COMPREHENSIVE REPORT ON THE RESULTS OF EXPLORATION AND MINERAL RESOURCE ESTIMATES FOR THE PROPOSED OFFSHORE MAGNETITE MINING PROJECT OF JDVC RESOURCES CORPORATION DENOMINATED AS MPSA-338-2010-II-OMR LOCATED IN THE OFFSHORE AREAS OF THE MUNICIPALITIES OF SANCHEZ MIRA, PAMPLONA, ABULUG, BALLESTEROS, APARRI, BUGUEY AND GONZAGA, PROVINCE OF CAGAYAN

Prepared for JDVC Resources Corporation by:

RAFAEL R. LIWANAG
PMRC Competent Person on Exploration Results
and Mineral Resource Reporting

August 15, 2015

1.0 CERTIFICATES AND CONSENTS OF CPs FOR TECHNICAL REPORTS

2.1 Certificates and Consents of CPs for Technical Reports

CERTIFICATE AND CONSENT OF COMPETENT PERSON
FOR PUBLICATION OF EXCERPT OF REPORT
AND COMPLIANCE STATEMENT
WITH THE PHILIPPINE MINERAL REPORTING CODE

The information in this report that relates to Exploration Results and Mineral Resources is based on information compiled by **MR. RAFAEL R. LIWANAG**, who is a member of the Geological Society of the Philippines.

Mr. Rafael R. Liwanag has sufficient experience which is relevant to the style of mineralization and to the activity which he is undertaking to qualify as a Competent Person as defined in the 2007 edition of the Philippine Mineral Reporting Code (PMRC) for Reporting Exploration Results, Mineral Resources and Ore Reserves. The CP accreditation is valid at the time of filing of this certificate.

Mr. Rafael R. Liwanag consents to the inclusion of the report on matters based on his information in the form and context which it appears. Mr. Rafael R. Liwanag certifies that at the time of the report and to the best of his knowledge, all technical information that is required to make the report not misleading has been included.

Mr. Rafael R. Liwanag consents to the public filing of this report, extracts here from, or a summary of this report in the Environmental Impact Statement and/or Partial Declaration of Mining Project Feasibility being filed in the context in which it was reported.

This certificate applies to the ***"Comprehensive Report on the Results of Exploration and Mineral Resource Estimate for the Proposed Offshore Magnetite Mining Project of JDVC Resources Corporation Denominated as MPSA-338-2010-II-OMR Located in the Offshore Areas of the Municipalities of Sanchez Mira, Pamplona, Abulug, Ballesteros, Aparri, Buguey and Gonzaga, Province of Cagayan"*** prepared on August 15, 2015.

Issued this 15th day of August 2015 in Quezon City, Metro Manila.

RAFAEL R. LIWANAG
PMRC Competent Person on Exploration Results and Mineral Resource Reporting
CP Accreditation Number 11-08-01
PRC Geologist No. 512
PTR No. A-2389213, Issued on 21 January 2015 in Taguig City

2.2 Scope of Work of Competent Person

Mr. Rafael R. Liwanag has been engaged by JDVC Resources Corporation (JDVCRC) as the Competent Person (CP) to make an estimate of the Magnetite Sand mineral resources contained within certain portions of MPSA-338-2010-II-OMR based on the information provided by JDVCRC in conformity with the Philippine Mineral Reporting Code.

Mr. Liwanag also is tasked to document the procedures used in handling the data, and the manner which the magnetite sand mineral resource estimate has been calculated, as well as the results of exploration within the said area.

The scope of this work is focused, among others, in estimating the mineral resources of magnetite within the explored areas of the said MPSA. The estimates in this report include the geological, physical and chemical analysis of all samples available as of July 31, 2015. While being consistent with the outline of PMRC reporting, this report does not consider the completeness, veracity, accuracy, suitability of the legal, permitting, commercial, social and other non-technical aspects of the project area; thus this report focuses chiefly on the exploration, sampling, and assay data only.

2.3 Reliance on Other Experts or Competent Persons

The quality of information, conclusions, and estimates contained herein is consistent with the level of effort involved in Mr. Liwanag's services, based on: i) information available at the time of preparation; ii) data supplied by JDVCRC; and iii) the assumptions, conditions, limitations and qualifications set forth in this report.

Mr. Liwanag understands that the collection of geological, exploration and sample data and the compilation of the assay database and geological interpretation have been undertaken either directly or under the supervision of Registered Professional Geologists and/or Mining Engineers of the Republic of the Philippines and in accordance with industry-accepted practices.

Mr. Liwanag has taken reasonable efforts to confirm that the data are reliable for the purpose of reporting exploration results and for resource modeling prior to estimation; however it was not possible to confirm the collection of data first-hand for the earlier exploration phases, but is attested to by JDVCRC staff as to the veracity and general accuracy of documentation of the previous work. Regardless, Mr. Liwanag has been able to witness the actual sampling, preparation and analysis of the most recent drilling programme.

Mr. Liwanag has not undertaken any legal due diligence into the status of the tenements, commercial agreements, environmental or permitting matters, as well as any areas encompassed/subject to Indigenous Peoples' interests nor of endorsements from the Barangay, Municipal and Provincial Local Government Units, and other relevant National Government agencies. Mr. Liwanag has accepted the tenement information as supplied by JDVCRC.

While Mr. Liwanag himself is a Au pioneer in the use of Gemcom modeling software, he still engaged the services of Mr. Melogyn Largo in the geological modeling and resource estimation and Mr. Edgardo Gonzales in the interpretation of the seismic refraction survey. Mr. Largo is an expert in mining software application. He trained under the Gemcom distributors while still working at the Carmen Copper Project of Carmen Copper Corporation (formerly Atlas Consolidated Mining and Development Corporation) in Don Andres Soriano, Toledo City, Cebu. He then worked with Mr. Liwanag at the Leyte Magnetite Project of Nicua Corporation, which later became the Leyte Ironsand Corporation, and then at Yinyi Philippines Mining Incorporated handling the GIS and geological modeling software.

Mr. Gonzales, on the other hand is an expert in marine geology and seismic reflection survey, having worked also at the Mines and Geosciences Bureau's Marine Geology Division for more than twenty years. He has conducted this type of survey as well as coastal monitoring all over the Philippines. Mr. Gonzales is responsible for the geological interpretation of the results of the seismic reflection survey.

While Messrs. Largo and Gonzales are not CP's in their professions, they have sufficient experience and expertise and Mr. Liwanag attests to their credibility. Mr. Liwanag assumes that the information they supplied in the resource estimates and refraction survey interpretation, respectively are accurate after detailed and lengthy discussions with them.

2.4 Signature of Competent Person:

RAFAEL R. LIWANAG
PMRC CP No. 11-08-01
PRC Geologist No. 512
PTR No. A-2389213
Issued in Taguig City
on 21 January 2015

3.0 EXECUTIVE SUMMARY

This is a comprehensive PMRC-compliant report on the Exploration Results and Mineral Resource Estimate for the Partial Declaration of Mining Project Feasibility in the Cagayan Offshore Magnetite Mining Project of JDVC Resources Corporation under MPSA-338-2010-II-OMR located in the municipal waters of Sanchez Mira, Pamplona, Abulug, Ballesteros, Aparri, Buguey and Gonzaga, all in the province of Cagayan. Using a data cutoff of July 31, 2015, the company has completed an exploration programme over an area of 4,999.2358 hectares of the 14,240-hectare MPSA area, consisting of geophysical surveys involving seismic reflection profiling and bathymetric surveys and diamond drilling and core sampling that employed a boat-mounted Longyear 38 Wireline drill with modified "Jar drill" core recovery system to ensure an acceptable high core recovery; using bathymetric points and drill collars surveyed by GPS using WGS 84 projection that enabled the delineation of an ore envelope using the conventional Polygon Method of resource estimation

Within this ore envelope, 11 vertical confirmation drillholes with an average of 90% recovery, amounting to more than 140 meters, with the collection of 142 samples, which were all analyzed by XRF for %Fe, %Al_2O_3, %CaO, %Cr_2O_3, %K_2O, %MgO, %P_2O_5, %SiO_2, %V_2O_5, %As, %BaO, %Cl, %Co, %Cu, %MnO, %Na_2O, %Ni, %Pb, %SO_3, %Sn, %Sr, %TiO_2, %Zn, %Zr and Per cent loss-on-ignition (LOI) and Sieve Test at Intertek Testing Services Philippines, Inc., and analyzed for Magnetic Fraction (MF) using a Dings Davies Tube (DDT) which segregates the magnetite through magnetism at the Petrochemical Laboratory of the Mines and Geosciences Bureau.

The confirmation holes were drilled using 2,000 and 4,000-meter interval spacings which were based on the result of the interpretation of the seismic reflection data of the area. It was established in this survey that the sand horizon which contains the economic values of magnetite sand ranges in thickness of about 25 meters on the easternmost portion of the tenement, tapering towards the west to about 10 meters. The seismic reflection survey generated about 270 points that are spaced at a maximum of 500-meter interval on the N-S direction and a maximum of 1,000-meter interval on the E-W direction. Each of these points has its own coordinates, elevation, and the individual thicknesses of the sand horizons (Stratigraphic Units). These data were used to establish the consistency of the possible magnetite sand-bearing horizons accurately. Based on the data gathered from the seismic reflection survey, the drillhole spacing programmed for Parcel A is 2,000 meters with an average drilling depth of 20 meters; while for Parcel B-1, it is 4,000 meters, with an average drilling depth of 5 meters.

On the average, the thicknesses of the sediments per Unit are as mathematically computed follows:

	Unit 1 (meters)	Unit 2 (meters)	Total (meters)
Parcel A	6.8	19.0	25.8
Parcel B-1	3.0	6.8	9.80

While the company implemented QA/QC protocols during the drilling operation, they were limited to core recovery, sampling, logging, labeling and chain of custody. Field duplicates *and standards were not inserted in the samples. Data accuracy was therefore measured from the results of analysis of laboratory replicates and standards. To test the accuracy of the methods of sampling and physical (DDT) and chemical (XRF) analyses, the results of analyses of the field standards, laboratory replicates were tabulated and compared and the result shows that the standards and the laboratory replicates gave very low absolute relative differences between the known (expected) and the assayed values for Fe; and consequently, very low percentage of error (0.1% and 0.35%, respectively).*

To determine the tonnage, the average specific gravity of 1.69 DMT/m^3 was used. This was determined at the petrochemical laboratory of the Mines and Geosciences Bureau. The resource polygons were constructed based on the topographic map produced from the bathymetric survey. The radii of influence used were 1,500 meters for indicated resource (Parcel A) area and 1,500 meters for the inferred resource (Parcel B-1) area based on the results of the seismic reflection profiling discussed above and as agreed with the proponents.

The estimation of the mineral resource using the polygon method shows an indicated resource of 606,458,000 DMT with an average grade of 25.47% MF, which will yield more than 150,000,000 DMT of magnetite concentrate which is about 60% Fe. The inferred resources consist of additional 63,000,000 DMT with an average of 47% MF content that can yield about 30,000,000 DMT of magnetite concentrate. Considering the unique contemplated method of mining which is by dredging, it was agreed with the proponent that a zero cut-off grade will be used in the resource computation. Based on this assumption, and based on the agreed parameters on resource categorization, the resulting details of the computed resource by level and categories are therefore tabulated as follows:

Level	Tonnage (DMT)	Grade (%MF)	DMT Conc.
INDICATED RESOURCE			
0-5 meters	114,167,560.95	23.16	26,445,391.99
5-10 meters	158,146,240.41	41.55	65,708,816.19
10-15 meters	164,786,486.19	24.68	40,668,170.45
15-20 meters	153,893,321.90	12.17	18,727,301.51
20-25 meters	15,464,363.07	18.86	2,916,578.87
Total	**606,457,972.52**	**25.47**	**154,466,259.02**
INFERRED RESOURCE			
0-5 meters	**63,179,310.69**	**47.71**	**30,140,910.80**

The polygon method of computation enabled the classification of the resources within the ore envelope to be in conformity to PMRC classification of indicated, and inferred resources which correspond to the level of confidence and certainty of estimate related to each class. The result of the computation can be validated by fill-in holes which can be drilled as time and weather will permit; although the best way to validate the accuracy of the computation is through ore reconciliation during the actual mining operation.

The estimates provide a firm basis for transforming resources into reserves, hence eventual mineral production, lasting many years, depending on the production rate and mine plan that can be set and designed by a PMRC CP Mining Engineer. Optimization of the resultant block model will provide basis for proper mine planning and scheduling that will maximize the value of the resources and reserves. The block model from this estimation also provides the basis for grade control, reconciliation, to meet customer specifications.

A substantial portion of the tenement is still not drill tested. The project's total resources can be significantly upgraded; additional resources can be determined by deeper drilling by closer spaced drill holes, implementing a stricter compliance to QA/QC protocols.

4.0 TABLE OF CONTENTS

CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

5.0 INTRODUCTION

5.1 Report Commission and Submission

This report on the results of exploration and mineral resource estimates in the magnetite sand property of JDVC Resources Corporation (JDVCRC) within its Cagayan Offshore Magnetite Mining Project has been prepared primarily by Mr. Rafael R. Liwanag as the Philippine Mineral Reporting Code (PMRC) Competent Person (CP) on Exploration Results and Mineral Resource Reporting as commissioned by JDVCRC, to support the public reporting in connection with its partial Declaration of Mining Project Feasibility (DMPF) that it is now preparing. While the discussion on the exploration methodologies and the general description of the project as to the physical features, geology and mineralization cover the whole MPSA-338-2010-II-OMR, the mineral resources being reported cover only those areas that are covered by the influence of the drill holes, which is the coverage of the DMPF.

Unless otherwise stated, information and data contained in this report or used in its preparation have been provided by PRMC. The data cutoff was information available as of July 31, 2015.

5.2 Purpose for which the Report was Prepared

This report mainly relates to the exploration results and resource estimate reporting for the JDVCRC's Cagayan Offshore Magnetite Mining Project. A PMRC-compliant comprehensive report on the results of exploration and mineral resource estimates is required for the processing of the DMPF for all mining entities on their mineral resource contents.

Among others, the resource estimate and resultant model form the principal basis for a PMRC Mining CP for subsequent transformation of resources into reserves, which can be valuated and mined. Subsequent optimization would likewise maximize the value of the resources/reserves, enabling sensible mine planning and scheduling.

The resource block model also provides the means for reconciliation of the estimate versus actual values realized upon subsequent mining, enabling efficient grade control during production.

5.3 Duration of the Preparation, including Field Visits and Verification

The preparation of this report commenced on June 17, 2015. Upon handover of the data, the undersigned CP checked its completeness and validity upon rigid verification. Missing overburden intervals, encoding errors in the assays, sample intervals, absence of lithology/matrix classification, and other possible sources of error were checked. The clean database was then used in the statistical and geostatistical processing, and eventually, geological modeling to derive the resource estimate.

Field verifications were conducted by Mr. Liwanag and Ms. Florence Mamungay on August 6 to 8, 2015. Mr. Liwanag is well-acquainted with field procedures of surveying, mapping, sampling by drilling, geological logging, sample preparation, and analysis; including QAQC procedures and geological modeling and mineral resource estimation of magnetite sand, having worked as Chief Geologist of Nicua Corporation and Leyte Ironsand Corporation in their Leyte Magnetite Sand Project in MacArthur, Leyte, from 2007 to 2012 and was responsible for the exploration and development of the said project.

5.4 Members of the Technical Report Preparation Team

The following JDVCRC staff members contributed immensely in the preparation of this report:

Ms. Florence Mamungay and Mr. Louie Santos, the technical Consultants of JDVCRC, provided all the technical data used in this report. These include field procedures, analytical results, matrix classifications, coordinates, tenement boundaries and densities, among others.

Mr. Alejandro G. Cruz Herrera, Chairman of Advanced Technology Resources Mining and Business Process Technology Provider Corporation, the principal consultant of JDVCRC provided the legal documents such as the MPSA, Operating Agreements, Deeds of Assignment and periodic reports on the MPSA.

Mr. Joseph R. Barce provided the assay records and actual physical samples of cores and core boxes in the Quezon City office of JDVCRC.

The non-PRMC members of the report preparation team are Messrs. Edgardo V. Gonzales and Mr. Melogyn Largo. Mr. Gonzales, who retired as Chief of the Marine Geology Division of the Mines and Geosciences Bureau and is now working as a Consultant of Isla Verde Mining Corporation and Green Process, Incorporated provided the analysis and interpretation of the seismic reflection data and correlation of the same with the drilling data, the results of which activities were used in the modeling of the sand horizons. On the other hand, Mr. Largo, who currently works as a free-lance software consultant provided his services in data processing, geostatistics and resource estimation using Mapinfo and GEMS.

5.5 Host Company Representative

As discussed above, Messrs. Alejandro G. Cruz-Herrera and Joseph R. Barce and Ms. Florence Mamungay of JDVCRC are the host company representatives that helped in the preparation of this report.

On the day-to-day aspects of the production of this report, Mr. Liwanag interacted mainly and directly with Ms. Mamungay.

5.6 Compliance of Report with PMRC

This report complies with the guidelines and format of the PMRC which emphasizes transparency, materiality and competence. As will be evident, this report comprehensively documents the detailed steps undertaken to produce the mineral resource estimate. The relevant details of significance to arrive at the resource estimate are considered, and all the applicable sections of the PMRC, especially its Table 1 have been considered in the resource estimation. Other relevant tests consistent with current best practices can be gleaned from the report, to provide any interested party, or his advisers, to check the adequacy and acceptability of the estimates herein.

6.0 RELIANCE ON OTHER EXPERTS OR CPs

Mr. Liwanag does not warrant the veracity, completeness, suitability and the like of all matters not relating to assays, geological information utilized in this report, including commercial, legal, sales and marketing, corporate and other matters. All other information is provided by JDVCRC "as is." Mr. Liwanag's scope of work is primarily on the reporting of exploration results and mineral resource estimates only. The company may at anytime subject the report to review by other competent persons.

While Mr. Liwanag himself is a pioneer in the use of Gemcom modeling software, he still engaged the services of Mr. Melogyn Largo in the geological modeling and resource estimation and Mr. Edgardo Gonzales in the interpretation of the seismic refraction survey. Mr. Largo is an expert in mining software application. He trained under the Gemcom distributors while still working at the Carmen Copper Project of Carmen Copper Corporation (formerly Atlas Consolidated Mining and Development Corporation) in Don Andres Soriano, Toledo City, Cebu. He then worked with Mr. Liwanag at the Leyte Magnetite Project of Nicua Corporation, which later became the Leyte Ironsand Corporation, and then at Yinyi Philippines Mining Incorporated handling the GIS and geological modeling software.

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While Messrs. Largo and Gonzales are not CP's in their professions, they have sufficient experience and expertise and Mr. Liwanag attests to their credibility. Mr. Liwanag assumes that the information they supplied in the resource estimates and refraction survey interpretation, respectively are accurate after detailed and lengthy discussions with them.

7.0 TENEMENT AND MINERAL RIGHTS

7.1 Description of Mineral Rights

The property was originally covered by MPSA No. 338-2010-II-OMR, a Mineral Production Sharing Agreement between the Republic of the Philippines and Bo Go Resources Mining Corporation (BGRMC) entered into on June 9, 2010. The contract area covers a total area of 14,240 hectares situated within or partly within the municipal waters of Sanchez Mira, Pamplona, Abulug, Ballesteros, Aparri, Buguey and Gonzaga, Cagayan. The tenement area is shown in Figures 7.1.1. (General Location Map of Cagayan Province) and 7.1.2 (Google Map Showing the Location of the MPSA Area).

