date: Sep. 28-29, 1993
 Measurement apparatus : Tide indicator

Tidal component	Tidal constant	
	Amplitude cm	Delay angle
M 2	3.7	40
S 2	1.9	69
K 2	1.2	69
N 2		
K 1	5.2	240
O 1	4.6	230
P 1	1.8	240
Q 1		
M 4		
M S 4		
A 0	226.8	

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NOTES ON BOREHOLE REPORTS

SOIL DESCRIPTION:

Each subsoil stratum is described using the following terminology. The relative density of granular soils is determined by the standard penetration index ("N" value), while the consistency of clayey soils is measured by the value of the undrained shear strength (Cu).









CLASSIFICATION (UNIFIED SOIL CLASSIFICATION)	
Silt and clay	Passing sieve No. 200
Sand	Sieve No. 200 to No. 4
Gravel	Sieve No. 4 to 3 in. (76 mm)
Cobble	3 in. (76 mm) to 8 in. (200 mm)
Boulder	>8 in. (200 mm)

TERMINOLOGY	
"traces"	<10%
"little"	10-20%
adjective (sandy, silty)	20-35%
"and"	35-50%

RELATIVE DENSITY (GRANULAR SOILS)	"N" VALUE (BLOWS/FT. - 300 mm)
Very loose	0-4
Loose	4-10
Compact	10-30
Dense	30-50
Very dense	> 50

CONSISTENCY (COHESIVE SOILS)	UNDRAINED SHEAR STRENGTH (Cu)	
	(P.S.F.)	(KPa)
Very Soft	<250	<12
Soft	250-500	12-25
Medium	500-1000	25-50
Stiff	1000-2000	50-100
Very stiff	2000-4000	100-200
Hard	>4000	>200

ROCK QUALITY DESIGNATION (R.Q.D.)	
<25	very poor
25-50	poor
50-75	fair
75-90	good
>90	excellent

STRATIGRAPHIC LEGEND			
			
Sand	Gravel	Cobbles & Boulders	Bedrock
			
Silt	Clay	Organic Soil (topsoil)	Fill

SAMPLES

TYPE AND NUMBER:

The type of sample recovered is shown on the log by the abbreviation listed hereafter. The numbering of samples is sequential for each type of sample.

- | | | |
|-----------------|-------------------------------|-----------------|
| WS: Wash sample | PS: Piston sample (Osterberg) | SS: Split spoon |
| AG: Auger | ST: Thin wall (Shelby) | RC: Rock core |

RECOVERY:

The recovery, shown as a percentage, is the ratio of the length of the sample obtained to the distance the sampler was driven/pushed into the soil.

OTHER TESTS (in-situ or laboratory)

- | | | | |
|---------------------|-----------------------------|-----------------------|---------------------------|
| H: Hydrometer | GS: Grain size distribution | A: Atterberg limits | WP: Plastic limit |
| W: Moisture content | γ: Unit weight | CS: Swedish fall cone | EM: Pressuremeter modulus |
| K: Permeability | PI: Plasticity index | WL: Liquid limit | PL: Limit pressure |
| | | C: Consolidation | |

ENCE No.: _____

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ENCLOSURE No.: _____

PAGE 1 OF 1

5 Lucas St. St. George's Granada W.I.

BOREHOLE No. 1

T: OAFIC

- SS SPLIT SPOON
- ST SHELBY TUBE
- LS LOST SAMPLE
- RC ROCK CORE
- WATER LEVEL

DATE (start) _____

DATE (finish) _____

Described by: _____ Checked by: _____

DEPTH	STRATIGRAPHY		SAMPLE			TEST RESULTS				
	ELEVATION	STRATIGRAPHY	STATE	TYPE AND NO.	RECOVERY	OTHER TESTS	BLOWS 6 in./15 cm	PENETRATION INDEX	Shear test (Cu) Sensitivity (S) Water Content (%) Atterberg limits (%) W _p W _L "N" Value (Blows/12 in.-30 cm)	<input type="checkbox"/> Field <input type="checkbox"/> Lab.
0		GROUND SURFACE			%			N	10 20 30 40 50 60 70 80 90	
0		SOFT DARK BROWN PLASTIC SILTY CLAY	X	SS1	72					
1.0		DARK BROWN VEILY SOFT FIBROUS PEAT.	X	SS2	100					
2.0			X	SS3	100					
3.0			X	SS4	100		0-0-1	1		
4.0			X	SS5	100		0-0-1	1		
5.0			X	SS6	100		0-0-1	1		
6.0		END OF BOREHOLE REFUSAL ON PROBABLE BEDROCK	X	SS7	0		0-100/2"	E		

REFERENCE No.: 9309

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5 Lucas St. St. George's Grenada W.I.

BOREHOLE No. 2

AGENT: OAFIC

- SS SPLIT SPOON
- ST SHELBY TUBE
- LS LOST SAMPLE
- RC ROCK CORE
- WATER LEVEL

DATE (start) _____

OBJECT: GRAND WAL. PROJECT.

DATE (finish) _____

CAUTION: _____

Described by: BB Checked by: E-T

STRATIGRAPHY			SAMPLE			TEST RESULTS													
DEPTH	ELEVATION	STRATIGRAPHY	DESCRIPTION OF SOILS AND BEDROCK	STATE	TYPE AND NO.	RECOVERY	OTHER TESTS	BLOWS 6 in./15 cm	PENETRATION INDEX	Shear test (Cu) Sensitivity (S) Water Content (%) Atterberg limits (%)									
										W _p W _L	"N" Value (Blows/12 in.-30 cm)								
Feet	Meters					%			N	10	20	30	40	50	60	70	80	90	
0	0		GROUND SURFACE																
			BROWN PLASTIC SOFT SILTY CLAY WITH OCCASIONAL ORGANICS	<input checked="" type="checkbox"/>	SS1	67		1-0-1	1										
	1.0		SOFT	<input checked="" type="checkbox"/>	SS2	100		1-1-1	2										
5			DARK BROWN FIBROUS PEAT. OCCASIONALLY INTER-BEDDED WITH THIN BANDS OF GREY SILTY CLAY. (VERY SOFT)	<input checked="" type="checkbox"/>	ST3	100		—											
	2.0			<input checked="" type="checkbox"/>	SS4	100		0-0-1	1										
	3.0			<input checked="" type="checkbox"/>	SS5	100		0-0-1	1										
	4.0			<input checked="" type="checkbox"/>	SS6	100		0-0-1	1										
15				<input checked="" type="checkbox"/>	SS7	100		1-1-2	3										
	5.0			<input checked="" type="checkbox"/>	SS8	100		2-3-4	7										
	6.0			<input checked="" type="checkbox"/>	SS9	100		6-6-4											
20			LOOSE BECOMING COMPACT DARK GREY MEDIUM TO FINE SAND WITH SOME GRAVEL AND TRACES OF SILT. OCCASIONAL OXIDATION STAINS.	<input checked="" type="checkbox"/>	SS10	100		10-10-9											
	7.0																		
	8.0																		
25																			
	9.0																		
30																			

REFERENCE No.: _____

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ENCLOSURE No.: _____

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5 Lucas St. St. George's Grenada W.I.