The MPSA has a term of twenty-five (25) years, or until June 8, 2035, renewable for another 25 years. The contract grants BGRMC the exclusive rights to explore and develop the magnetite resources within the MPSA area, subject to the terms and conditions of the MPSA, and subject to compliance to the rules and regulations of other government agencies.

Figure 7.1.1: General Location Map of Cagayan Province

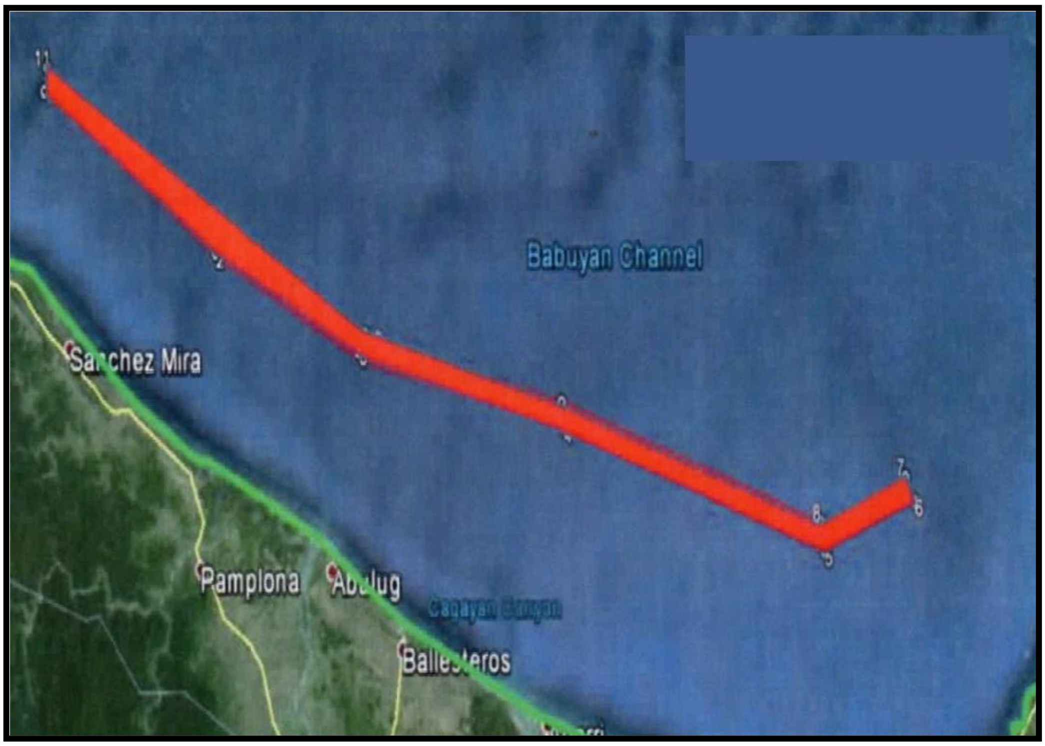


Figure 7.1.2: Google Map Showing the Location of the MPSA Area

The MPSA also provides for a two-year exploration period within which BGRMC has to conduct exploration and evaluation of the resources and determine if the deposit is economically mineable. If the deposit is economically mineable, the Company is required to submit a DMPF along with other mandatory requirements before the MPSA is converted into a Commercial MPSA, after which mining operation can commence. However, if the first two-year exploration period is not sufficient to prove an economically mineable deposit to put the tenement area in operation, the exploration period can be renewed or extended only twice for a total exploration period of six (6) years.

7.1.1 Location of Area, Barangay, Municipality, Province

The contract area is situated within the municipal waters of the Municipalities of Sanchez Mira, Pamplona, Abulug, Ballesteros, Aparri, Buguey and Gonzaga in the Province of Cagayan covering approximately 14,240 hectares. The areas covered by each municipality are shown in Figure 7.1.1.1.

7.1.2 Coordinate locations as per MGB

The contract area is situated within the municipal waters of the Municipalities of Sanchez Mira, Pamplona, Abulug, Ballesteros, Aparri, Buguey and Gonzaga in the Province of Cagayan. The area is bounded by the following geographic coordinates:

Table 7.1.1: Technical Description of MPSA Area

Corner	North Latitude	East Latitude
1	18° 42' 34.56''	121° 13' 26.76''
2	18° 33' 39.60''	121° 29' 45.96''
3	18° 31' 01.20''	121° 40' 18.48''
4	18° 26' 36.24''	121° 53' 32.28''
5	18° 27' 42.84''	121° 58' 06.24''
6	18° 26' 57.48''	121° 58' 31.44''
7	18° 25' 35.04''	121° 53' 36.96''
8	18° 30' 14.40''	121° 40' 04.44''
9	18° 32' 53.16''	121° 29' 37.68''
10	18° 36' 30.96''	121° 22' 01.20''
11	18° 41' 51.36''	121° 13' 14.52''
	Area = 14, 240.0000 hectares	

The general location of the province is shown in Figure 7.1.1; while the MPSA area is shown in the Google Earth Map in Figure 7.1.2.

7.1.3 Number of claims and hectares covered by EP/MPSA/FTAA mode of agreement

MPSA-338-2010-II-OMR - 14,240 hectares

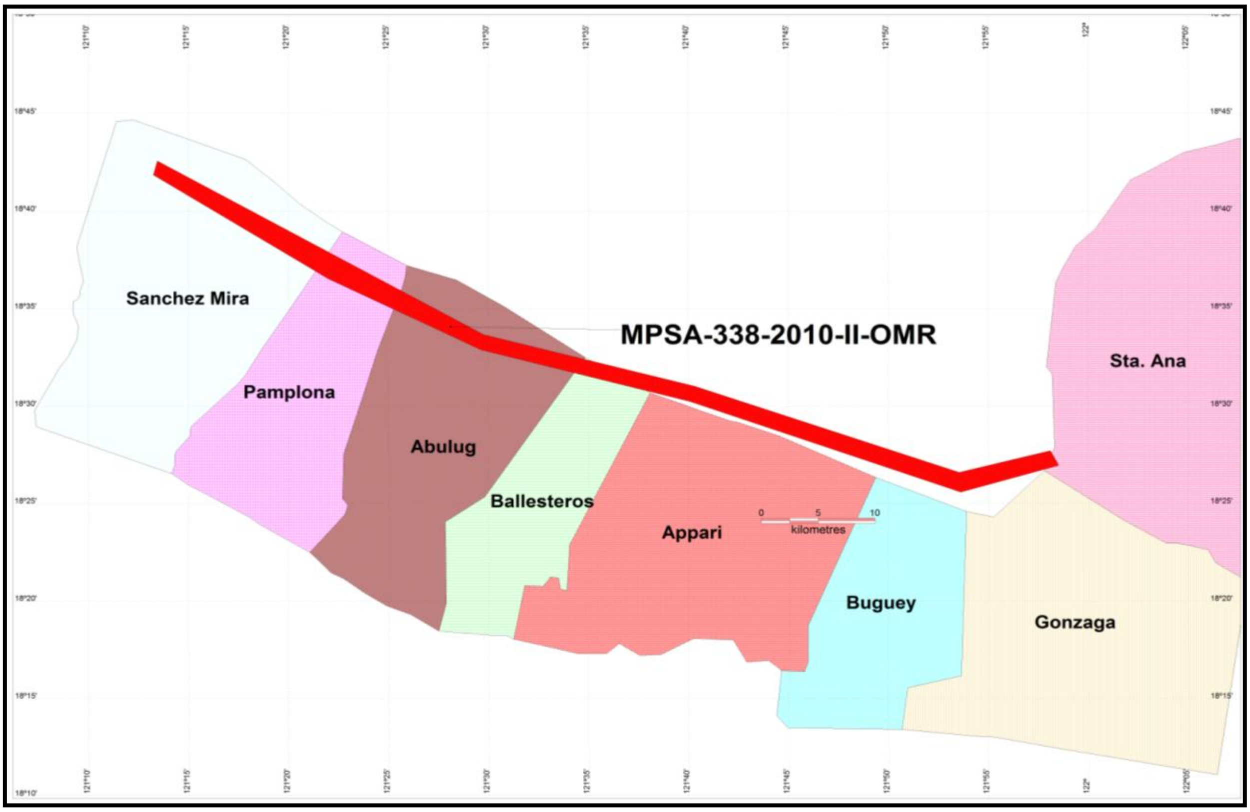


Figure 7.1.1.1: Political Map Showing the Areas Covered by the Tenement by Municipality

7.1.4 Type of permit or agreement with government

Mineral Production Sharing Agreement (Exploration) issued on June 9, 2010.

7.2 History of mineral rights

MPSA-338-2010-II-OMR was approved on June 9, 2010 as a contract between the Republic of the Philippines and BGRMC.

The MPSA Contract ownership was transferred to JDVCRC by BGRMC on November 25, 2011 by virtue of a Deed of Assignment duly approved and confirmed by both company's Board of Directors Resolutions and Corporate Secretary's Certifications. The same Deed of Assignment was duly registered with the DENR-MGB Region II, Tuguegarao City, Cagayan on 27, January 2012. It was duly approved on January 25, 2013 by the DENR Secretary Ramon J. P. Paje as recommended by MGB Director Leo L. Jasareno.

The Deed of Assignment as approved carries with it the responsibility to implement the Exploration Work Programs and the Environmental Work Program, which were eventually undertaken by JDVCRC, as well as the submission of the regular Technical/Progress Reports. The Environmental Impact Assessment (EIA) has likewise been completed and presented to the various Municipalities and stake holders in the Province of Cagayan.

The first renewal of the Exploration Period of MPSA No. 338-2010-II-OMR was granted on June 17, 2013.

7.3 Current owners of mineral rights

MPSA-338-2010-II-OMR - JDVC Resources Corporation

7.4 Validity of Current Mineral Rights

MPSA-338-2010-II-OMR - MPSA (exploration) approved on June 9, 2010; 25-year term, renewable for a like period. The Two (2)-Year Exploration Period was renewed on June 17, 2013.

7.5 Agreements with Respect to Mineral Rights.

MPSA No. 338-2010-II-OMR - Mineral Production Sharing Agreement dated June 9, 2010 by and between BGRMC and the Republic of the Philippines represented by the Secretary of the Department of Environment and Natural Resources;

Deed of Assignment between BGRMC and JDVCRC transferring the ownership of the MPSA Contract to JDVCRC on November 25, 2011; duly approved and confirmed by both company's Board of Directors Resolutions and Corporate Secretary's Certifications. The same Deed of Assignment was duly registered with the DENR-MGB Region II, Tuguegarao City, Cagayan on 27, January 2012. It was duly approved on January 25, 2013 by the DENR Secretary Ramon J. P. Paje as recommended by MGB Director Leo L. Jasareno.

7.6 Net Revenue That May be Derived from the Project

7.6.1 Royalties, taxes, advances and similar payments paid or to be paid by the company to the mineral rights holder, joint venture partner(s), government, indigenous people, local government, and others;

- The company has a yearly obligation to pay the occupational fee amounting to P100/hectare or a total of P1, 424,000.00 per year;

- During the commercial operation, the company is obliged to pay 2% of the gross sales to the BIR in the form of excise tax and 1% of the gross sale to Indigenous People (IP's) in the area if there are any, income taxes based on net income, business taxes and other applicable local and national taxes.

7.6.2 Receivables and Payable Sums to the Company and Mineral Rights Holder:

- Payment for Concentrate - $90 to $120/DMT at 60% Fe (varies depending on world metal prices)

7.6.3 The Preliminary Financial Evaluation presented and the Offshore Extraction Equipment Designs done by the experts and the specialists of JDVCRC seem to match the technical validation of the Resource Estimates herewith, as well as the Environmentally Safe and Effective Extraction and Magnetic Separation that have been used already for several decades by Arc Countries that started ahead the Offshore Mining of Magnetite Iron Sand respectively.

8.0 GEOGRAPHIC FEATURES

8.1 Location and accessibility

The tenement area is located about 14 kilometers off and parallel to the coast of the said coastal municipalities. It can be reached by motorized boat (*banca*) or any marine vessel. Travel to the portion of the tenement area directly north of the Cagayan River mouth using a motorized boat usually takes 1.5 hours. The camp site in Aparri is accessible from Manila via commercial airlines to Tuguegarao City and by land travel via private cars or buses (2-3 hours) thereafter. Public buses also travel directly from Manila to Aparri on a regular basis. Land travel from Manila usually takes 12 to 14 hours.

8.2 Topography, physiography, drainage and vegetation

The Cagayan Province is characterized by a vast expanse of plains and valleys, bordered by mountain ranges to the east by the Sierra Madre Range and to the west and south by the Cordillera Mountains. Of the Province's total area of about 900,110 hectares, 28.2% or 253,830 hectares are classified as flat to nearly level land. The larger part of the Province are categorized as rolling terrain, moderately steep, steep and very steep topography. Figure 8.2.1 presents the terrain map of Cagayan Province consisting dominantly of flat to level terrain, steep to very steep slopes forming the cores of the Sierra Madre Range, Cordillera Mountains and Caraballo.

Northeast Luzon is the area encompassing Cagayan Valley, the Northern Sierra Madre Mountain Range and the eastern part of the Cordillera Mountains. Cagayan River is the biggest river system of the Philippines. Originating in the highlands of the Sierra Madre in the East, the Cordillera in the West and the Caraballo Mountains in the South, it flows North through the broad Cagayan Valley ending in the Babuyan Channel.

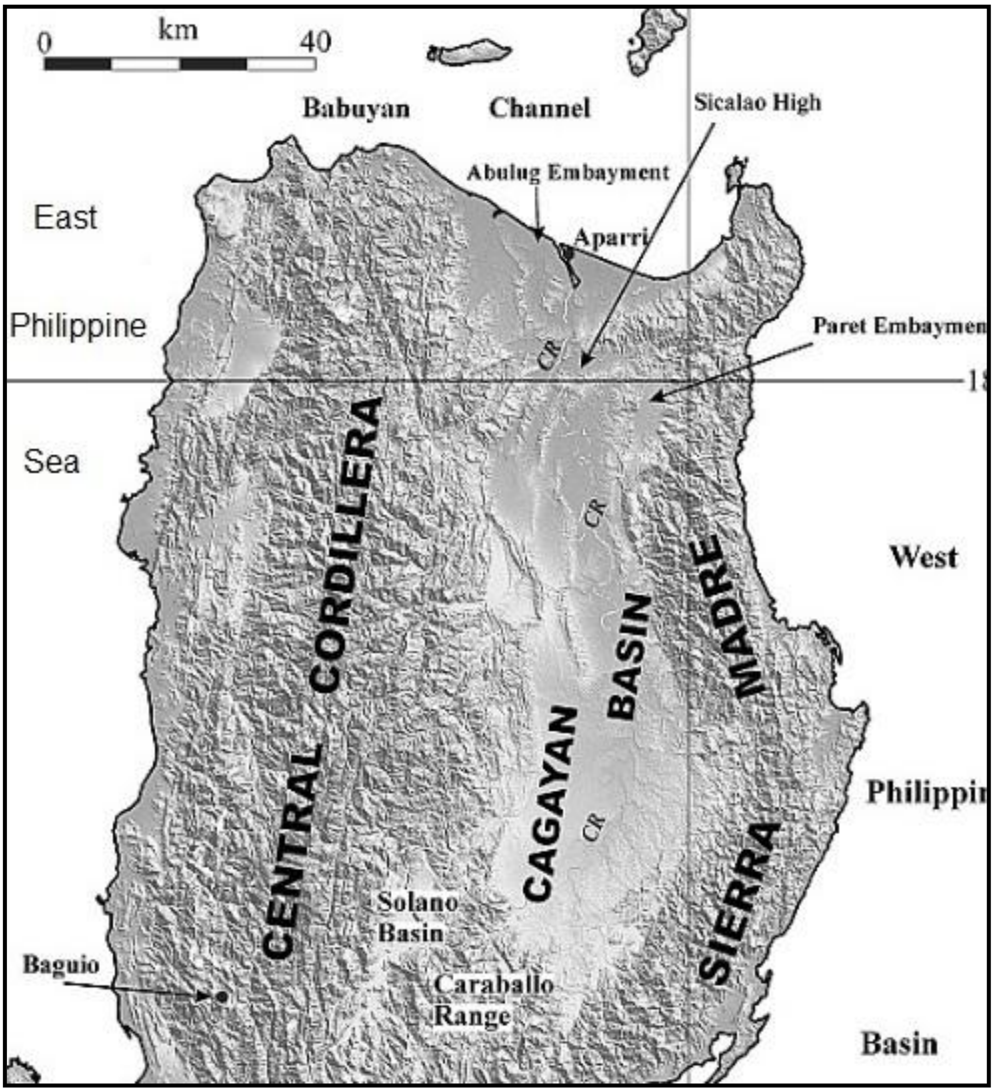


Figure 8.2.1: Terrain Map of the Cagayan Valley Region

The Sierra Madre Mountain Range is situated on the eastern side of Cagayan Valley and extends south from the extreme tip of Northeast Luzon to Central Luzon. The highest peaks of the Sierra Madre are about 2,000 meters. The Cordillera is situated on the western side of Cagayan Valley and covers the entire central part of northern Luzon. The highest peaks here are nearly 3,000 meters. The Caraballo Mountains in the South form the natural barrier between the Central Luzon plains (in which Manila is situated) and the Cagayan Valley. Numerous rivers from the Cordillera and Sierra Madre Mountains feed the Cagayan River.

About 28.2% of the total area of Cagayan Province is flat to nearly level land consisting of alluvial plains, river delta, wetlands, mangrove areas, and beaches. Contiguous with the flat to level lands are the gentle to moderate slopes forming the plains of meandering rivers and creeks. Steep to very steep land comprises flanks and peaks of the Sierra Madre and Cordillera Mountains which accounts for about 35% of the total area. Table 8.2.1 summarizes the slope classification of Cagayan Province.

Table 8.2.1: Slope Classification of Cagayan Province

Description	Slope Range	Area in Hectares	Percent
Flat, nearly level land	0 - 3%	253,831	28.19%
Gently sloping land to undulating	3 - 8%	54,763	6.08%
Moderately sloping land to rolling	8 - 18%	121,386	13.48%
Rolling land to moderately steep	18 - 30%	153,665	17.07%
Steep land	30 - 50%	94,030	10.44%
Very steep land	> 50%	222,595	24.73%
TOTAL		900,270	00.00%

Source: ALMED, Bureau of Soils and Water Management, DA

The Province of Cagayan is crisscrossed by numerous rivers and creeks, the largest of which is the Cagayan River, considered as the lifeline of the province, where most of the towns of the Province are situated along its banks and plains. It originates from Quirino and traverses Cagayan from south to north. The larger tributaries of Cagayan River are the Pinacanauan, Chico, Magat, Malig, Ilagan, Dummun and Pared Rivers. The River headwaters are at Caraballo Mountains.

Cagayan River flows north for about 505 kilometers to its mouth at Aparri, Cagayan toward the Babuyan Channel. It has a total drainage area of about 27,300 sq. kilometers with an estimated annual discharge rate of 53,943 m^3. Figure 8.2.2 shows the Cagayan River Basin Map.