BOREHOLE No. _____

2

AGENT: _____

- SS SPLIT SPOON
- ST SHELBY TUBE
- LS LOST SAMPLE
- RC ROCK CORE
- WATER LEVEL

DATE (start) _____

DATE (finish) _____

Described by: _____ Checked by: _____

STRATIGRAPHY			SAMPLE			TEST RESULTS													
DEPTH	ELEVATION	STRATIGRAPHY	DESCRIPTION OF SOILS AND BEDROCK	STATE	TYPE AND NO.	RECOVERY	OTHER TESTS	BLOWS 6 in./15 cm	PENETRATION INDEX	TEST RESULTS									
										Shear test (Cu)	Sensitivity (S)	Water Content (%)	Atterberg limits (%)	W _p W _L	"N" Value (Blows/12 in.-30 cm)	Field Lab.			
Feet	Meters	GROUND SURFACE					%		N	10	20	30	40	50	60	70	80	90	
0	0.0			X	SS11	100		7-10-12	22										
0.5	0.5		LOOSE GREY DARK GREY SILTY FINE SAND WITH OCCASIONAL POCKETS OF OXIDIZED SILT	X	SS12	100		2-1-2	3										
1.0	1.0			X	SS13	100		4-7-20	11										
1.5	1.5		SOFT TO FIRM GREENISH -BROWN OXIDIZED WITH SILTY CLAY WITH OCCASIONAL OXIDATION STAINS	X	SS14	100		2-1-2	3										
2.0	2.0		COMPACT TO DENSE BROWN SILT AND FINE TO MEDIUM SAND WITH SOME TO TRACES OF GRAVEL.	X	SS15	80		8-14-16	30										
2.5	2.5			X	SS16	100		4-11-15	26										
3.0	3.0			X	SS17	100		8-12-14	26										
3.5	3.5		END OF BORING																

REFERENCE No.: _____

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ENCLOSURE No.: _____

PAGE 1 OF 2

5 Lucas St. St. George's Grenada W.I.

BOREHOLE No. 3

CLIENT: OAFIC

- SS SPLIT SPOON
- ST SHELBY TUBE
- LS LOST SAMPLE
- RC ROCK CORE
- WATER LEVEL

DATE (start) _____

PROJECT: _____

DATE (finish) _____

LOCATION: _____

Described by: _____ Checked by: _____

DEPTH		STRATIGRAPHY		SAMPLE			TEST RESULTS				
		ELEVATION	STRATIGRAPHY	DESCRIPTION OF SOILS AND BEDROCK	STATE	TYPE AND NO.	RECOVERY	OTHER TESTS	BLOWS 6 in./15 cm	PENETRATION INDEX	Shear test (Cu) Sensitivity (S) Water Content (%) Atterberg limits (%) W _p W _L \' "N" Value (Blows/12 in.-30 cm)
Feet	Meters			GROUND SURFACE		%			N	10 20 30 40 50 60 70 80 90	
0	0										
	1.0			WATER							
5	1.5		•••••	Loose grey medium coral sand	X	SS1	100		4-1-1	2	
	2.0		~ ~ ~ ~ ~	Soft to very soft dark brown fibrous peat. Occasionally interbedded with thin bands of grey silty clay	X	SS2	100		1-0-1	1	
10	3.0		~ ~ ~ ~ ~		X	SS3	55		1-0-1	1	
	4.0		~ ~ ~ ~ ~		X	SS4	45		1-0-6	6	
15	5.0		•••••	Loose dark grey fine to medium sand, with some fine gravel and traces of silt	X	SS5	100		6-4-5	9	
	6.0		•••••		X	SS6	67		5-6-6	12	
20	7.0		•••••		X	SS7	100		4-4-5	9	
	8.0		•••••		X	SS8	67		2-3-2	5	
30	9.0		•••••								

REFERENCE No.: _____

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5 Lucas St. St. George's Grenada W.I.

BOREHOLE No. 3

CLIENT: OAFIC

- SS SPLIT SPOON
- ST SHELBY TUBE
- LS LOST SAMPLE
- RC ROCK CORE
- WATER LEVEL

DATE (start) _____

DATE (finish) _____

PROJECT: _____

Described by: _____ Checked by: _____

LOCATION: _____

DEPTH			STRATIGRAPHY		SAMPLE			TEST RESULTS						
Feet	Meters	ELEVATION	STRATIGRAPHY	DESCRIPTION OF SOILS AND BEDROCK	STATE	TYPE AND NO.	RECOVERY	OTHER TESTS	BLOWS 6 in./15 cm	PENETRATION INDEX	Shear test (Cu) △ Field Sensitivity (S) □ Lab. Water Content (%) Atterberg limits (%) W _p W _L "N" Value (Blows/12 in.-30 cm)			
											10	20	30	40
0	0			GROUND SURFACE	X	SS9	60		1-1-2	3				
1.0			Very dense brown silt and fine to medium sand with traces of gravel.	X	SS10	100		18-44-77	21					
5				X	SS11	100		12-24-44	68					
10			X	SS12	58		15-27-31	58						
15			X	SS13	100		18-30-42	72						
20	6.0			END OF BORING										
25														
30	9.0													

REFERENCE No.:

9309

LEON TAYLOR B.Sc. M. Eng MASCE
Consulting Civil Engineer

ENCLOSURE No.:

PAGE 01

BOREHOLE No.

4

5 Lucas St. St. George's Grenada W.I.

DATE (start)

DATE (finish)

Described by:

Checked by:

CLIENT: OVERSEAS AGRO FISHERIES CO. SS SPLIT SPOON
PROJECT: ARTISANAL FISHERIES COMPLEX ST SHELBY TUBE
LOCATION: GRAND MAL LS LOST SAMPLE
GRENADA. W.I. RC ROCK CORE
 WATER LEVEL