The other major river systems in the Province are the Abulug River and the Pata River, both situated in the nortwest portion. The Abulug River is the second largest river system in Cagayan Province and holds historic and cultural values. Don Juan Salcedo set foot on the mouth of Abulug River in 1572. The Abulug River, which has 3,372 sq. kilometers drainage area, ranks number 9 among the country's major river systems, in terms of the size of drainage area (Table 8.2.2 and Figure 8.2.3).

The Abulug River receives fresh water laden with suspended and bed-load sediments from Apayao River and tributaries from the western part of the Cordillera (Fig. 5) The twin Abulug and Apayao River systems has a total drainage area of 44,500 hectares (DENR-RBCO, 2010).

Figure 8.2.2: Cagayan River Basin Map Showing Its Drainage Area

The low-lying, flat floodplains of the Cagayan Valley are intensively cultivated. The main crops are corn, irrigated rice and tobacco. Towards the Sierra Madre Mountain Range, the landscape becomes hilly. The main crops here are corn, upland (rain fed) rice and banana. The Sierra Madre is steep and still mostly covered with forest. The portion of the Sierra Madre within Isabela Province has been declared a protected area: the Northern Sierra Madre Natural Park.

<u>***Table 8.2.2: Major river basins of the Philippines (DENR: RBCO)***</u>

River Basin	Region	Drainage Area (sq km)
Cagayan River	Cagayan Valley	25,649
Mindanao River	Southern Mindanao	23,169
Agusan River	Northern Mindanao	10,921
Pampanga River	Central Luzon	9,759
Agno River	Central Luzon	5,952
Abra River	Ilocos	5,125
Pasig-Laguna Lake	Southern Luzon	4,678
Bicol River	Bicol Region	3,771
Abulug River	Cagayan Valley	3,372
Tagum-Libuganon River	Southeastern Mindanao	3,064
Ilog Hillabangan	Western Visayas	1,945
Panay River	Western Visayas	1,843
Tagoloan River	Northern Mindanao	1,704
Agus River	Southern Mindanao	1,645
Davao River	Southeastern Mindanao	1,623
Cagayan River	Northern Mindanao	1,521
Jalaud River	Western Visayas	1,503
Buayan-Malungun River	Southern Mindanao	1,434

Figure 8.2.3: Abulug River System Situated on the Northwestern Portion of Cagayan

The eastern portion of the Tenement area is generally characterized by shallower (~35 meters to 75 meters water depth) water and gently sloping seabed while its western portion is characterized by deep to very deep water (water depth ranging from 100 meters to more than 300 meters) and steeply sloping landscape. The two different physiographic settings are separated by what seems to be a submarine canyon.

8.3 Coastal Geomorphology and Seabottom Topography

8.3.1 Coastal Geomorphology

The coastal areas of Cagayan are overlain predominantly by recent alluvium, beach dunes, and sands containing magnetite in varying proportions. Mountainous terrains occur along the eastern (Sierra Madre Mountains) and western borders (Cordillera Mountains) of Cagayan Valley. The northern border of the valley is flanked by the Caraballo Mountains.

Where the sediment-laden river meets the sea, barrier dunes have formed with inland lagoons (Figure 8.3.1.1). More resistant sedimentary rocks at the flank of Sierra Madre Range form points and coves along the eastern portion of Cagayan Province.

Figure 8.3.1.1: Geomorphological Features of Cagayan Coastal Area

The Province of Cagayan covers an area of about 900,270 hectares that includes the Babuyan Island Group and the mainland Luzon. The northern coast of Cagayan mainland is characterized by a level and almost straight shoreline facing the Babuyan Channel except its eastern part, west of the town of Gonzaga, where the Sierra Madre Range forms its rugged and mountainous coast with numerous coves and islets.

The coast from the Municipality of Buguey toward Claveria is characterized by a straight shoreline that trends WNW with wide expanse of sandy beaches containing appreciable amount of magnetite. The straight shoreline is sporadically interrupted by mouths of several rivers that drain into the Babuyan Channel. Figure 8.3.1.2 shows the terrain map of Cagayan mainland showing the straight and level nature of the shoreline and sporadic topographic highs outcropping on Cagayan Valley.

The wide expanse of the Cagayan Valley plain is broken by numerous topographic highs and hills comprising of Pleistocene to Pliocene folded sequence of sedimentary rocks.

Figure 8.3.1.2: Terrain map of Cagayan Mainland

8.3.2 Sea Bottom Topography

The Luzon Strait is approximately 250-kilometer wide span of body of water that connects the East Philippine Sea and the Pacific Ocean with the West Philippine Sea and the South China Sea (Fig. 8.3.2.1). The Strait is subdivided into three smaller channels. The Babuyan Channel separates mainland Luzon with Babuyan Islands, which is separated from the Batanes Islands by the Balintang Channel. The Bashi Channel separates Batanes Islands with Taiwan.

Based on the NAMRIA nautical chart and from satellite images, the bathymetry of the Babuyan Channel ranges from a few meters to more than 1,000 meter depth.

The prominent sea bottom topographic features of the Babuyan Channel are the westward trending trough that passes through the northernmost tip of northern Luzon in Sta. Ana Cagayan and the Camiguin and Fuga Islands of Babuyan Group of Islands. The peculiar delta built up is present northeast of the mouth of Cagayan River in Aparri, Cagayan (Fig. 8.3.2.1).

The sediment built-up is influenced by the supply of sediments coming from the Cagayan River and the Kuroshio Current.

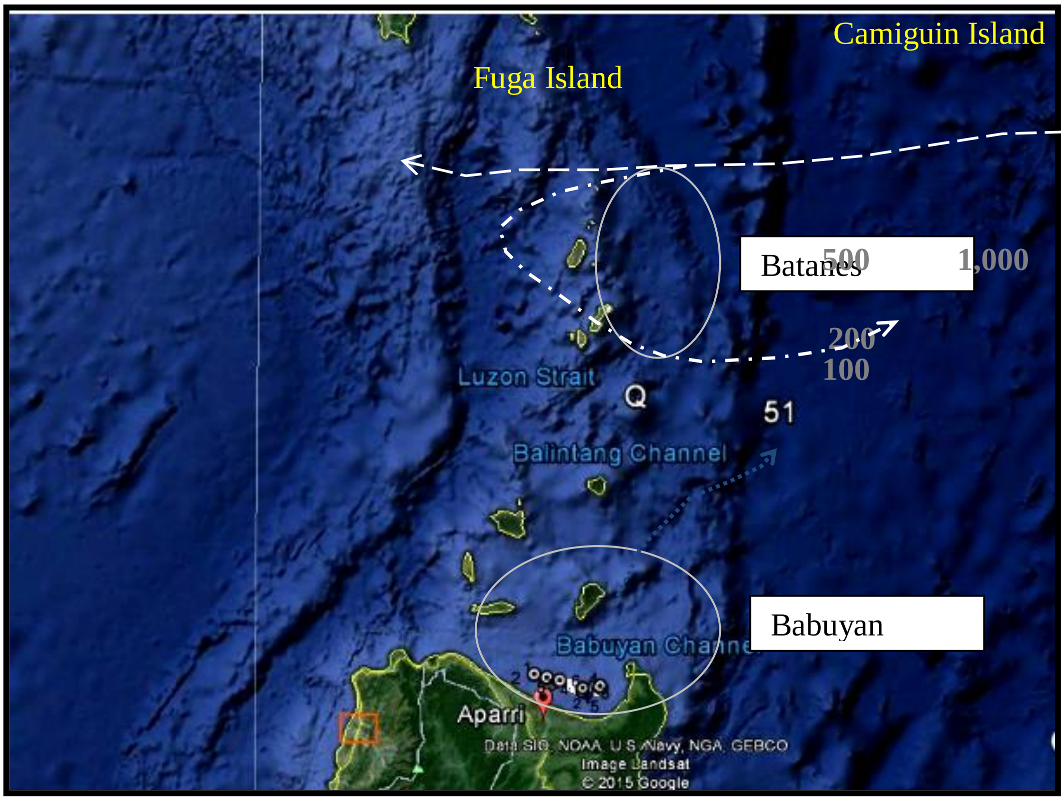


Figure 8.3.2.1: Location of Luzon Strait, Balintang and the Babuyan Channel

The Cagayan River is the largest river system in the Philippines with an estimated annual discharge rate of 53,943 million cubic meters (Wikipedia, 2010). The sediment transport capacity of the river in its lower segment near its mouth is estimated to be about 5 million cubic meters /year.

There are indications that Cagayan River had meandered through time as suggested by the relict lakes and marsh lands in the Buguey, Cagayan. The blue colored arrow in Figure 8.3.2.2 is presumed to be the former river path and the submerged channel. The blue dotted line is inferred to be the relict river path of Cagayan River; the white dash arrow represents the trajectory of the Kuroshio current deflected from its northward direction. As will be shown later, the submarine channel has been identified and traced during the bathymetric survey in the project area.

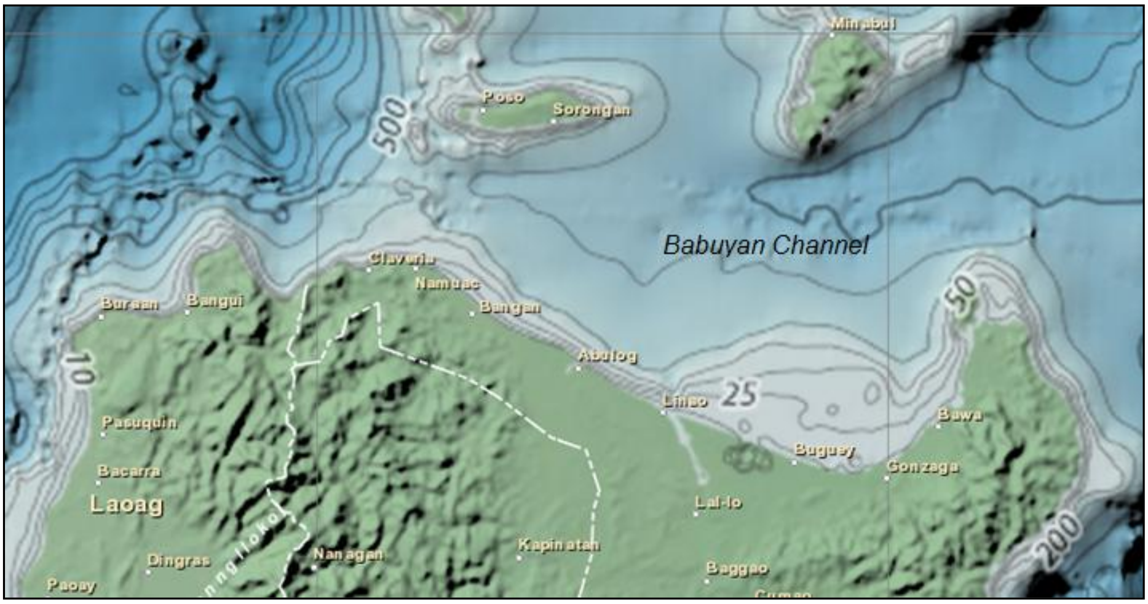


Figure 8.3.2.2: Sea bottom topography and submarine features of Babuyan Channel

The Kuroshio Current is a northward flowing ocean current induced by West Pacific Current in the North Pacific Ocean and intrudes into the West Philippine Sea and South China Sea through the Luzon Strait. The Kuroshio current flows from the east coast of Luzon through Taiwan and thence to Japan as illustrated it Figure 8.3.2.3. The effects of the northeast monsoon cause the deflection of the Kuroshio current towards the deeper portion of the Babuyan Channel.

The Kuroshio Current contributes significantly to the dispersal pattern and accumulation of sediments in the Babuyan Channel including the delta built-up in northeast of Appari.

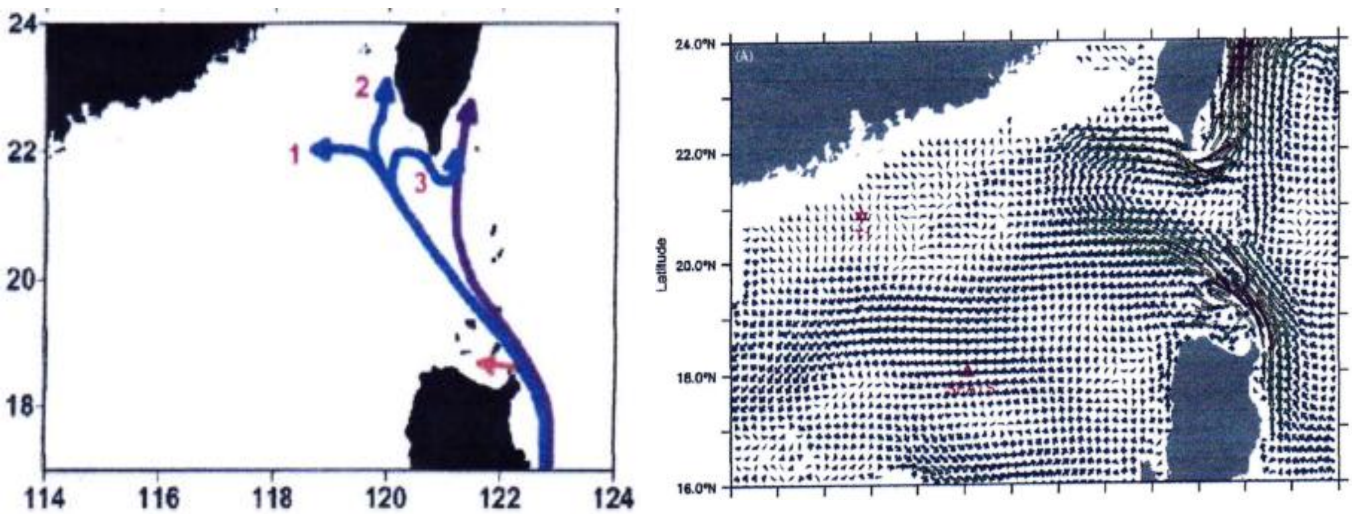


Figure 8.3.2.3: Paths of Kuroshio Current in Luzon Strait through Babuyan, Balintang and Bashi Channels

8.4 Climate, population

The province of Cagayan has three types of climate based on the Modified Coronas Classification (Figure 8.4.1). Type I, which prevails in the areas of Sta. Prexedes and Western Claveria has two (2) pronounced seasons: dry from November to April and wet the rest of the year. Only a small portion of the province has this type of climate.

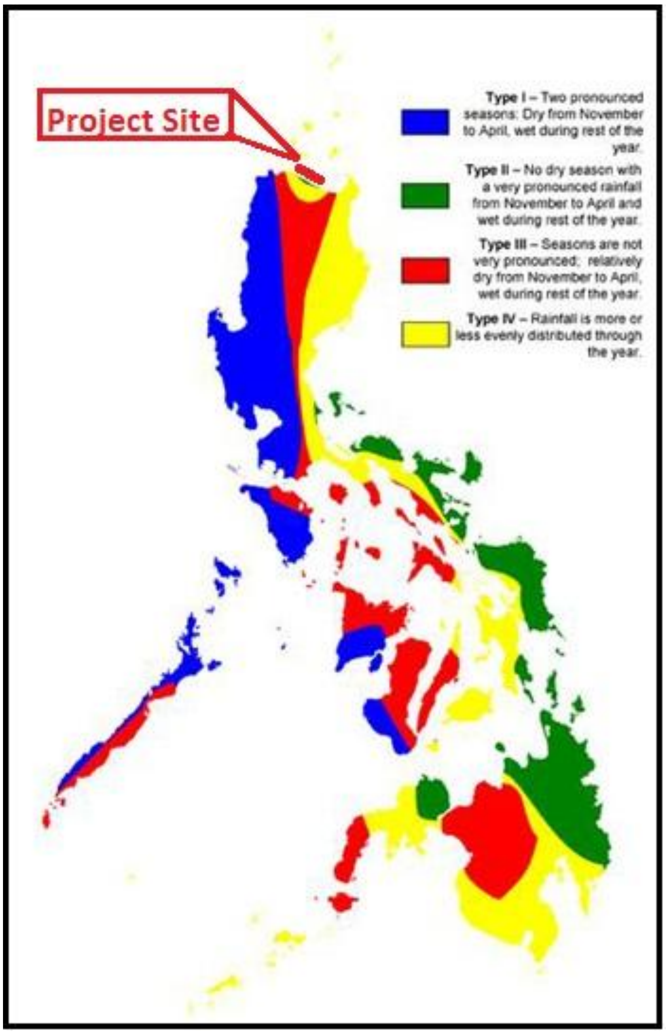


Figure 8.4.1: Climate Map of the Philippines showing the type of climate prevailing at Cagayan Province

Type II climate, which is characterized by the absence of a dry season, but with a very pronounced maximum rainy period from November to January, is predominant from Claveria to Buguey and Sta. Teresita towards the east, then to the general direction of Tuao in the southwest.

Type III climate, on the other hand, where the seasons are not very pronounced but are relatively dry from November to April and wet during the rest of the year, covers the general area in the Sierra Madre Mountain Range and its foothills in the east and the towns of Gonzaga and Sta. Ana in the north.

Cagayan Province lies on the lee side or the sheltered side of both the Sierra Madre and the Cordillera Mountains, hence it receives smaller amount of rainfall compared to the Ilocos coast on the west and the Pacific coast in the east. Incidentally, the highest temperature recorded in the country occurred in Tuguegarao, Cagayan on April 29, 1912, with a temperature of 42.2^{o}C.

Based on records of climatological normals from 1951 to 1985 from a station in Tuguegarao, average rainy days totaled 128 a year with an annual rainfall of 1,771.8 millimeters. August has the most number of rainy days, sixteen (16) days, while February has the least, four (4) rainy days. Annual rainfall ranges from 16.5 mm in February to 246.5 mm in August. Yearly mean temperature is 27.5°C. The coolest month is January with an average temperature of 19.3°C, and the hottest month is May with an average temperature of 36.7°C.

The province of Cagayan, including the Babuyan Island Group has a total land area of 9,295.75 square kilometers. It is composed of twenty-eight (28) municipalities and one (1) component city, Tuguegarao which is the provincial capital. It is composed of three (3) congressional districts; the municipalities of Aparri, Gonzaga and Buguey belong to the first district while Abulug, Pamplona, Ballesteros and Sanchez Mira belong to the second district.

The 2010 Census of Population and Housing placed the population of Cagayan at 1,124,773 with an annual growth of 1.74%. Table 8.4.1 shows the population statistics of the municipalities covered by the project with comparative figures for the province of Cagayan.

The table shows that while the municipality of Gonzaga is the largest in terms of total land area, it has the least population density of only 64 persons per square kilometer compared to 120 for the whole province; while Ballesteros has the highest density of 270 persons per square kilometer. Aparri, the most populous municipality has the second highest population density of 210 persons per square kilometer.