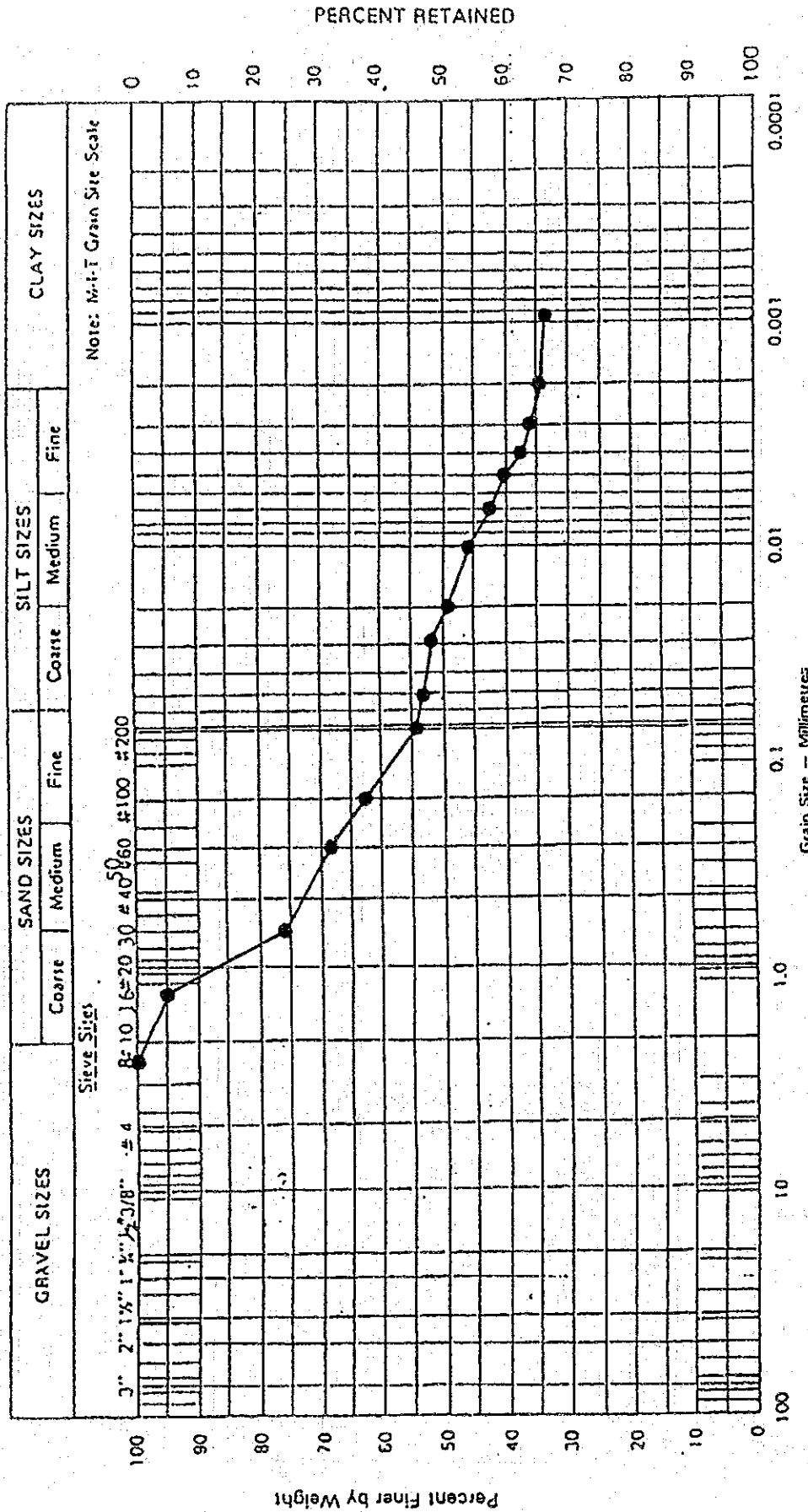
STRATIGRAPHY			SAMPLE			TEST RESULTS			
DEPTH	ELEVATION	DESCRIPTION OF SOILS AND BEDROCK	STATE	TYPE AND NO.	OTHER TESTS	BLOW 6 in./15 cm	PENETRATION INDEX	Shear test (Cu) Sensitivity (S) Water Content (%) Atterberg limits (%) W _p W _L "N" Value (Blows/12 in.-30 cm)	<input type="checkbox"/> Field <input type="checkbox"/> Lab.
Feet	Meters	-1.60m					N		
0	0	GROUND SURFACE							
		WATER							
0	0								
1.0	1.0								
5	5								
2.0	2.0								
10	3.0	LOOSE DARK GREY SAND WITH TRACES OF SILT	X	SS1 100		1-2-2	4		
15	4.0	COMPACT GREY MEDIUM CORAL SAND AND GRAVEL	X	SS2 100		4-5-7	10		
20	5.0		X	SS3 100		7-6-7			
25	6.0	VERY DENSE DARK BROWN GRAVEL (WELL CEMENTED)	X	SS4 80		7-50-92			
30	7.0		X	SS5 120		100/44	12		
35	8.0		X	SS6 80		100/34	12		
30	8.0	END OF BORE HOLE	X						

Report No. 9309-1

Enclosure No. 1

GEOTECH ASSOCIATES LTD.
TRINIDAD, W.I.