Table 8.4.1: Population Statistics for Project-Affected Municipalities

	Sanchez Mira	Pamplona	Abulug	Ballesteros	Aparri	Buguey	Gonzaga	Cagayan
Total Land Area, km^2	198.80	173.30	162.60	120.00	286.64	164.50	567.43	9,295.75
Population as of 2010 Census	23,257	23,236	30,675	32,215	61,199	28,455	36,303	1,124,773
Population Density, per km^2	120	130	190	270	210	170	64	120
Annual Population Growth (% p.a.)	0.34	2.20	2.36	1.36	0.10	0.42	0.90	1.74
Number of Barangays	18	18	20	19	42	30	25	820

8.5 Land use

While Cagayan province and the municipalities covering the tenement are basically suited for agriculture, the areas actually covered by the JDVCRC property are basically suited for Offshore Magnetite Iron Mining. In a scientific and expert report by Dr. Felipe P. Calderon, Dr. of Science and Engineering, Reg. EM. Reg. E., MScE, Pr, Geol., Pr. Phy. Sc in a book entitled "Environmentally Safe and Effective Offshore Mining for Magnetite Iron Sand Operation at the Province of Cagayan", the herewith PMRC Competent Person on Exploration Results and Mineral Resource Reporting quote some portions as follows: *"ON FISHING- Magnetite Black Sand of high grade is toxic to aquatic life. Hence, history will tell us that for the last several hundred years, there has been a continuing decline of aquamarine products like fish within the area where the magnetite black sand is highly concentrated. Fisher folks have to resort to using their motorized bancas up to about 20 kilometers or more from the shore before they can catch fish, or, other fishing livelihood products."* Hence, the highest and best use of the JDVCRC Offshore Mining Tenement of 14,240 hectares as well as its nearby offshore areas are for offshore Commercial Extraction of its Mineral Resources for the benefit of the community, country and its people, as well as the proponent as one of its stakeholders.

The fishing facilities presently in use by fisher folks both inland and marine fishing are small to large fishing boats with inboard or outboard motors and equipped with assorted fishing gears. The sapioa, beach seine (locally called dakils) and ring seine (locally called sirot) are used for deep sea fishing. The grill net and the hook and line are used for both marine and inland fishing, while tangar and bubo are exclusively used for inland fishing. So far, there are 284 gill nets, 2,177 hook and line, 80 tangars and 19 bubos.

Generally, the municipalities are best suited to agriculture (rice, corn, high value commercial crops, vegetables, etc.), forestry (protection and production of forestlands), livestock production and swine and; brackish fish production – considering the mangroves along the coastal areas of the municipalities.

8.6 Socio-Economic Environment

The province is bounded by the Pacific Ocean on the east; on the south by Isabela province; on the west by the Cordillera Mountains; and on the north by the Balintang Channel and the Babuyan Group of Islands. About two kilometers from the northeastern tip of the province is the island of Palaui; a few kilometers to the west is Fuga Island. The Babuyan Group of Islands, which includes Calayan, Dalupiri, Camiguin, and Babuyan Claro, is about 60 nautical miles (110 km) north of Luzon mainland. The province comprises an aggregate land area of 9,002.70 square kilometers, which constitutes three percent of the total land area of the country, making it the second largest province in the region. . Cagayan has 28 municipalities and one city divided into three congressional districts. It has 820 barangays. Tuguegarao City (as of December 18, 1999) is the provincial capital, regional seat, and center of business, trade, and education. It has a land area of 9,295.75 square kilometers and a population of 1,124,773 as of 2010 census.

The majority of the people in Cagayan are of Ilocano descent, mostly from migrants coming from the Ilocos Region. Originally, the more numerous group were the Ibanags, who were first sighted by the Spanish explorers and converted to Christianity by missionaries. This is why the Ibanag language spread throughout the area prior to the arrival of Ilocanos.

Agricultural products are rice, corn, peanut, beans, and fruits. Livestock products include cattle, hogs, carabaos, and poultry. Fishing various species of fish from the coastal towns is also undertaken. Woodcraft furniture made of hardwood, rattan, bamboo, and other indigenous materials are also available in the province. The Northern Cagayan International Airport is a planned airport in Lal-lo, Cagayan. The airport will be built to support the Cagayan Special Economic Zone in northern Cagayan, which also serves seaborne traffic through Port Irene. The airport project will involve the construction of a 2,200-meter runway, with a width of 45 meters, following the standards of the International Civil Aviation Organization. Once completed, the planned international airport can accommodate large aircraft such as the Airbus A319-100 and Boeing regional jets of comparable size. SM City Aparri will soon be built once the towns of Aparri, Santa Ana and Lal-lo attained their cityhood.

8.7 Environmental Features

The shoreline fronting Cagayan Province is fairly uniform and the beaches are relatively wide. Along the shoreline stretch, the seashore is characterized by gradually dropping bathymetric profile which allows giant waves from the rough sea to break continuously into the beaches. Waves are most turbulent during storms and northeast monsoon periods.

The direction of maximum fetch of the wave is northeast. This is a long narrow corridor bounded by Fuga Island and Camiguin Island and may run up to more than 200 kilometers. From the east, the fetch is only about 100 kilometers. Based on the above-mentioned fetch lengths that may control wave heights within the study area, the significant wave heights were calculated using nomograms of deep water significant wave prediction curves as functions of wind speed fetch length and wind duration.

The shoreline from Sanchez Mira on the west to Abulug and Ballesteros on the east presents a uniform, continuous and almost straight strip occasionally cut by intervening (sic) drainage (Cesar V. Ramos, BMG, 1971). Highly elevated sand bars of about 15 meters high characterize the land form along the beaches. The beach deposit mostly of black sand materials extends further inland merging with the alluvial deposits of major waterways.

9.0 PREVIOUS WORK

9.1 History of Previous Work

The exploration history in the MPSA area and its vicinity dates back to the late 1960's. Researches made at the Mines and Geosciences Bureau in Manila indicate that most of the literature on magnetite sand covers investigations of Placer claims along the beaches from Sanchez Mira down south to Sta. Ana. The sub-sections that follow present a brief discussion of the activities conducted during the different exploration periods

9.2 Brief Description of Essential Work Done by Previous Workers

Site investigations previously undertaken by various workers in the area were noted between 1969 and 1979. Table 9.2.1 presents a summary of relevant findings by previous companies or organizations:

Table 9.2.1: Field Investigation Activities Conducted Between 1969 and 1979

Year	Organization	Activities	Findings
1969	Anglo-Philippine oil and Mining Corporation	Offshore Survey	Presence of magnetite sand deposit
1971	Mines and Geosciences Bureau	Mineral verification from Sanchez Mira to Ballesteros	Occurrence, character, and thickness of the deposit
1974	Mines and Geosciences Bureau	Mineral verification in Gonzaga	Occurrence, character, and thickness of the deposit
1974	Mines and Geosciences Bureau	Mineral verification of the magnetite sand deposits in Sanchez Mira	Sediment profile and thickness
1978-1979	Mines and Geosciences Bureau	Beach and near-shore sediment sampling	Delineation of potential magnetite sand accumulations

9.3 Conclusions of Each of the Previous Workers

The previous workers that conducted field investigations in the area have established the presence of magnetite sand deposits within the beaches and near-shore areas within the coastal areas from Sanchez Mira to Gonzaga, their character, thickness, sedimentary profile, and have also delineated the economic potential of the magnetite accumulation.

10.0 HISTORY OF PRODUCTION

10.1 Production History of the District and Area

Black sand mining in the municipal waters and beaches of the seven municipalities of northern Cagayan has been a very hot issue lately because of the rampant illegal mining conducted by several companies in the beaches within the 200-meter buffer zone from the mean low tide sea level landward. Some companies, disguising as legitimate operators with contracts from the local government of Aparri and the Department of Public Works and Highways (DPWH) to desilt the river, are reported to be dredging the Cagayan River to recover magnetite sand instead, but dumping the non-magnetic wastes back to the river. These mining activities date back to as early as the early 1970’s.

However, the Department of Environment and Natural Resources (DENR) was forced to take action and ordered the closure of these illegal mining activities since last year due to insistent complaints, coming mostly from organized non-government organizations (NGO’s), environmentalist, civic and religious groups (e. g., *Gonzaga Alliance for Environmental Protection and Preservation (GAEPP), the Federation of Environmental Advocates of Cagayan (FEAC), Save Sierra Madre Network Alliance, Inc., etc.)* backed up by the tri-media.

10.2 Areas Which Were Mined Within the Subject Tenement Area

The reported mining activities however are very far from the subject tenement area. In fact, no offshore mining within the Babuyan Channel has been reported yet. The mining activities are confined to the near beach areas and in the mouth of Cagayan River in Aparri. Beach or near beach mining has been reported in the municipalities of Sanchez Mira, Pamplona, Abulug, Ballesteros, Aparri, Gonzaga and Sta. Ana.

10.3 General Description of Mining, Beneficiation, Concentrate, Mineral Product Market

In the beaches and near-beach areas, simple open pit mining is done using backhoe excavators to dig and load the raw sand to hauling trucks that deliver the ore to magnetic separator plants also located in the beach area. The open pit is usually very shallow, 3-4 meters, which is the maximum vertical reach of the digging equipment.

The beneficiation process consists of simply separating the magnetite fraction of the sand by a series of magnetic separators. The separated magnetite concentrate is discharged in the ore bin where the water separates by means of gravity; while the non-magnetic waste coming out is usually hauled back to the mined-out pit or used to construct barrier dikes as part of the rehabilitation activities.

Figure 10.3.1 shows some pictures of the alleged illegal mining operations in Cagayan.

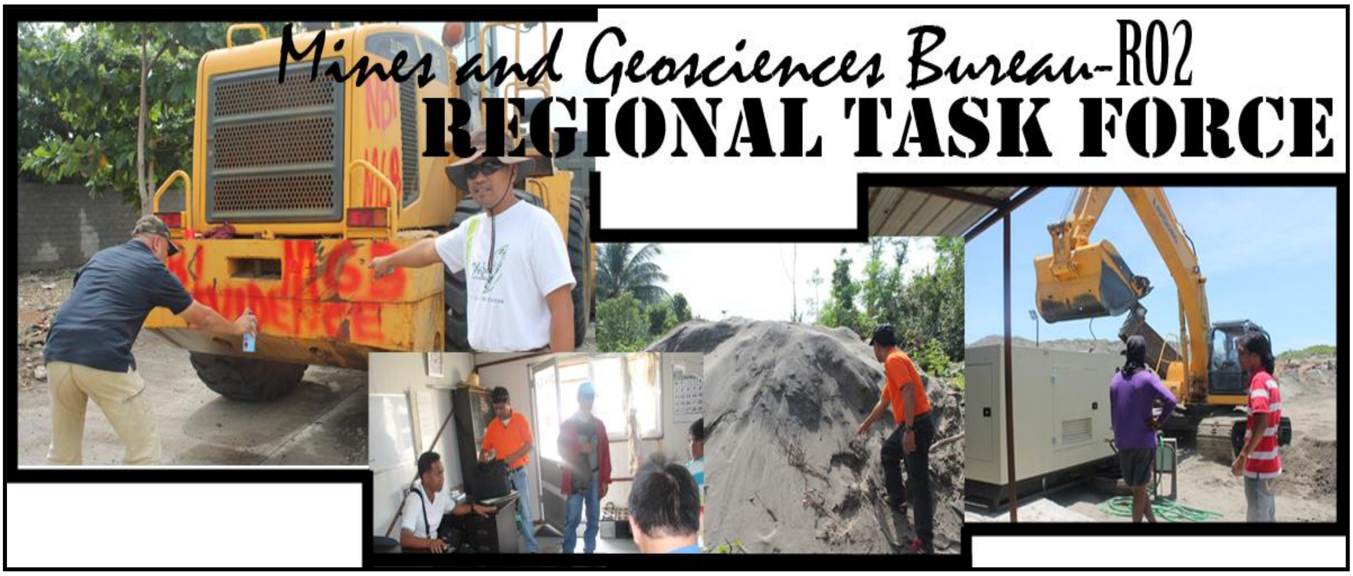


Figure 10.3.1: Pictures showing the facilities of magnetite sand mining companies in Cagayan (from MGB-2 website)

10.4 Tonnage Mined and Sold

While black sand mining has been very rampant in the northern Cagayan area, it is ironic that no record of iron sand mined and sold is reflected in the statistics of the Mines and Geosciences Bureau (MGB). In the Mining Industry Statistics (Release Date: 6 November 2013) covering the years 1997 to 2012, the only reported companies operating iron mines are those producing lumpy iron ores in Bulacan, Zamboanga and Bicol, while the only company reported to be producing magnetite sand is the ironsand mine in Leyte. However, the NGO's cited previously report that a single Chinese mining company has produced and shipped to China at least "200,000 metric tons since their operation in 2006."

11.0 REGIONAL AND DISTRICT GEOLOGY

11.1 Regional Geologic Setting

A prominent aspect of the country's physiography is the presence of opposite facing trenches and troughs on the eastern and western borders of the Philippine physiographic region. Philippine tectonics is one of the most active in the world as manifested by the devastating Luzon 1990 Earthquake and the catastrophic 1991 eruption of Mount Pinatubo. The tectonic activity is the result of interactions of 3 major tectonic plates, namely: the Pacific, the Eurasian and the Indo-Australian Plates

The Philippines is composed of a series of mobile belts and stable blocks as shown in Figure 11.1.1. The mobile belts are characterized by the frequent activities of earthquakes and volcanic eruptions. The stable or the continental block is represented by northern Palawan, southern Mindoro, Romblon Island Group and Buruanga Peninsula in Panay Island. Rock suites in this block include schists that are characteristically rich in quartz and chert formations that have been dated Late Permian to Jurassic.

The N-S trending Cordillera Central, a 300 km-long and 90 km wide, is one of the major tectonic unit of Northern Luzon. Acid plutonic rocks form the core of the mountain chain, the outer shell of which consists of shallow to deep sea sedimentary rock formations with intercalated volcanics. The uplift of the Central Cordillera batholith started during the Miocene. The Sierra Madre Range likewise consists of the acidic plutonic intrusive bodies. The third morpho-tectonic unit is the Caraballo Mountains, which serve as the connection of the southern segment of the Central Cordillera and the Sierra Madre.

These three morpho-tectonic units form the catchment basin of the N-S oriented Cagayan River Valley. The fault-bounded Cagayan Valley, 200 km long and about 50 km wide, is surrounded by these mountains, except on the northern side.

The rest of the Archipelago is considered as the Philippine mobile belt. Many areas of the mobile belt are underlain by ophiolitic complexes. Ultramafic rocks of these ophiolites are hosts to significant deposits of chromite and nickel. Massive sulphide and manganese deposits are associated with the volcanic and sedimentary carapace of the ophiolite. Ancient magmatic arcs in the mobile belt are characterized by thick volcanic flows intercalated with pyroclastic and sedimentary rocks and intrusions of diorite, quartz diorite and andesitic to dacitic rocks. Younger volcanic rocks, occurring as flows, intrusions and volcanic edifices disposed in linear belts are associated with active subduction zones, best exemplified by the Negros Volcanic belt, Bataan volcanic belt and Bicol volcanic chain. These volcanic flows intercalated with pyroclastic and sedimentary rocks and intrusions of diorite, quartz diorite and andesitic to dacitic rocks commonly have specks of magnetite that were disintegrated from the host rocks during weathering process and eventually transported and concentrated through river systems and through the winnowing actions of waves tides and currents.

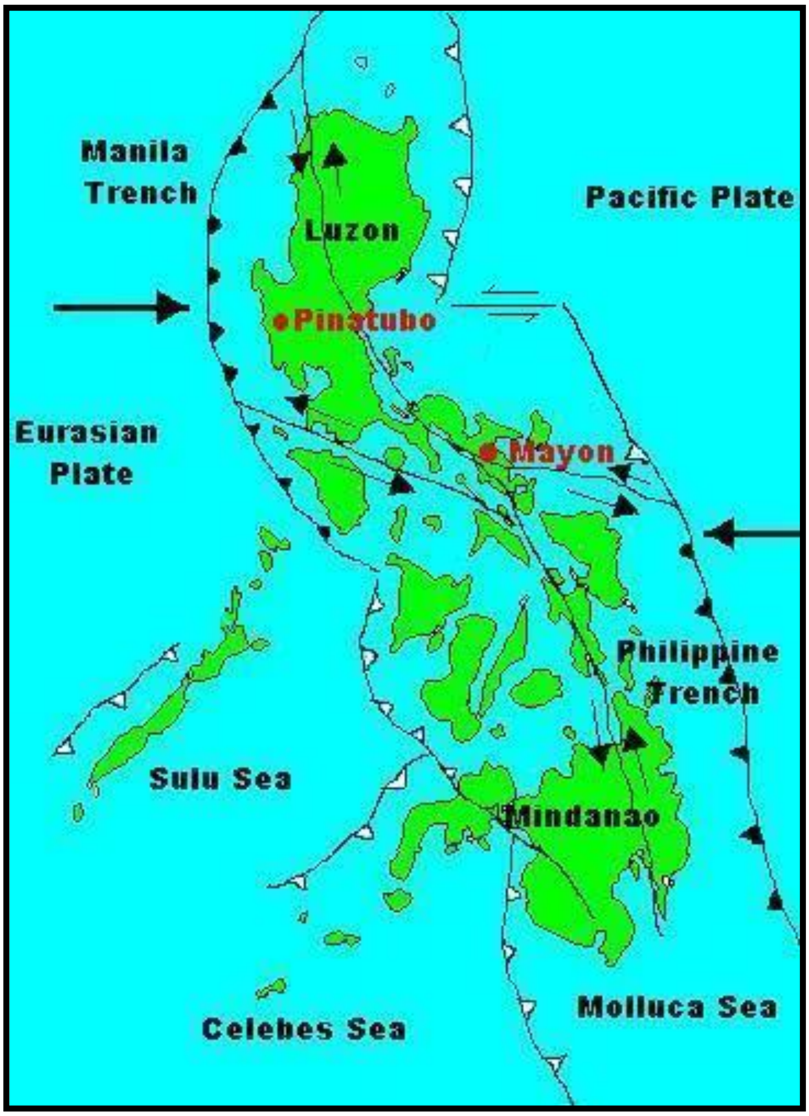


Figure 11.1.1: Major Tectonic Features of the Philippines

Structural and physiographic elements of northern Luzon include (from east to west) the Sierra Madre Range and the Central Cordillera mountains. The Sierra Madre Range is a volcanic arc composed of sialic basement (DeBoer et al., 1980) intermediate (andesitic) igneous rocks, diorite intrusives, metavolcanics, metasediments, and ophiolites that consist of spilite and associated chert (Caagusan, N., 1980). Figure 11.1.2 shows the geologic map of Northern Luzon.

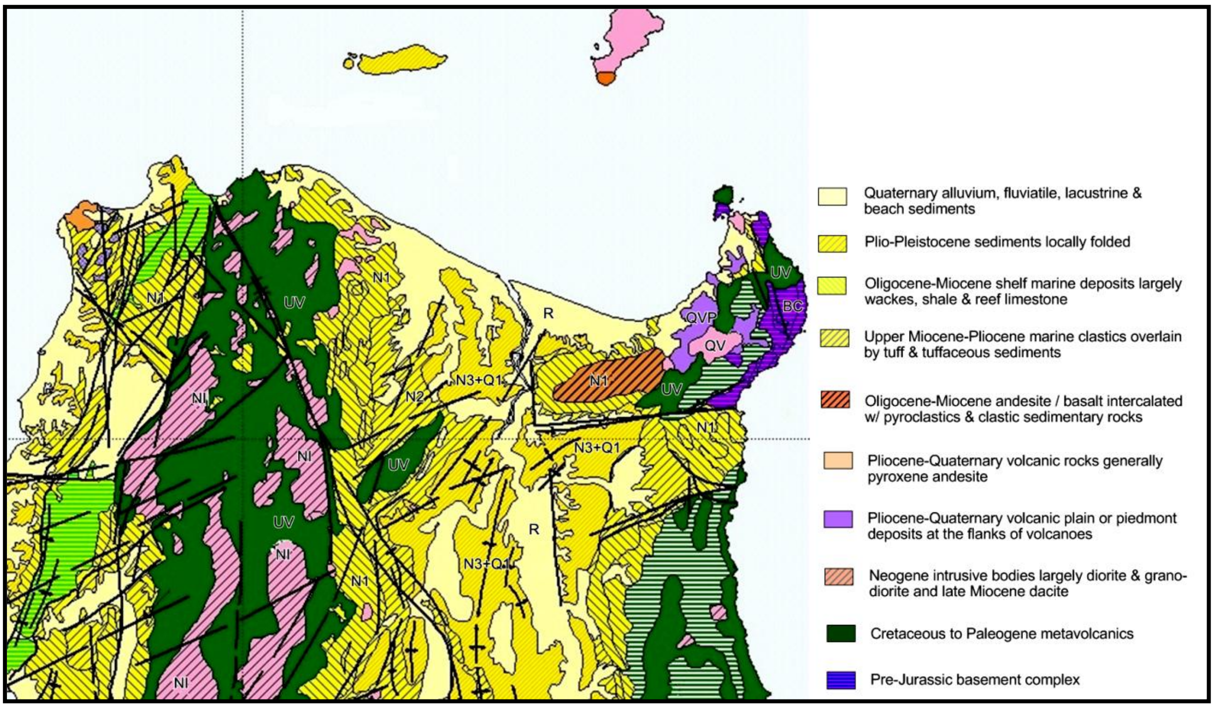


Figure 11.1.2: Regional Geologic Map of Northern Luzon (Geology of the Philippines vol. 1, 2004)

The Neogene Central Cordillera mountains borders the Cagayan Basin to the west and is a volcanic arc composed of mafic to intermediate plutonic rocks, basalt, andesite, metasediments and silicic intrusives and extrusives.

The Cagayan valley is a major intermontane structural basin containing folded and faulted late Tertiary eugeosynclinal deposits measuring 250 kilometers long and 80 kilometers wide. The oldest sedimentary rock in the basin is the Oligocene to Miocene marine sediments consisting of shale, chalk, turbidites and limestone. Regional uplift in the Plio-Pleistocene resulted in the deposition of transitional marine and fluvial sediments of the Ilagan and Awidon Mesa Formations. The latter is a thick sequence of pyroclastic and fluvial sediments that conformably overlies the Ilagan Formation but unconformably overlies the folded Miocene and Pliocene strata in the foothills of the Cordillera.

The coastal municipalities of Cagayan are part of the so called Aparri Basin. It consists mainly of recent beach deposits that had been formed and reworked by a continuous wave action along the coastline fronting Babuyan Channel. According to M.C. Liggayu, BMG, 1966, "*these sandy deposits overlie and veneer (sic) yellow brown, slightly consolidated and roughly bedded magnetite-bearing sandstone which is similar mineralogically and physically to the sandstone interbeds of a formation that contains iron deposits in Camalaniugan.* His report also indicated that "*in Paddaya, Buguey in the same coastline but southeast of the claims towards Gonzaga, this sandstone is exposed at the base of the beach ridge. It is believed that the sandstone underlies and seemingly constitutes the floor and part of the marshy ground, swamps and the alluvial plain.''*

11.2 Stratigraphy

The area of interest has a good potential for magnetite mineralization due to the presence of rock units/lithology that are good source of heavy minerals such as magnetite which are of products of continuous weathering and erosion from the mountains particularly at the northern Sierra Madre. Below are the geologic rock formations in the area and their position in the stratigraphic column as shown in Figure 11.2.1.

11.2.1 Abuan Formation

The Abuan Formation, which was named as Abuan River Formation by MMAJ-JICA (1989), is the oldest formation in the western part of the Northern Sierra Madre and presumably comprises part of the basement of the Cagayan Valley sedimentary sequence. It is a heterogeneous mixture of basaltic to andesitic flows, pyroclastics and sedimentary rocks widely distributed in the southwest part of Divilaca River and northern and western part of Maconacon River. The age deposition of the Abuan formation is inferred to be before Early Oligocene, probably Eocene. The thickness of this formation was not indicated by MMAJ-JICA (1989).

The Abuan Formation is probably partly equivalent to the Caraballo Group, which was named by MMAJ-JICA (1977) for the volcanic and sedimentary rocks comprising the basement of northern Sierra Madre. This was later renamed by Ringenbach (1992) as Caraballo Formation. Its age was previously presumed by MMAJ-JICA (1977) to be Cretaceous-Eocene, but it was later found to be Middle – Late Eocene (Ringenbach, 1992).

The Abuan Formation may be correlated with the Mt. Cresta Formation, which is exposed typically on the slopes of Mt. Cresta and lies scattered on the ridges of the Northern Sierra Madre Range, as mapped by MMAJ-JICA (1989). It is a dacitic complex of lava flows, intrusive rocks, pyroclastic rocks and sedimentary deposits, conformably overlain by the well-bedded Oligocene Masipi Green Tuff of Northern Sierra Madre.

The Dumatata Formation of Huth (1962), which was considered as the basement of the Cagayan Valley sedimentary sequence in BMG (1981), may be regarded as partly equivalent to the Abuan Formation. The Dumatata Formation is composed of an alternation of basic lava flows, partly metamorphosed pyroclastic breccias and tuffaceous sandstones and siltstone. It is about 500 m thick.

11.2.2 Dibuluan Formation

This formation, named by MMAJ-JICA (1989) as Dibuluan River Formation, is found along the western flanks of the Northern Sierra Madre Range. It embodies the principal position of the westward-dipping monoclinical structure of the Cagayan Basin. It unconformably overlies the Abuan Formation and is unconformably overlain by the Ibulao Limestone along Dibuluan River and elsewhere in the southeastern end of the Cagayan Valley Basin (Aurelio and Billedo, 1987). The Dibuluan Formation consists mainly of basic volcanic flows, volcanic breccias and pyroclastic rocks, with interbeds of clastic rocks.

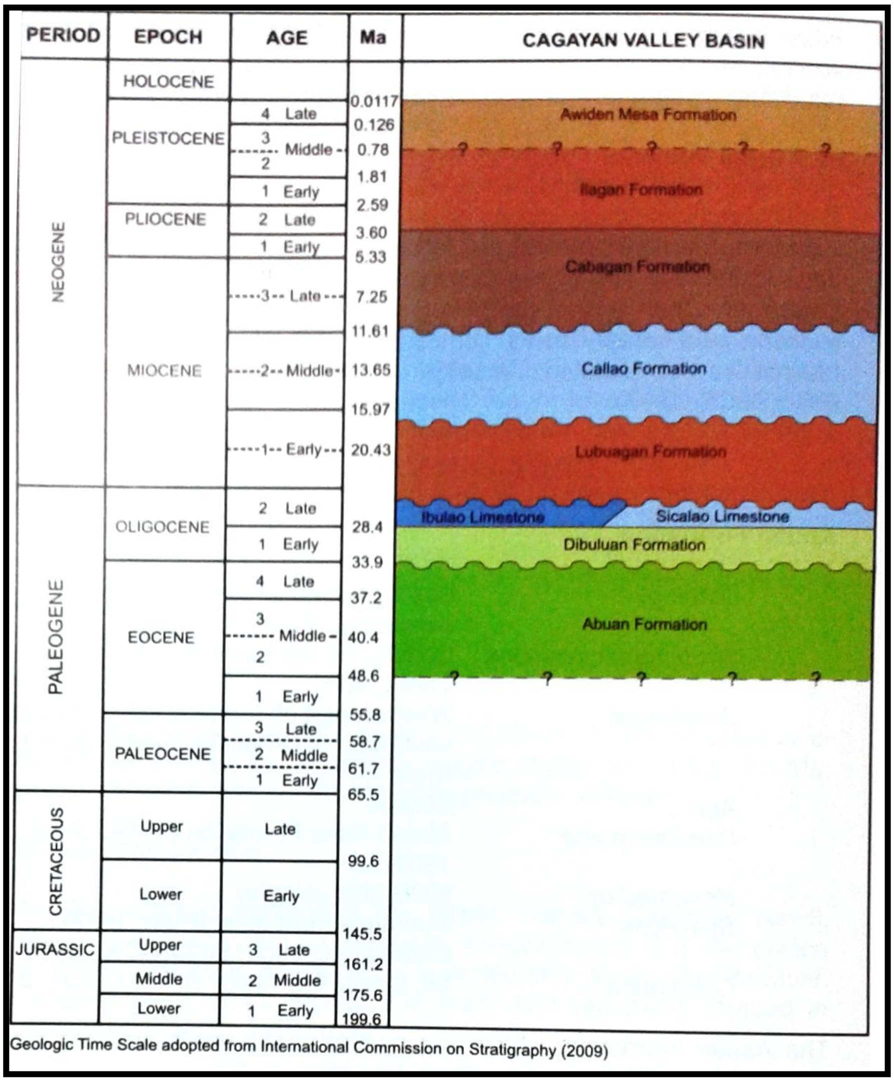


Figure 11.2.1: Stratigraphic Column for Cagayan Valley Basin
(Geology of the Philippines, 2nd Edition, 2010)

The clastic rocks in the lower portions generally consists of well-indurated brownish gray to greenish gray feldspathic wacke with minor intercalated intraformational conglomerate, while the upper portions are marked by thin to medium beds of green siltstone and light green to red, well-indurated mudstone. Radiometric K-Ar dating of a sample of basic lava flow of the Dibuluan Formation gave an age of 29 Ma, equivalent to late Early Oligocene (Billedo, 1994).

This formation is partly equivalent to the Dumatata Formation of Huth (1962) in the southwestern part of the Cagayan Valley basin (see description above). The Dibuluan could also be correlated with the Oligocene Masipi Green Tuff of MMAJ-JICA (1989) in Northern Sierra Madre. The Masipi Green Tuff represents a sequence of parallel-bedded greenish tuff, tuffaceous sandstone and some pyroclastic rocks found at the type of locality, Masipi River, in Cabagan, Isabela. The nannofossils contained in tuffaceous sandstone indicate a Middle to Late Oligocene age (MMAJ-JICA, 1987). Likewise, it could be correlated with the Mamparang Formation of MMAJ-JICA (1977) in the eastern fringe of the Northern Sierra Madre Range. The Dibuluan Formation may also be considered as partly equivalent to the

Lower Zigzag Formation of BED (1986a) and Caagusan (1978), which is estimated to be around 1,800 meters thick.

11.2.3 Quaternary Alluvium

The Cagayan Valley basin is overlain by various assemblages of Quaternary alluvium resulting from weathering and erosion of the older rocks and natural transport of minerals by rivers, wind and current. These are accumulations of detrital minerals or placer minerals that compose most of the Quaternary alluvium within the Cagayan River Valley and the Cagayan Basin.

11.3 Structural Geology

The structural pattern in Cagayan Province is dominated by folded structures in the Plio-Pleistocene sedimentary rocks and numerous parallel faults in the older formations principally the basement rocks and the Cretaceous-Paleogene assemblages. The fold axes in the young sedimentary rocks generally trend north-south and plunge to the north. The faults in the older rocks maybe grouped to two (2) sets according to the general trend. The first set trends N20 - 30^{o}W, and the second set trends N60 – 80^{O}W. Based from their relatively straight configuration, the dips may not vary much from the vertical. The folding and faulting in the area might have arisen in response to the widespread orogenic event that occurred during and after the Tertiary period (Antonio, 1974).

11.4 Mineralization Location(s) and General Description

Generally, the beach sands are the product of weathering, erosion, transportation, and deposition. The heavy minerals in the parent rocks are liberated when the rocks break down by differential weathering. The streams and rivers that cut the highlands carry the stable, heavy minerals down slope and build up the alluvial deposits along the valleys. These deposits are then eventually reworked and sorted by the action of strong ocean currents, winnowed by the wind and the waves, and are laid down in parallel terraces, spits, and sand bars. As the coastline retreats, the parallel terraces, spits and sand bars are left as remnants of the retreating shoreline.

12.0 MINERAL PROPERTY GEOLOGY

12.1 Geological Work Undertaken by the Company in the Property

The early geological work conducted by BGRMC after it acquired the property consisted only of underwater sampling by scuba divers doing shovel diggings at the surface of the sea bed and random sampling at the beaches within the municipalities covered by the original EP application area and initial diamond drilling. These activities yielded good results that prompted BGRMC to convert the EP to MPSA.

After JDVCRC acquired the property from BGRMC, JDVCRC conducted the following exploration activities:

- Geophysical surveys involving magnetic anomaly mapping, seismic reflection profiling, and bathymetry;
- Confirmation drilling at 2,000 meters and additional exploratory drilling at 4,000 meters; and
- On-going mine planning.

These activities shall be discussed in detail in the following sections.

12.2 Rock Types and their Geological Relationships

The lithology of Cagayan is dominated by a broad expanse of sedimentary rocks that range in age from Oligocene to Pliocene-Pleistocene. The rocks overlap and unconformably overlie the Cretaceous-Paleogene rocks on the east and western part of the province. The boundaries of the different rock formations were taken from the Geological map of the Philippines which is the basis of the geological map presented in Figure 12.2.1.

12.2.1 Basement Complex

This rock formation that consists of undifferentiated schist and quartzite are exposed on the northeastern part of the province. The rocks are usually overlain by the Lower Miocene sedimentary rocks. There is very limited information that can be gathered regarding the occurrence of this rock assemblage. It has been observed by recent investigators that the rock formation might be actually a part of the Cretaceous-Paleogene formation.

12.2.2 Cretaceous Paleogene Rocks (NPg-UV)

The rock formations are disposed dominantly at the eastern part of the province with limited occurrence near the boundaries of Ilocos Norte and Apayao-Kalinga province. The rocks consist dominantly of submarine flows, largely of basaltic and andesitic compositions and intercalated with graywackes, metamorphosed shale and occasional conglomerate and chert. The metamorphosed sedimentary-volcanic rocks are generally chloritized and partly silicified. Portions of the formation are pyritized and weakly mineralized.

12.2.3 Oligocene-Miocene Sedimentary Rocks (N_1)

The rock formation is extensively exposed in the eastern highlands unconformably overlying the Cretaceous-Paleogene rock assemblage. A similar extensive occurrence is at the western part outside of the province and extends into the province up to Sanchez Mira-San Jose area. The eastern section shows dominant occurrence of the non-detrital units together with extensive basalt flows possibly intercalated with the sedimentary unit. The extensive basalt flows are exposed from Gonzaga at the northeast and extends to Lal-lo at the central part of the province. The sedimentary sequence is composed of sandstone, shale, limestone and lenses of conglomerate. Coal bands also occur within the sequence. The rock formation is reported to be as thick as 1,500 meters.

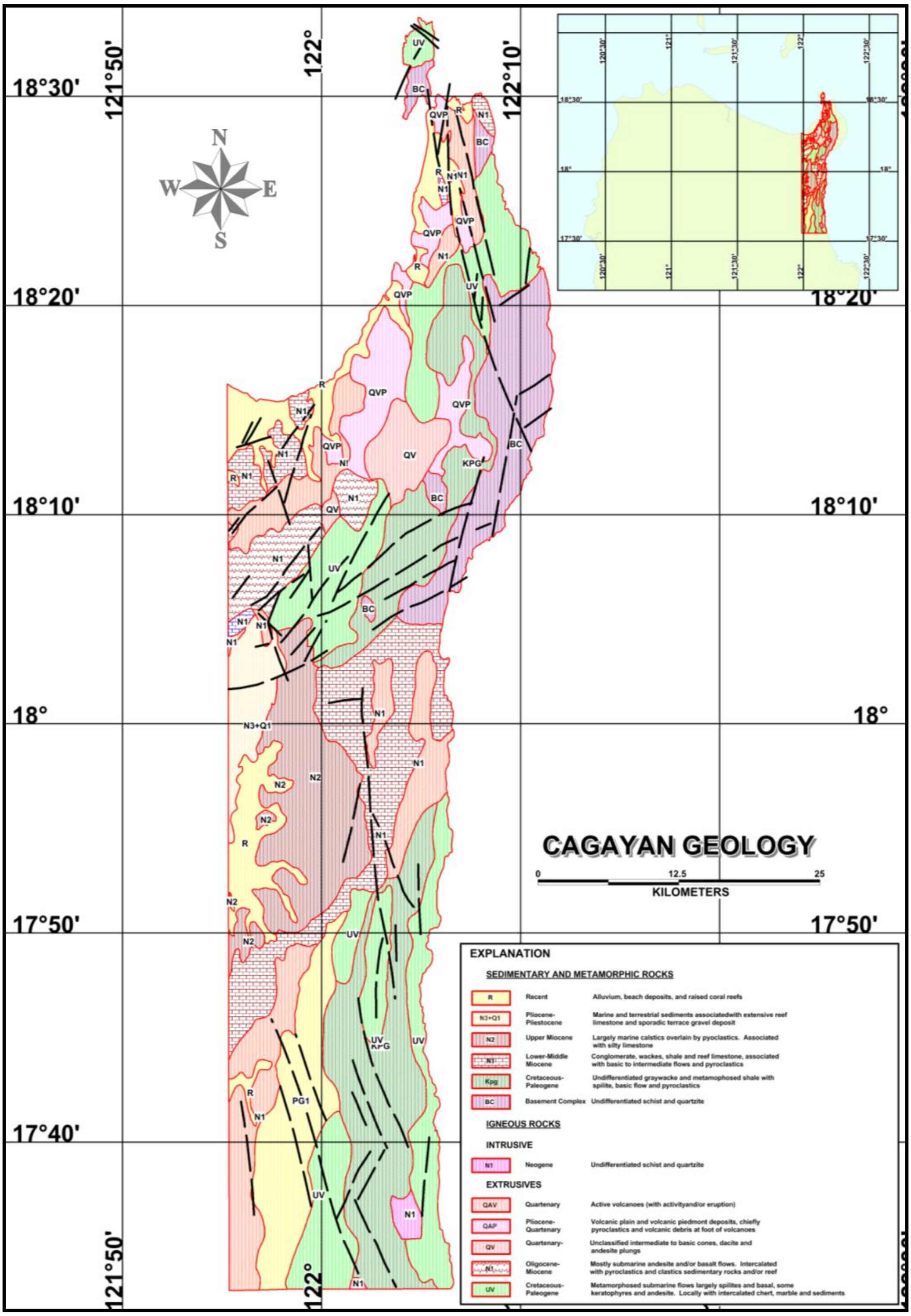


Figure 12.2.1: Geology and Mineral Resources Map of Cagayan (L. R. Antonio, 1974)

12.2.4 Neogene Intrusives (NI)

The intrusive rocks occur in limited exposures at the southeastern boundary of the province with Isabela and at the northwestern boundary with Ilocos Norte. The exposures at the northwestern part probably represent the northern extension of the Agno Batholith that underlies the core of the Central Cordillera. The plutonic complex consists principally of quartz diorite and its related phases.

12.2.5 Upper Miocene Sedimentary Rocks (N_2)

The rock formation is made up mostly of shale and mudstone which grade to limy fossiliferous sandstone. The rock series overlies the limestone member of the Lower Miocene sedimentary rocks. The rocks are exposed in limited extent east of Tuguegarao and in some portions of Tuao. Vergara et al., estimated that the thickness of the formation ranges from 420 to about 1,200 meters.