GRAIN SIZE DISTRIBUTION

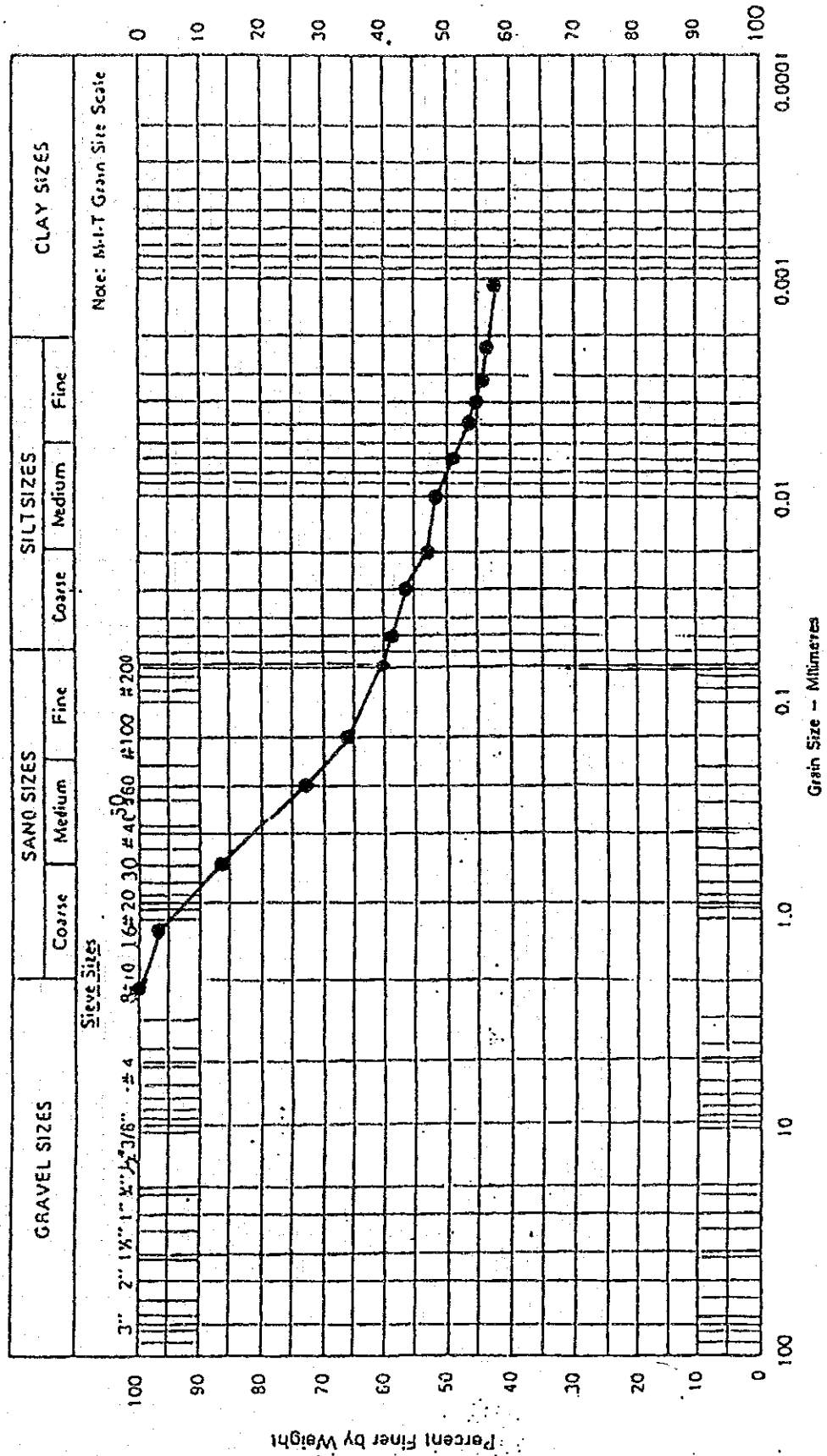


Client OVERSEAS AGED FISHERIES CONSULTANTS Co.
 PROJ. ST. GEORGE'S FISHERIES COMPLEX

Sample: Source: BH2, S51
 Legend:

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TRINIDAD W.I.

GRAIN SIZE DISTRIBUTION



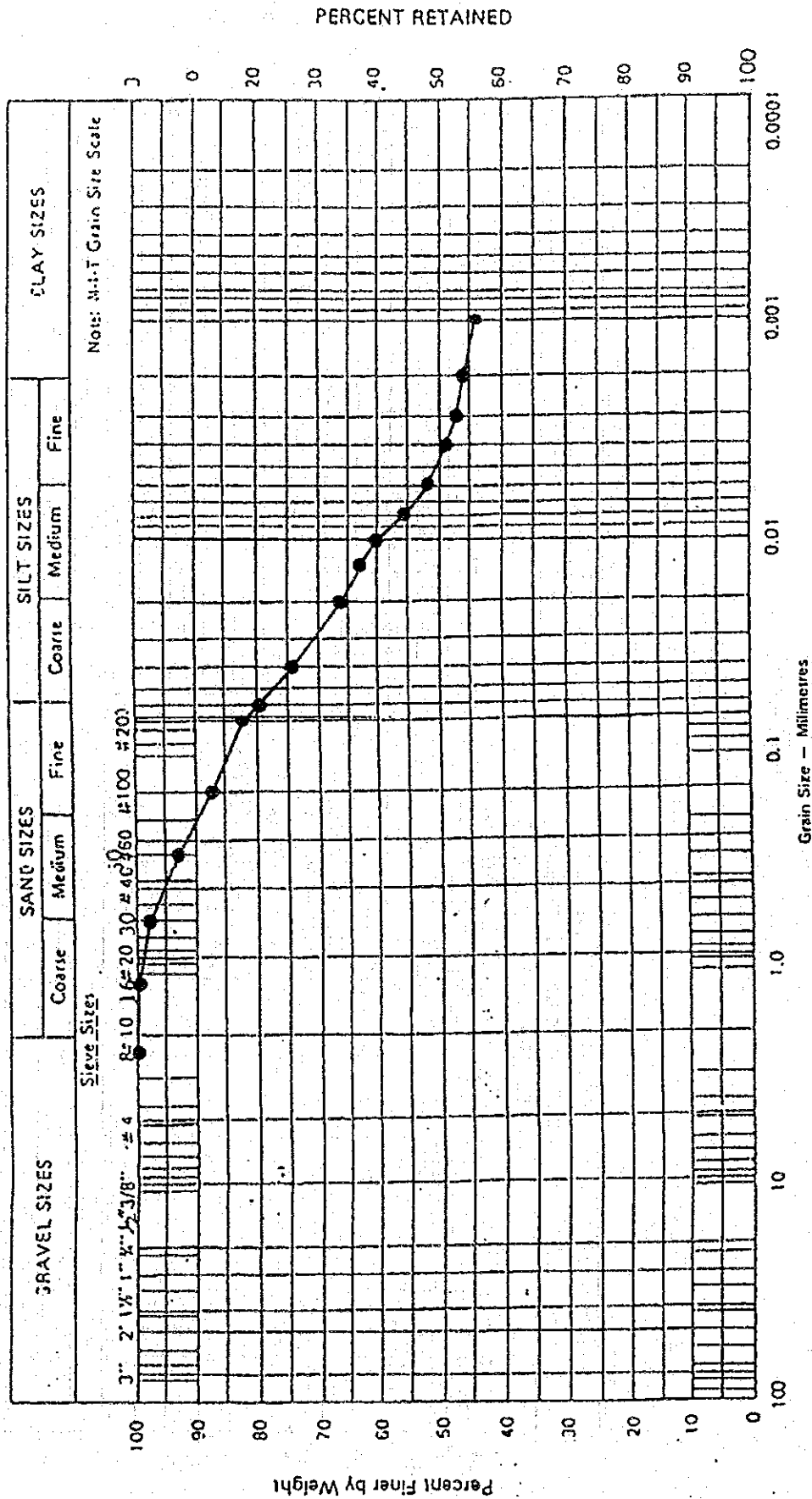
Sample Source: BH 1, S51

Legend:

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PROJECT ST. GEORGE'S FISHERIES COMPLEX