12.2.6 Pliocene-Pleistocene Sedimentary Rocks (N_3 + Q_1)

The formation is the youngest sedimentary formation and the most extensive in the province. It consists dominantly of sandstone with thin interbeds of shale and lenses of conglomerate.

The formation generally strikes to the north with low to moderate dips. It was reported that the thickness of the formation ranges from 500 to 1,400 meters.

12.2.7 Quaternary Volcanics (QV)

The rock constitutes the basaltic and andesitic cones and/or plugs that underlie most of the volcanic islands of Calayan and Camiguin. They are considered non-active volcanic cones.

12.2.8 Quaternary Volcanic Plain (QVP)

The rock formation is exposed at the northeastern part of the province unconformably overlying the older rock series. They usually surround the volcanic plugs or cones and consist mostly of volcanic (including pyroclastic) materials interbedded with tuffaceous sediments. Perlite and clay deposits are usually associated with the volcanic rocks.

12.2.9 Quaternary Active Volcano (QAV)

The rock is represented by the Camiguin Volcano located at the southern tip of Camiguin Island. The volcano has been known to be active and is the site of most recent explosions.

12.2.10 Alluvium (R)

The quaternary alluvium constitutes one of the most widespread deposits in the province. The deposit consists mainly of unconsolidated gravel, sand and soil along rivers and derived mainly from rock debris of older rock formations in the area.

12.3 Description of Various Geological Structures and their Trends

The structural pattern in Cagayan Province is dominated by folded structures in the Plio-Pleistocene sedimentary rocks and numerous parallel faults in the older formations, principally the basement rocks and the Cretaceous-Paleogene assemblages. The fold axes in the young sedimentary rocks generally trend north-south and plunge to the north. The faults in the older rocks maybe grouped to two (2) sets according to the general trend. The first set trends N20 - 30^{o}W, and the second set trends N60 – 80^{O}W. Based on their relatively straight configuration, the dips may not vary much from the vertical. The folding and faulting in the area might have arisen in response to the widespread orogenic event that occurred during and after the Tertiary period (Antonio, 1974).

13.0 MINERALIZATION IN THE MINERAL PROPERTY

13.1 Overview of the Mineralization

The type of mineralize in the mineral property is iron mineralization consisting of magnetite (Fe_3O_4) concentration in beach and alluvial sand in the seabed of Babuyan Channel. Economic deposits generally contain 15 to 30 percent magnetite or magnetic fraction (MF) which can be concentrated by magnetic separation to yield about 55 to 62 % Fe. The magnetite concentrate usually contains impurities of titanium and vanadium which interfere with the smelting process, thus lowering the quality of the iron ore; however, the value of the magnetite concentrate is however enhanced when the titanium and/or vanadium content are high enough to produce special steel.

13.2 Type of Mineralization as Mapped

The beach sands are the product of weathering, erosion, transportation, and deposition. When the parent rocks break down by weathering, the heavy minerals therein are liberated. The creeks and rivers carry the liberated heavy minerals downslope and build up the alluvial deposits along the valleys. These deposits are then eventually reworked and sorted by the action of strong ocean currents, winnowed by the wind and the waves, and are laid down in parallel terraces, spits, and sand bars. As the coastline retreats, the parallel terraces, spits and sand bars are left as remnants of the retreating shoreline. In the offshore deposits, the heavy minerals are carried by the current along the channel and deposited in the more silent and stable portions of the channel.

13.3 Style of Mineralization

Mineralization is generally an accumulation of the heavy minerals, the deposition of which is directly related to the prevailing conditions of current and sediment load (nature of materials in the water). Alternating periods of changing current and sediment loads may result to alternating bands of magnetic sand deposits. The sediments, whether sand-sized or mud-sized, are generally dark gray when wet. There are some very well sorted very fine sand samples which have a greenish tinge, which may be due to the presence of chlorite or chloritic alteration in the lithic fragments. The roundness of the sediments is noted to be related to grain size as coarser grains, which are usually lithic fragments, are more rounded while liberated minute grains are commonly sub-angular to sub-rounded. Very fine sand is made up of approximately 25-30% lithic fragments while medium sand is composed of approximately 40-60% lithic fragments. Coarse sand is rarely observed in the cores.

When present, coarse sand fragments usually occur in a subtle mixture with medium sand components. Among the minerals identified include magnetite, pyrite, plagioclase, quartz, chlorite, pyroxene, olivine, amphibole, mica ± hematite and calcite. The presence of magnetic components was initially determined using a magnet pen.

Sorting ranges from very well sorted to very poorly sorted. Sections of moderate to very poorly sorted sediment sizes usually contain relatively higher percentage of shells and/or shell fragments. Mollusk shell fragments and foraminifera are the most common biogenic matter discerned, regardless of the grain size of sediments and core depth. In several cores, bivalve beds are consistently present. Mud (silt and/or clay), and even muddy sand, sections appear to be more consolidated. When well-sorted, coarser grains result to higher permeability and loose compaction. The amount of material with a longitudinal diameter of more than 2 mm, whether gravel or biogenic matter, are also estimated.

13.4 Wall Rock Alteration, Paragenesis

Considering the type of deposition of the magnetite sand which is alluvial in nature and considering the stable nature of the magnetite mineral, no distinct alteration is observed in the associated sand deposit. The only observable trace of iron in the ground is the reddish rusty deposit that develops over time in containers used in bailing out water from the shallow wells dug within the sand deposit in the coastal communities in the municipalities within the northern and eastern Cagayan or in concrete surfaces where water from these wells flow.

Beach and offshore placer mineral deposits are formed and concentrated through the winnowing action of waves, tides and currents. Placer minerals should have high density, mechanical durability and chemically resistant in order for them to accumulate on high energy depositional environment. Heavy mineral deposits accumulate within the beach face and further inland during unusually high wave energy as in during typhoons.

As the waves, tides and currents approach the shore, they bring with them both the heavy and light minerals. Upon their retreat, they leave behind denser materials while carrying lighter ones. This process continues for years and decades and results in the natural accumulation of placer heavy minerals including magnetite sand. The rock formations that may have contributed as source of magnetite and other associated placer minerals include the volcanic, diorite intrusive and sedimentary derivatives of Abuan Formation and Dibuluan Formation.

These volcanic flows intercalated with pyroclastic and sedimentary rocks and intrusions of diorite and andesitic commonly have specks of magnetite that were disintegrated from the host rocks during weathering process and eventually transported and concentrated through river systems and through the winnowing actions of waves, tides and currents. The magnetite sand may also have been derived from younger sedimentary rocks as reworked derivatives. The rivers that bring down detritus from upstream may also deposit their load within the river mouths where their velocity is considerably reduced.

13.5 Geological Structures

The observable dominant geologic structure in the tenement area is the submarine canyon that seems to separate the two different physiographic settings observed from the bathymetric survey conducted in the area. These physiographic feature consists of the eastern portion of the project area which is generally characterized by shallower (~35 meters to 75 meters water depth) water and gently sloping seabed and the western portion which is characterized by deep to very deep water (water depth ranging from 100 meters to more than 300 meters) and steeply sloping landscape.

13.6 Localization of the Deposit

The accretion of non-consolidated sediments in and around the concession tenements of JDVCRC results from the occurrence of various depositional environments. Foremost are the interplays of fluvial, marine and coastal environments. These depositional environments have been discussed in the preceding discussions on the paragenesis of the magnetite sand.

13.7 Length, Width, Depth of Mineralization

The drainage system which has the most significant influence on the project area is the Cagayan River. The Cagayan River, meandering in a generally north-south direction, originates in the Caraballo Mountain Range and discharges its load into the Babuyan Channel of the Luzon Strait. Being the longest river in the Philippines and having the largest catchment area, its downstream portion has an annual sediment transport capacity of approximately 5 million cubic meters (Oosterberg, 1997). These sediments carry the magnetite minerals which are then carried by the current and deposited in the Babuyan Channel up northwest towards Sanchez Mira and beyond and up northeast towards Sta. Ana and Palui Island.

The analysis of the seabed topography based on seismic reflection profiling has indicated thicker sediment sequences in the offshore area east of the mouth of the Aparri River. This inference is substantiated by the results of the seismo-stratigraphic examination of the seismic profiles as will be discussed in Section 14.5. As graphically illustrated in the profiles, the total thickness of sediments runs up to approximately 26 meters consisting of four (4) distinct units that will be discussed in later sections of this report. The total sediment thickness of magnetite bearing horizons comprising of Unit 1, Unit 2 and Unit 3 range from 10 to 26 meters. Unit 4, which is overlying the basement rock is composed of very fine-grained mud. The deeper seabed on the western portion of the area resulted in the faint reflections due to decay of seismic signal as they travel longer distances.

13.8 Element Grade Levels and Patterns

The physical and chemical properties of the black sand are largely dependent on the mineral composition and size of the grain particles that make up the sand. The amount of quartz, feldspar, limestone, corals and other light colored particles may render the sand shades of gray color; the abundance of clay particles may give it shades of brown color, while the predominance of magnetite, hornblende and other dark-colored minerals may render it black or gray or even greenish.

To be able to establish the grade levels and patterns, JDVCRC dispatched selected core samples from the confirmation sampling activities to the Intertek Testing Services Philippines, Inc. (Intertek) for homogenization, X-ray fluorescence (XRF) analysis, and particle size distribution (PSD).

Without processing, the raw samples from 0 to 20 meters, sampled at 5-meter intervals returned only 10% to 25% Fe; however, after manual separation of the magnetic from the non-magnetic materials, the same samples returned up to 61% Fe on the average. The results of the test is tabulated in Table 13.8.1 which shows also the results for 24 other minerals including Loss on Ignition (LOI) and additional data on grain size analysis. The same increasing trend was also observed for other minerals such as Cao, Co, MnO,TiO_2, V_2O_5, Zn and LOI; however, inverse pattern has been observed on Al_2O_3, Ci, K_2O, MgO,Na_2O, SO_3, SiO_2 and Zr. No appreciable changes were observed on As, BaO, Cr_2O_3, Cu, Ni, P_2O_5, Pb and Sn.

This test also shows that the samples are dominantly made up of the coarser sand components; with most of the liberated grains recovered being within the +75 µm fraction (93% for the raw sand and 88% for the magnetite concentrate). The pictures of the samples showing the relative grain sizes are shown in Figure 13.8.1.

The actual Report of Analysis for this test is attached in this report as Appendix-2.

COARSE SAND SAMPLE (Gonzaga Area)
0-5 Meter Depth (Iron Grade = 24.94)

FINE SAND SAMPLE (CONCENTRATE) Gonzaga Area
0-5 Meter Depth (Iron Grade= 60.50)

Figure 13.8.1: Pictures Showing the Raw Sand and Magnetite Concentrate Samples

Table 13.8.1: Summary of Chemical and Sieve Analysis of Selected JDVCRC Core Samples

		Raw Sand, Stage 1, 0-5M.	Raw Sand, Stage 1, 5-10M.	Raw Sand, Stage 1, 10-15M.	Raw Sand, Stage 1, 15-20M.	Magnetite Concentraate, Stage 2, 0-5M.	Magnetite Concentraate, Stage 2, 5-10M.	Magnetite Concentraate, Stage 2, 10-15M.	Magnetite Concentraate, Stage 2, 15-20M.	Magnetite Concentraate, Stage 2, 0-5M. ®	Coarse Sand	Fine Sand
CHEMICAL ANALYSIS (XRF)	Fe	24.94	47.29	27.89	10.24	60.50	61.49	60.37	61.78	60.71		
	Al_20_3	10.01	4.37	9.25	11.14	2.42	2.00	2.35	2.00	2.42		
	As	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
	BaO	0.024	0.029	0.022	0.020	0.025	0.025	0.023	0.023	0.024		
	CaO	4.39	3.23	4.97	13.05	0.69	0.65	0.69	0.64	0.69		
	Cl	0.101	0.076	0.226	0.249	0.023	0.011	0.017	0.011	0.019		
	Co	0.006	0.009	0.005	<0.005	0.011	0.011	0.012	0.012	0.012		
	Cr_20_3	0.055	0.109	0.052	0.016	0.052	0.047	0.050	0.045	0.055		
	Cu	0.005	0.007	0.007	0.005	0.008	0.007	0.008	0.007	0.008		
	K_20	0.69	0.16	0.62	0.83	0.07	0.04	0.07	0.04	0.07		
	MgO	3.02	2.58	2.93	2.92	1.52	1.35	1.47	1.36	1.51		
	MnO	0.37	0.64	0.41	0.24	0.67	0.70	0.68	0.70	0.67		
	Na_20	1.98	0.53	1.96	2.58	0.13	0.06	0.13	0.07	0.13		
	Ni	0.008	0.006	<0.005	<0.005	0.006	<0.005	0.008	0.006	0.006		
	P_20_5	0.158	0.270	0.152	0.105	0.208	0.298	0.238	0.300	0.210		
	Pb	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
	SO_3	0.126	0.026	0.168	0.259	0.012	0.011	0.021	0.011	0.012		
	SiO_2	37.92	13.28	34.25	43.54	2.92	1.59	2.79	1.58	2.91		
	Sn	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
	Sr	0.024	0.008	0.026	0.055	<0.005	<0.005	<0.005	<0.005	<0.005		
	Ti_20	3.48	7.36	3.79	1.26	6.61	7.03	6.52	7.07	6.63		
	V_20_5	0.225	0.413	0.255	0.083	0.575	0.558	0.550	0.561	0.574		
	Zn	0.029	0.053	0.032	0.012	0.068	0.068	0.069	0.070	0.067		
	Zr	0.030	0.064	0.028	0.007	0.010	0.010	0.008	0.010	0.010		
	LOI	1.34	-1.47	1.87	9.51	-2.22	-2.58	-2.55	-2.56	-2.31		
SIEVE ANALYSIS	+75µm										92.97	87.9
	+53µm										4.08	5.04
	+38µm										1.26	2.7
	-38µm										1.69	4.39

13.9 Development of "Ore Shoots"

Strictly speaking, the term "ore shoots" is more appropriate for vein-type deposits and not applicable to layered deposits such as magnetite sand.

13.10 Continuity of Mineralization

Geologically, the continuity of mineralization of magnetite sand in fluvial-marine depositional settings is determined by the action of currents and waves. Basically, in fluvial settings, the magnetite will be of stringer type following the stream channels; in marine settings, the magnetite sand is developed over wide areas along a general specific direction parallel to the coast/ strand line.

As blanket deposits, there will be a highly continuous trend in a specific direction and a similar, but intermediate range in the perpendicular direction. Expectedly, the vertical direction will be of the shortest range.

14.0 EXPLORATION

14.1 Geological Work (by issuer)

The exploration activities conducted in the area consisted mainly of bathymetric survey/seabed profiling, seismic reflection survey, initial diamond drilling and sampling, physical and chemical analysis of core samples, initial resource estimation and confirmation/infill drilling. These activities are discussed in the following sections.

14.1.1 Geological Data Generated from Mapping and Surface Sampling

There are no records of data generated from mapping and surface sampling either from BGRMC, or the new owners of the property which is JDVCRC. While surface sampling of the sea bed was conducted simultaneous with the seabed profiling, no results of analysis nor sampling maps were provided by JDVCRC.

14.1.2 Geological map and sections

The construction of geological map is not practical considering the project is located offshore and surface mapping is nearly impossible. However, as will be discussed later, geophysical methods of exploration were conducted consisting of bathymetric survey and seismic reflection profiling, which have established the profile of the sand deposit. The interpreted sand profiles are shown as sections and discussed in detail in Section 14.5.

14.1.3 Samples location map

As already stated in 14.1.1, no samples location map was provided by JDVCRC; however, drillhole location maps were produced and presented in the following sections.

14.2 Surface sampling

14.2.1 Outcrop sampling (Confirmation Sampling)

No outcrop sampling of hard rocks was conducted inasmuch as virtually all magnetite sand is in the near surface and subsurface, below the soil and overburden.

14.2.2 Trench Sampling

No trench sampling was conducted as the area is offshore and under water wherein water will inundate any excavations made; thus trenches were never used. Trenching of subhorizontal accumulations of magnetite sand is inappropriate.

14.2.3 Test Pit Sampling

For the same reasons cited in 14.2.2, test pitting was not used as the main exploration method during the actual detailed exploration.

14.3 Drilling and Sampling

14.3.1 Type of Drilling Program

Considering the impracticability of surface exploration methods such as surface sampling, test pitting and trenching, JDVCRC resorted to diamond drilling to be able to get samples for analysis to serve as basis for an accurate evaluation of the mineral resources in the tenement area.

The plan of JDVCRC was to drill holes on the offshore waters covering the project area in order to validate the presence of magnetite at depth and to locate the magnetite occurrences which are of economic value for commercial mining operations in future. Earth Moving and Drilling Machinery Corporation, the drilling contractor engaged by JDVCRC, used three (3) motorized boats connected together by marine wood provided at the center with a space where a small rotary diamond drill rig (Longyear-38 Model) is installed as shown in Figure 14.3.1.1. The drilling operation was duly supervised by a licensed geologist Mr. Louis T. Santos of JDVCRC.

Generally, the holes were initially laid out on 300-meter x 300 meter-grid at a consistent vertical depth of 110 meters to determine the general profile of the seabed that extends through the sand horizon to the bedrock.

The core recovery ranged from a low of 68% to a high of 95% at a 5-meter vertical interval. The notable result highlighted in all the 83 drilled holes was the homogenous character of the magnetite iron sand mineral within the 4,998.2358-hectare area drilled, both vertically and horizontally. While the water depth ranges from 36 to 68 meters, with an average of 52 meters, the observed thickness of the magnetite sand or black sand horizon is about 20 meters. The rest of the horizon consists of the coarser materials underlain by the basement rock formations.

Figure 14.3.1.1: A Longyear 38 Rotary Drill mounted in 3 interconnected boats

Strict protocols in drilling, core logging, sampling and physical and chemical analyses were observed during the drilling operation to ensure that the highest QA/QC controls were maintained.

Cores were transported from Offshore to On Shore Site facility in Aparri, Cagayan of Earth Moving and Drilling Machinery Corp. for picture taking, logging, tagging and core box numbering, prior to shipment to Quezon City administrative office of JDVCRC.

Properly labeled and logged core samples were taken at five (5) meters interval, then, dried under the sun prior to sending to Intertek laboratory for the first stage raw grade test and manual process magnetic separation for the second stage chemical analysis.

Core Boxes with respective tags, meter log, hole depth labels are stored in JDVCRC's administrative office for Inspection by third party appraiser.

JDVCRC engaged the services of Earth Moving and Drilling Machinery Corporation to conduct a confirmatory drilling inside the 4,999.23-hectare portion of the MPSA contract area for the initial offshore mining development. The same drilling protocols are being followed, except for the drilling depth, which is now maintained at 20 to 25 meters, just immediately after the sand horizon. A total of 11 drill holes were completed and located in the contract area within the municipal waters of Gonzaga, Buguey and Aparri (portion). The initial results of the completed holes are presented below in Table 14.3.1.1. They will be shown graphically later in Chapter 15. The geographic coordinates of the said 4,999.23-hectare portion of the MPSA contract area are shown in the attached Appendix 1 (Table 14.3.1.2).

Table 14.3.1.1: Summary of Drillhole Data

ID	From (m)	To (m)	%MF	%Fe
GN18	0	5	26.58	62.05
GN18	5	10	43.87	61.53
GN18	10	15	24.89	60.45
GN18	15	20	12.58	62.58
GN33	0	5	22.56	62.53
GN33	5	10	41.89	61.52
GN33	10	15	23.63	61.23
GN33	15	20	11.65	62.03
GN48	0	5	24.87	60.58
GN48	5	10	46.55	62.12
GN48	10	15	25.41	62.35
GN48	15	20	12.66	60.09
GN58	0	5	24.94	60.50
GN58	5	10	47.29	61.49
GN58	10	15	27.89	60.37
GN58	15	20	10.24	61.78
GN68	0	5	26.98	60.38
GN68	5	10	43.15	62.58
GN68	10	15	23.89	61.06
GN68	15	20	13.56	61.74
GN68	20	22	18.86	60.53
GN30	0	5	3.23	59.69
GN30	5	10	21.01	61.80
GN30	10	15	20.71	61.38
GN01	0	5	59.3	
GN02	0	5	45.2	
GN03	0	5	46.7	
GN04	0	5	45.4	
GN05	0	5	39.7	

14.3.2 Drill Site Spacing, Depth of Drilling

The main constraint for a detailed or close-interval drilling program in the offshore environment is the problem on the difficulty of establishing the stability of the drilling platform due to big waves in the area most of the time of the year. The only window available for a stable drilling platform is during October where the sea is relatively calm. To be able therefore to drill as much holes as possible, the drill spacing should be optimized or be kept as long as possible. This can only be attained if the consistency of the sand horizon can be established. This was made possible by the conduct of the seismic reflection survey which is discussed in a separate section. It was established in this survey that the sand horizon which contains the economic values of magnetite sand ranges in thickness of about 25 meters on the easternmost portion of the tenement, tapering towards the west to about 10 meters. The seismic reflection survey, as explained in Section 14.5, generated about 270 points that are spaced at a maximum of 500-meter interval on the N-S direction and a maximum of 1,000-meter interval on the E-W direction. Each of these points has its own coordinates, elevation, and the individual thicknesses of the sand horizons (Stratigraphic Units). These data were used to establish the consistency of the possible magnetite sand-bearing horizons accurately.

Based on the data gathered from the seismic reflection survey, the drillhole spacing programmed for Parcel A is 2,000 meters with an average drilling depth of 20 meters; while for Parcel B-1, it is 4,000 meters, with an average drilling depth of 5 meters.

14.3.3 Core Logging

The cores recovered from the core barrel are put on the core boxes and labeled accordingly in the field. Core logging is conducted by the assigned geologist after the cores are inspected and prepared for sampling and core photography as will be explained in the following section. The samples are logged in accordance with the details required, as indicated in the geologic log sheet: color, dominant grain size, roundness, sorting, % lithic fragments, % biogenic matter, minerals visible, % oversize, and other comments (e.g. compaction, relative hardness, etc.).

After the core log is finalized, it is immediately encoded to preserve the record for merging with the assay analysis results later.

14.3.4 Drill core sampling method and interval

14.3.4.1 Core Sampling

The sealed core boxes are delivered to the core shed in Aparri, along with the diamond drilling monitoring sheets every time the vessel docks (ideally, every 3 to 4 days unless in cases of interruptions such as unfavorable sea conditions, equipment breakdown, etc.). At least one geologist is in-charge of logging and supervision at the vessel. Core processing steps are described in detail below and shown graphically in Figure 14.3.4.1.1.

- Retrieval of Cores from the Core Barrel: Upon retrieval of the cores from the core barrel, the core is placed in a core tray 1-meter long. The core is measured and photographed with the proper label immediately. The geologist on board the drill platform immediately logs the core, taking note of the color, dominant grain size, roundness, sorting, % lithic fragments, % biogenic matter, minerals visible, % oversize, and other comments (e.g. compaction, relative hardness, etc.)

- Core Bagging, Labeling, Packing: After Core logging and photography, each 1-meter interval core is placed in a pre-labeled polyethylene bags and then sealed. Once all the samples for one hole is completed, all the samples are packed together, covered with sample transmittal and chain of custody form for shipment to Intertek-Manila through the Aparri Office of JDVCRC.

- Sample Preparation at Intertek-Manila: At Intertek-Manila, the shipment of sample is checked for completeness against the transmittal and chain of custody form. If everything is complete, the samples are dried, weighed and mixed thoroughly. An appropriate amount of sample is taken for XRF, sieve and density analyses are taken and an equal amount is also taken, labeled and packed separately for delivery to Mines and Geosciences Bureau-Manila. The Intertek samples are analyzed accordingly.

- The MGB samples are picked up by JDVCRC personnel and delivered to MGB-Quezon City for Magnetic Fraction (MF) determination and metallurgical tests when needed. The excess samples are also retrieved by JDVCRC from Intertek. They are then arranged in core boxes and properly labeled for storage and safekeeping.

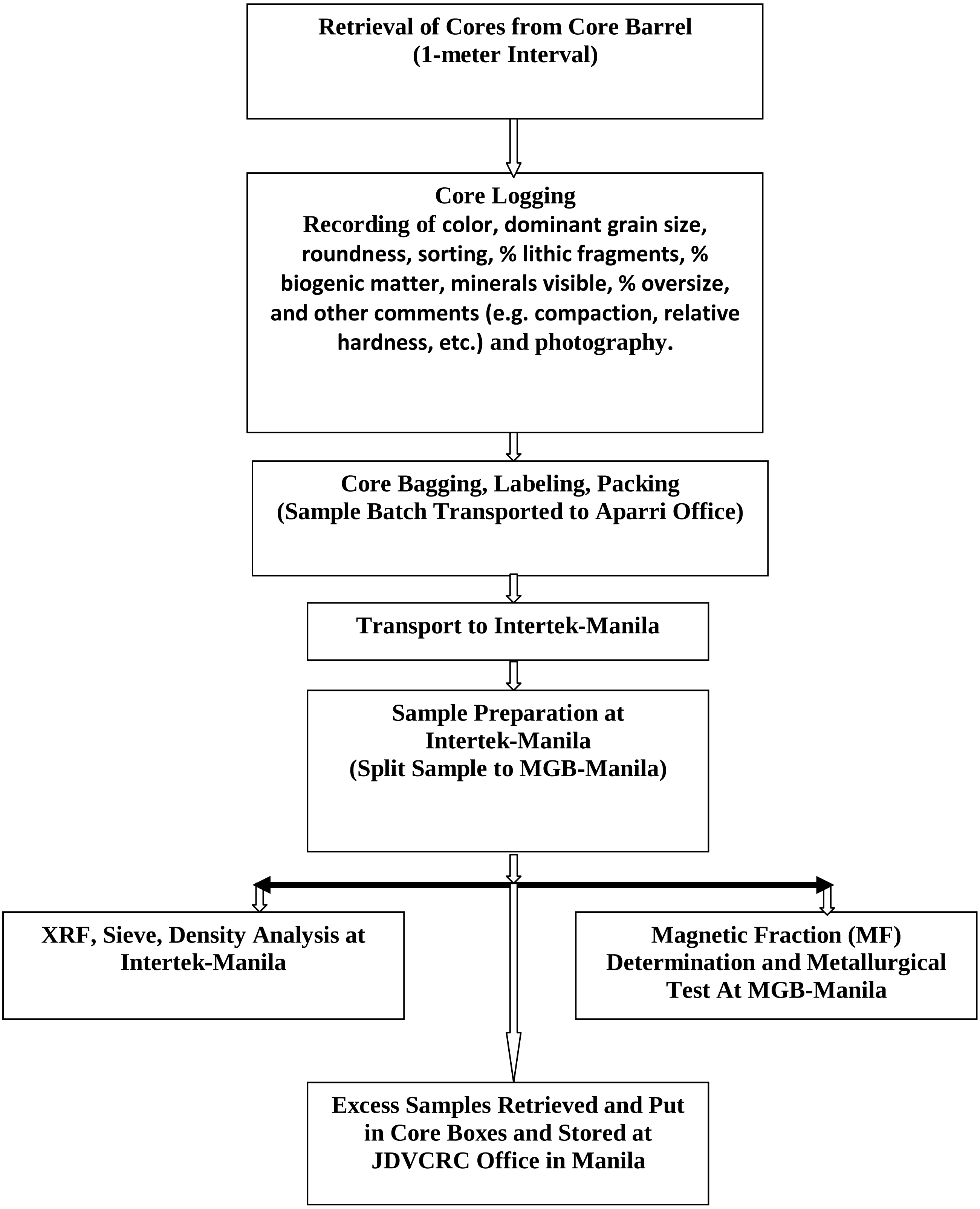


Figure 14.3.4.1.1: Core Processing Flowsheet

14.3.4.2 Drill Hole Surveying and Topographic Surveying

The holes are laid out using a hand-held GPS of the drilling contractor, which is subscribed to a satellite network in the USA.

The topographic surveying, as will be discussed later was conducted through bathymetric survey. The bathymetric survey was carried out using a dual frequency Teledyne Echotrac MK-III high precision echo sounder set at frequencies of 200 KHz and 33 KHz. A total of 452 line-kilometers of bathymetric traverses were accomplished to produce a more detailed and precise bathymetric map in the area. Figure 14.5.3.2 shows the actual traverse lines within the eastern segment of the JDVCRC tenement area. The dotted gray lines represent the additional bathymetric measurements.

Surfer V.11 software was used in constructing bathymetric contours and 3-D representation of the seabed. An example of the contours generated from the bathymetric survey is shown later in Section 14.5.5.

14.3.4.3 Core Recovery

To ensure 100% core recovery, a slight modification was introduced in the conventional rotary drilling method. Instead of using the split-spoon sampler or the conventional core lifter, a fabricated flapper was attached to the end of the inner tube of the core barrel. This flapper was used in combination with a jar weight which drives down the drill stem instead of rotating the rod through the drill head. The flapper opens to ensure that the sand sample goes inside the core barrel as the stem is driven down; and it closes to prevent the content of the inner tube when the stem is pulled out.

Using the method discussed above, and using the conventional formula for determining the core recovery, the resulting average computed core recovery is 90%, which is highly acceptable enough considering the difficulty in recovering cores in sandy formation.

14.4 Exploration Geochemistry (by issuer or previous work)

14.4.1 Geochemical Survey Type

Aside from the sampling methods described earlier (diamond drilling), no other geochemical methods were conducted in the project. Even the previous works conducted by previous Bureau of Mines and Geosciences workers used only onshore geochemical sampling methods of exploration.

14.4.2 Sampling and Analytical Methods Employed

Drillcore sampling has been described in the preceding sections. All analytical methods (XRF, Sieve analysis, Density measurement, etc, are done on 5-meter composite samples instead of the 1-meter original samples to save on costs. The analytical method used in determining the magnetic fraction (MF, in %) is through the use of a Dings Davies Tube (DT); chemical analysis for Fe and 14 other minerals including loss in ignition are done using the X-ray fluorescence (XRF) analyzer, while particle size distribution (PSD) is done using a root 2 series of sieve sizes.

For the Davis Tube test, a magnetic intensity of 3,200 Gauss was used and the glass tube was inclined at an angle of approximately 35°C. Unless insufficient in weight, a 500-gram split was taken for DT wash. Prior to XRF analysis, samples had to be pulverized to 75 µm (95% passing) and fused with the aid of lithium borates at 1050°C. A wavelength dispersive XRF spectrometer was used to analyze absolute concentrations of iron (Fe) and other major and minor elements. A certified reference material (standard) was inserted after every 25 samples analyzed and a replicate analysis was completed for every 10 samples analyzed. Elements and oxides analyzed under Intertek's iron sand package included: Fe, $Al2O_3$, CaO, Cr_2O_3, K_2O, MgO, MnO, Na_2O, P, SO_3, SiO_2, TiO_2, V_2O_5. Per cent loss-on-ignition (LOI) was determined by subjecting the samples to a temperature of 1000°C. XRF analysis was conducted on the composite sample as well as on the magnetic and non-magnetic fractions where the weights were sufficient for analysis. The pulp reject of the composite sample was submitted to MGB for DT Recovery (DTR).

Particle Size Distribution analysis was conducted on the composite sample. For the PSD, a root 2 series of sieve sizes was preferred. This consisted of 12 sieves with a maximum opening size of 1,700 µm and a minimum of 53 µm.

14.4.3 Background, Threshold, and Anomaly Levels for the Elements Determined

Offshore mining of magnetite sand, which is the mining method to be employed in the project, is rather unique because it is done underwater by mechanical dredging where all materials that can be extracted and pumped up from the sea bed are fed to the magnetic separators. Thus, practically the entire volume of material is magnetically segregated; thus, it is not entirely appropriate that background, threshold, and anomaly levels are determined. However, considering the industry restrictions in the marketing of the expected iron fine products, it is important that the said levels in the important minerals such as Iron, Titanium, Vanadium, and even rare earth minerals are considered. It is for this reason that the company opted to have the samples analyzed by XRF method wherein simultaneous determination of %Fe, %Al_2O_3, %CaO, %Cr_2O_3, %K_2O, %MgO, %P_2O_5, %SiO_2, %V_2O_5, %As, %BaO, %Cl, %Co, %Cu, %MnO, %Na_2O, %Ni, %Pb, %SO_3, %Sn, %Sr, %TiO_2, %Zn, %Zr and Per cent loss-on-ignition (LOI) is possible on a single run.

14.4.4 Synthesis and Interpretative Techniques

This report is the synthesis of all the geochemical assays available in the project, and the interpretation approach is statistical/geostatistical based on the geological domains assigned.

14.4.5 Geochemical Anomalies Detected

Drilling confirmed the presence of high valued intervals of magnetite in most holes driven. These high values, together with the rest of the data, were modeled conventionally using the polygon method for resource estimation.

14.4.6 Relationship of Geochemical Findings to Geology and Mineralization

It will be shown later in resource estimation that the Fe grades are almost consistent horizontally in the raw sand deposit, however, certain portions of the area drilled are either enriched or relatively low in magnetite.

14.5 Applied Geophysics (by issuer or previous work)

14.5.1 Geophysical Methods Used

A marine geophysical survey was carried out within Parcels A and B-1 of the MPSA contract area in April 2015 located in Gonzaga, Buguey and Aparri (portion), Cagayan to provide sub-surface information on the stratigraphy, character and structure of unconsolidated sediments. The survey consisting of high-resolution seismic reflection profiling and continuous bathymetric measurements was undertaken primarily to precisely map water depths, characterize submarine topographic features, subsurface stratigraphy of consolidated sediments and to identify, delineate and map areas with potential economic occurrences of magnetite bearing sand bodies in the area.

High-resolution seismic profiling was carried out simultaneous with bathymetric measurements along pre-determined survey tracklines. Traverse lines were oriented almost perpendicular to the general trend of the shoreline and spaced at 500 to 1,000 meters interval. Figure 14.5.1.1 shows the proposed traverse lines within the eastern segment of the mineral tenement of JDVCRC covering/adjoining the municipal waters of Ballesteros, Aparri, Buguey and Gonzaga, Cagayan. The traverse lines running NNE-SSW and NNW-SSE were spaced at 1 km interval with the option of using a closer interval (i.e. 500-meter) in areas where on-site preliminary analysis of the data indicates promising sites.

The high-resolution seismic reflection profiling and bathymetric measurements were run simultaneously at ship's speed of 4 to 5 knots (7.2 to 9 kilometers per hour). The picture in Figure 14.5.1.2 shows a schematic representation of the seismic reflection and bathymetric surveys.

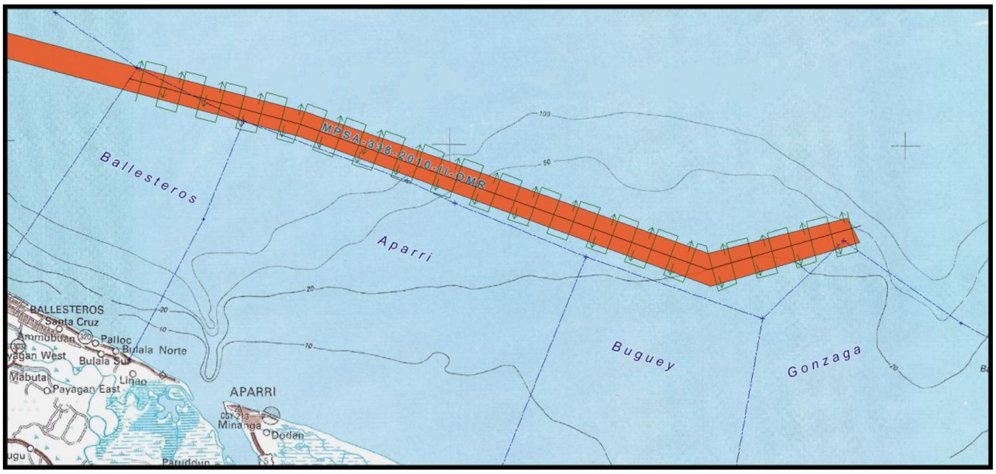


Figure 14.5.1.1: Pre-determined Tracklines Along the Eastern Segment of the JDVCRC Tenement

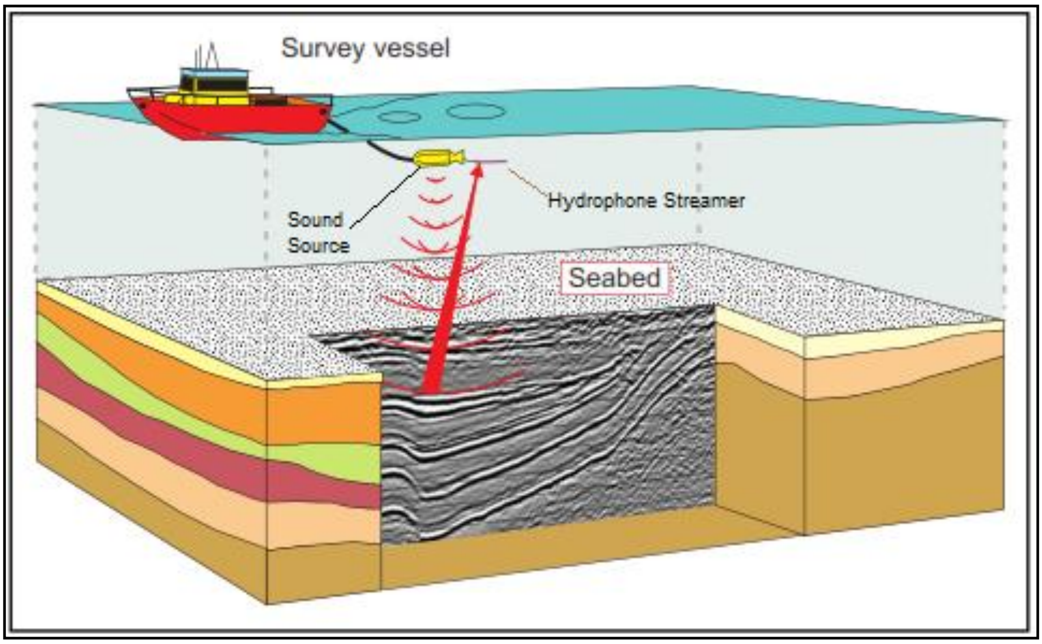


Figure 14.5.1.2: Schematic Representation of Seismic Reflection and Bathymetric Surveys

14.5.2 Geophysical Contractor

The complete set of the seismic reflection survey equipment was sourced from Hydronav Services (Singapore) Pte Ltd on contract rental basis including the assignment of field technician during the course of the survey.