GEOTECH ASSOCIATES LTD.
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GRAIN SIZE DISTRIBUTION

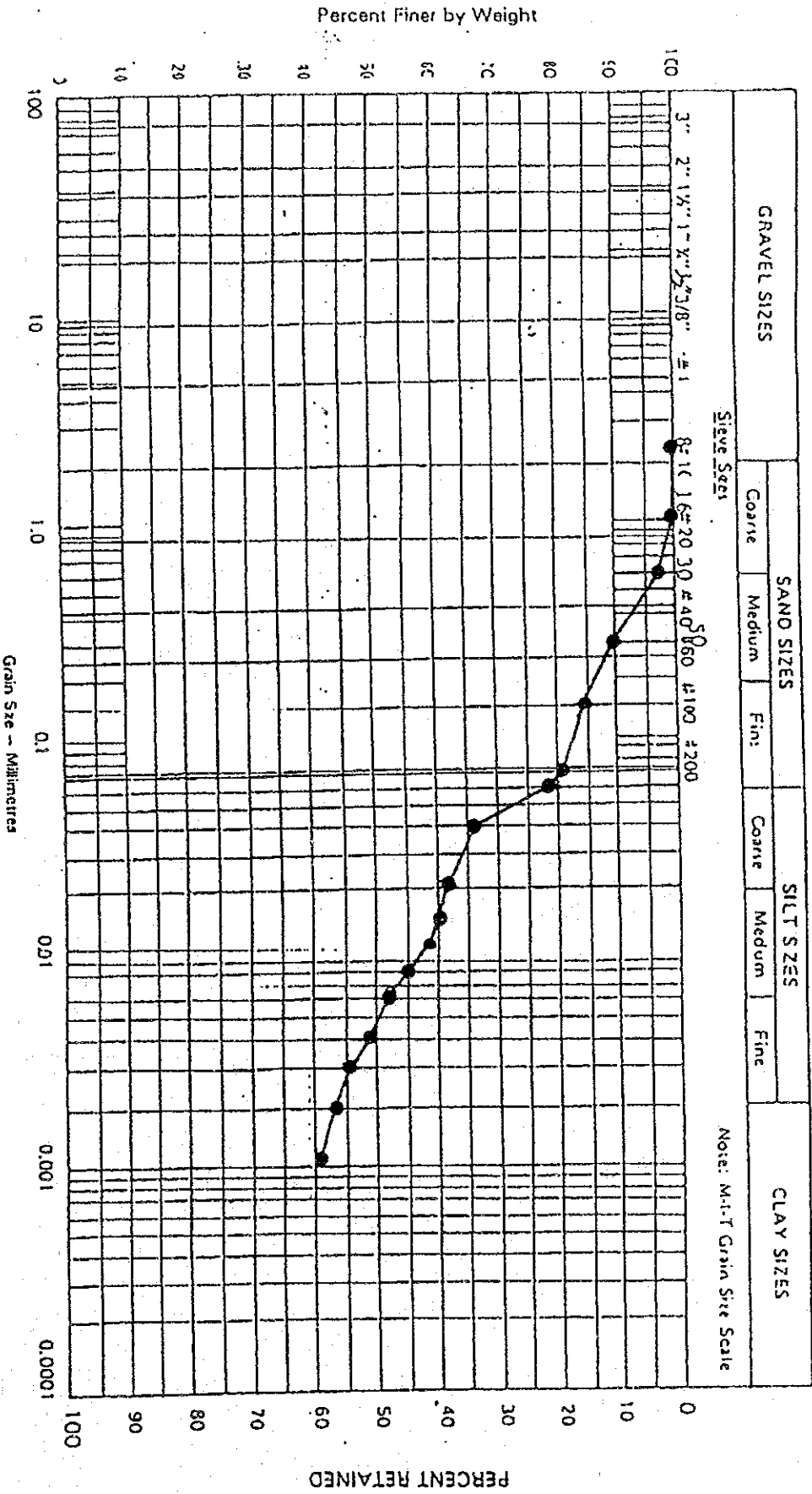


Client OVERSEAS AGRO FISHERIES CONSULTANTS. W
PROJECT ST. GEORGE'S FISHERIES COMPLEX

Sample Source: BH 1, ST 4

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GRAIN SIZE DISTRIBUTION



Report No. 9809-1

Enclosure No. 4

Sample: Source: BH2, 564
Legend:

Client: OVERSEAS AGRO PRODUCTS CONSULTANTS CO. P
PROJECT

JICA