14.5.3 Equipment Used, its Limitation and Survey Parameters

Seismic reflection profiling is accomplished by towing a sound source that emits acoustic energy in timed intervals behind the ship. The transmitted acoustic energy is reflected from the boundaries between various layers with different acoustic impedances (e.g. water-sediment interface or between stratigraphic units). Acoustic impedance is defined by the density of the medium and the sound velocity within that medium. The reflected acoustic signal is then received by the ship hydrophone streamer. The receiver amplifies and converts the reflected signal to analog signal. The analog signal is digitized, displayed and logged with a high-speed computer and plotted on a paper.

Seismic data can be used to identify variations in the subsurface materials, their character and extents. By measuring the two-way travel times for the seismic waves to travel to the various lithological units and back to the receiver, the depth of the horizons can be precisely estimated using appropriate sound velocities. Figure 14.5.1.2 illustrates the principle of seismic reflection survey.

The seismic reflection survey within the mineral property of JDVCRC was carried out using the Applied Acoustics sparker seismic equipment consisting of the following components as shown in Figure 14.5.3.1:

Sound source : Squid 2000 multi-tip electrodes mounted on Catamaran; HVC-2000 power cable; RMK

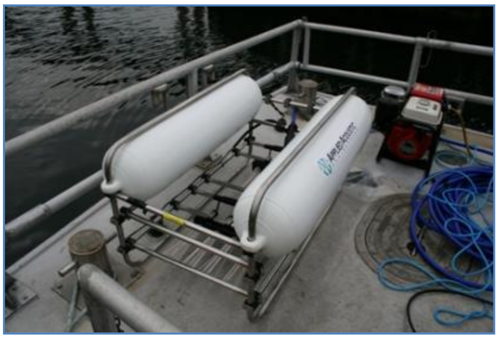
Energy Source : CSP-D 1200 swithchable output energy, 50 to 1200 joules per second

Hydrophone : Streamer cable (AH-250) with 12 element Hydrophones with pre-amplifier

Data Acquisition : Seismic data acquisition and processing System

The complete set of the seismic reflection survey equipment was sourced from Hydronav Services (Singapore) Pte Ltd on contract rental basis including the assignment of field technician during the course of the survey.

The Delph Seismic Analog Acquisition Unit was used as central control and signal processing module.



a) Squid 2000 sparker array

b) HVC-2000 high power cable

c) CSP-D2000 capacitor bank

d) 12-element hydrophone streamer

Figure 14.5.3.1: Seismic Reflection Survey Equipment

The bathymetric survey was carried out using a dual frequency Teledyne Echotrac MK-III high precision echo sounder set at frequencies of 200 KHz and 33 KHz. A total of 452 line-kilometers of bathymetric traverses were accomplished to produce a more detailed and precise bathymetric map in the area. Figure 14.5.3.2 shows the actual traverse lines within the eastern segment of the JDVCRC tenement area. The dotted gray lines represent the additional bathymetric measurements.

Surfer V.11 software was used in constructing bathymetric contours and 3-D representation of the seabed.

In summary, the marine geophysical survey undertaken in the JDVCRC property and its immediate surroundings consisted of high-resolution seismic survey, magnetic profiling and bathymetric measurements. The survey was undertaken primarily to map and characterize the seabed topographic features, subsurface stratigraphy of unconsolidated sediments and delineate potential economic occurrences of magnetite sand and other associated minerals in the area. The interpretations deducted in these studies also served in the interpretation of the drilling results which later resulted in the formulation of the parameters use in the classification of mineral resources.

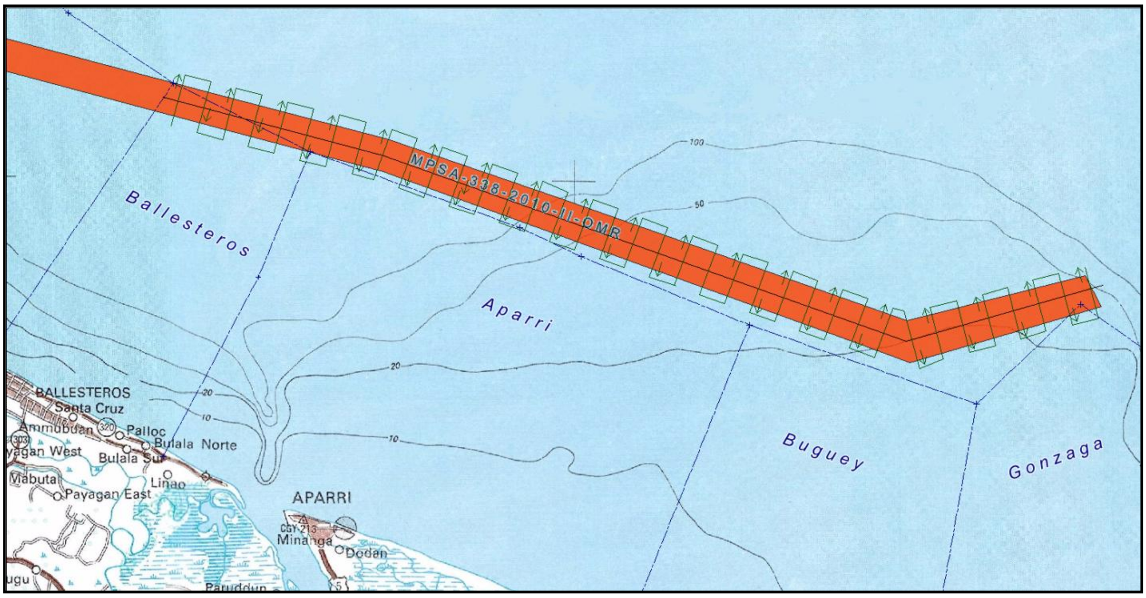


Figure 14.5.3.2: Location of Actual Traverse lines Within the Eastern Segment of the JDVCRC Tenement

14.5.4 Methodology

As explained in 14.5.1, a high-resolution seismic profiling was carried out simultaneous with bathymetric measurements along pre-determined survey tracklines. Traverse lines were oriented almost perpendicular to the general trend of the shoreline and spaced at 500 to 1,000 meters interval. Figure 14.5.1.1 shows the proposed traverse lines within the eastern segment of the mineral tenement of JDVCRC covering/adjoining the municipal waters of Ballesteros, Aparri, Buguey and Gonzaga, Cagayan. The traverse lines running NNE-SSW and NNW-SSE were spaced at 1 km interval with the option of using a closer interval (i.e. 500-meter) in areas where on-site preliminary analysis of the data indicates promising sites.

The high-resolution seismic reflection profiling and bathymetric measurements were run simultaneously at ship's speed of 4 to 5 knots (7.2 to 9 kilometers per hour).

14.5.5 Results with Respect to the Objective

The marine geophysical survey undertaken in the study area generated a total of 187.3 line-kilometers of high-resolution seismic reflection data and a total of 377.3 line-kilometers of bathymetric data. The additional echosounder measurements of about 190 kilometers were accomplished in order to get a more precise seabottom topographic configuration of the submarine delta within and adjacent to the municipal waters of Aparri, Buguey and Gonzaga, Cagayan. Figure 14.5.3.2 shows the actual traverse lines within the study area.

The deltaic sediment sequence is believed to compose largely of progradational sediments that potentially host possible economic occurrences of magnetite and other associated minerals.

Analysis of the bathymetric contours shown in the NAMRIA 1:250,000 topographic map (Figure 14.5.1.1) indicates contrasting submarine topography of the seabed east and west of the mouth of Cagayan River. A gentler slope of the seabed prevails on the eastern side of offshore Cagayan from the mouth of Cagayan River towards the town of Santa Ana. In contrast, the seabed west of Cagayan River shows a moderate slope of about -1.4% slope from the shoreline of the town of Ballesteros to a distance of 3,600 meters (where the -50 meter contour is encountered) seaward. The slope of the seabed from the Town of Buguey to a distance of 24,500 meters (up to -50 meter contour line) has a relatively gentler slope of about -0.2%.

Result of the bathymetric survey of the eastern segment of MPSA-338-2010-II-OMR is shown in Figures 14.5.5.1 and 14.5.5.2. The bathymetric contours are presented at 5-meter interval.

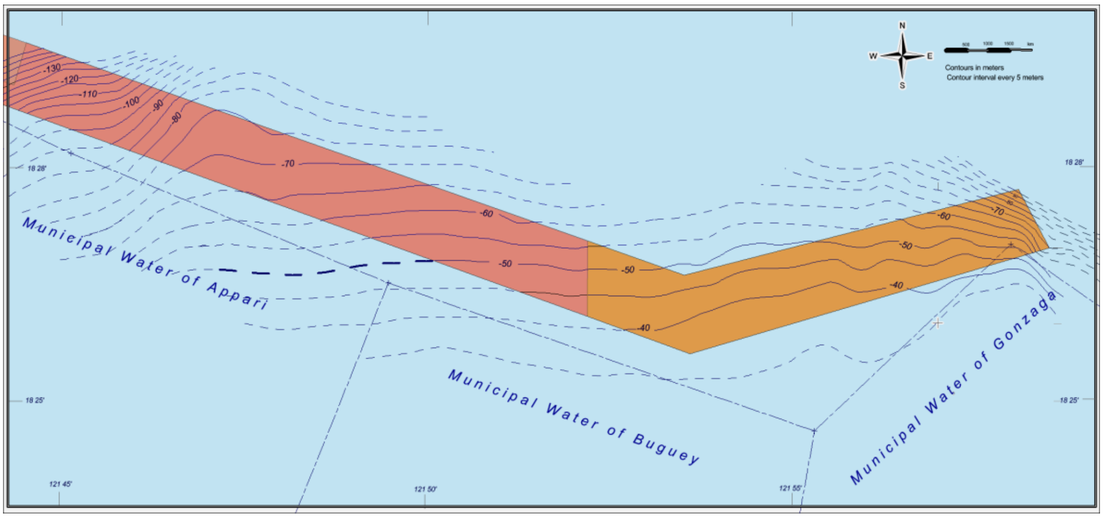


Figure 14.5.5.1: Bathymetry of the Eastern Segment of MPSA-338-2010-II-OMR

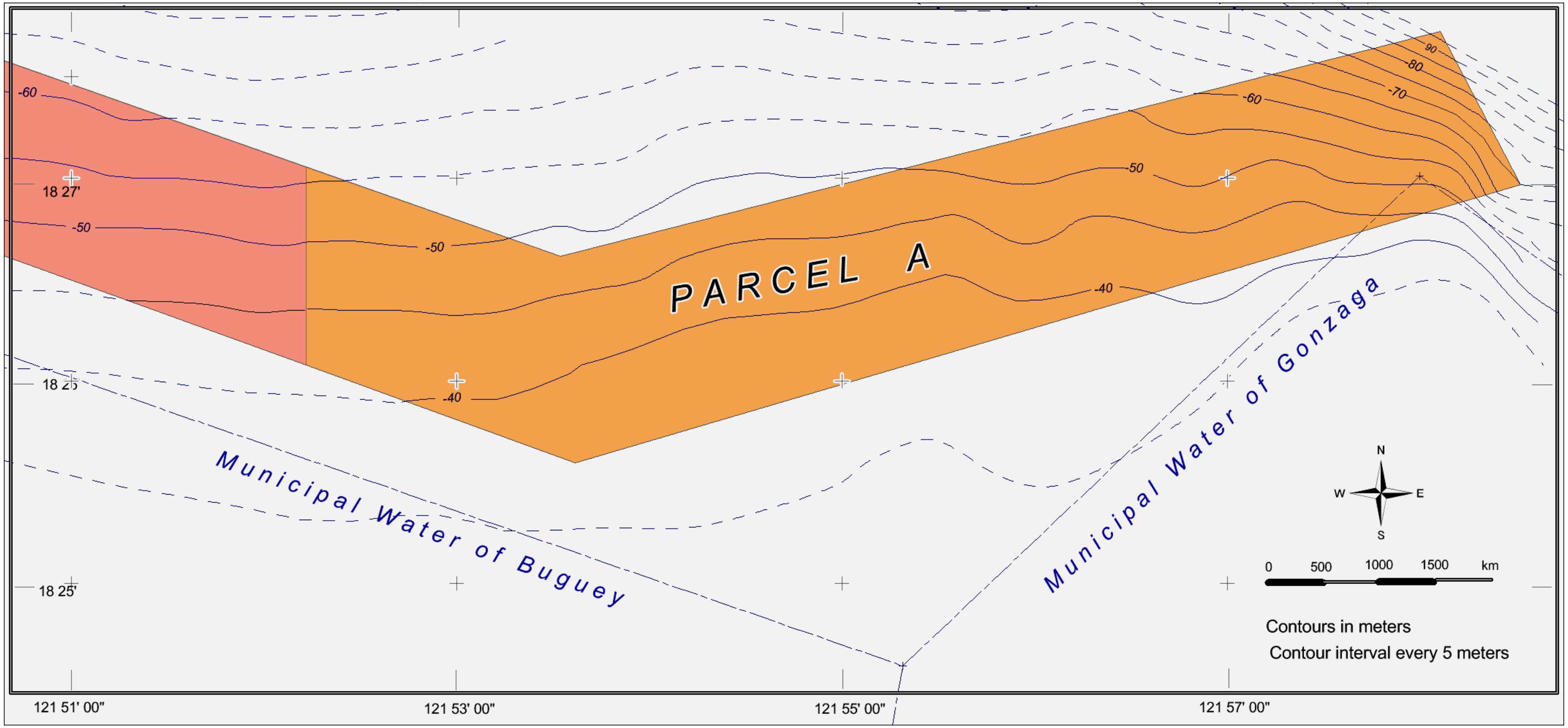
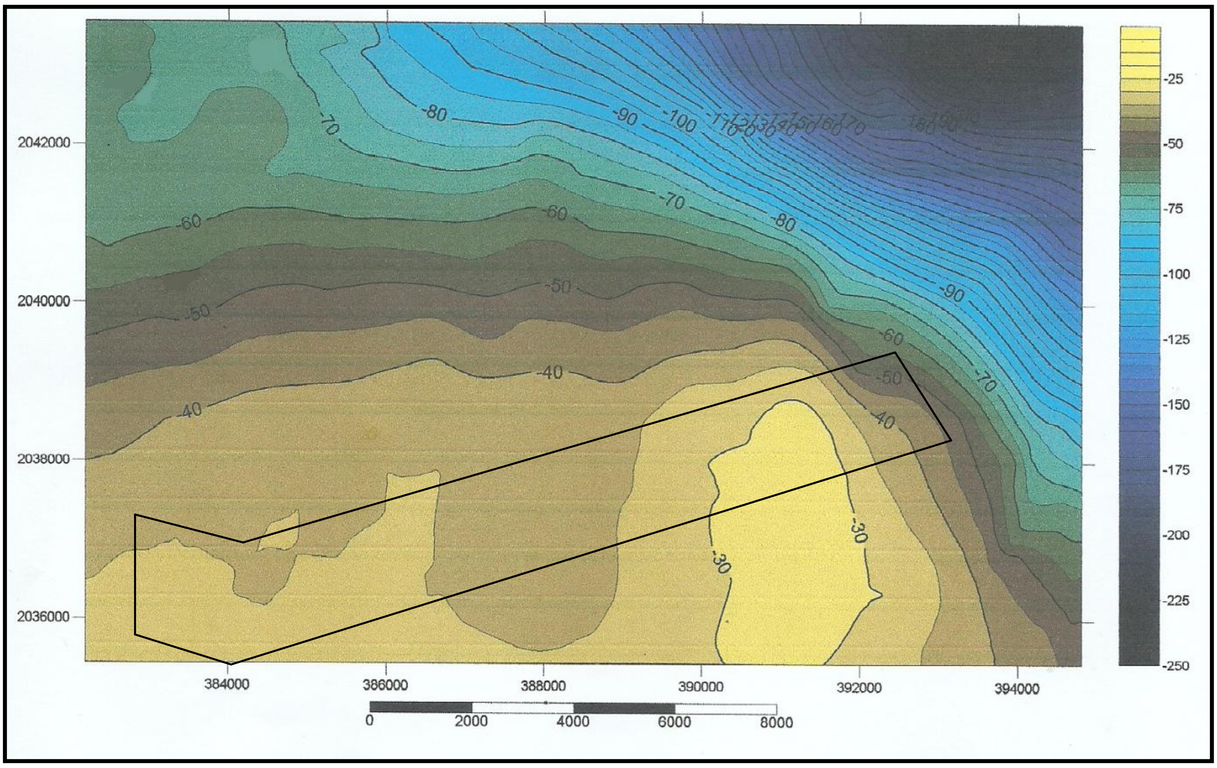


Figure 14.5.5.2: A More Detailed View of the Bathymetry of the Eastern Segment of the Tenement Area.

Figures 14.5.5.3 and 14.5.5.4 graphically present the color-filled contour maps and 3-D presentations of the seabed of the eastern portion of MPSA-338-2010-II-OMR.



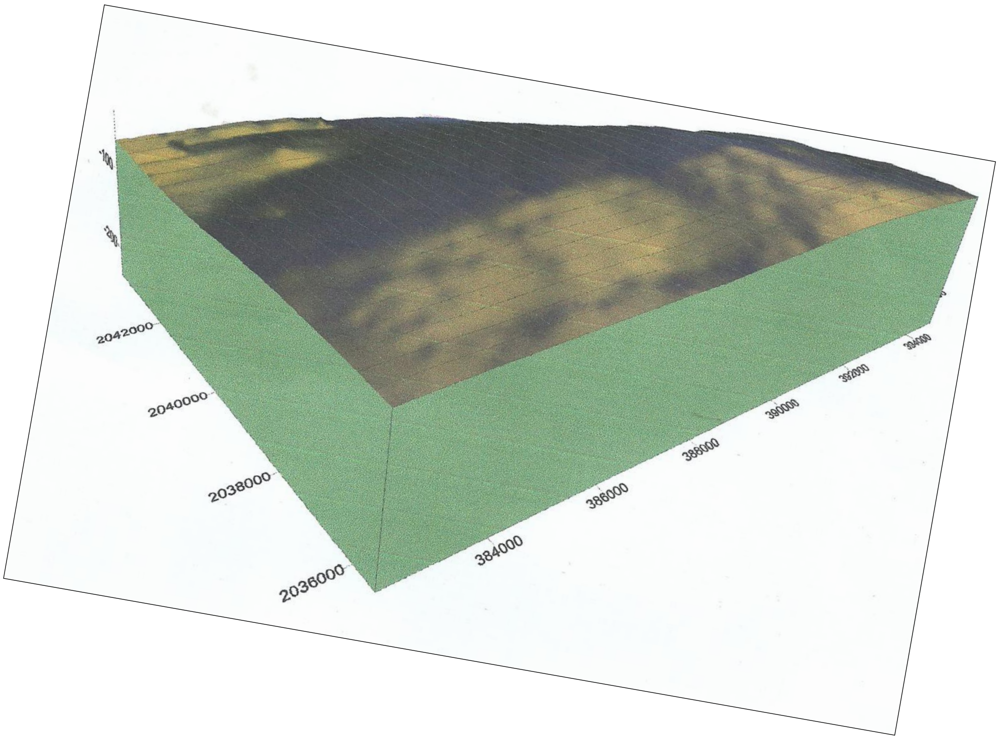
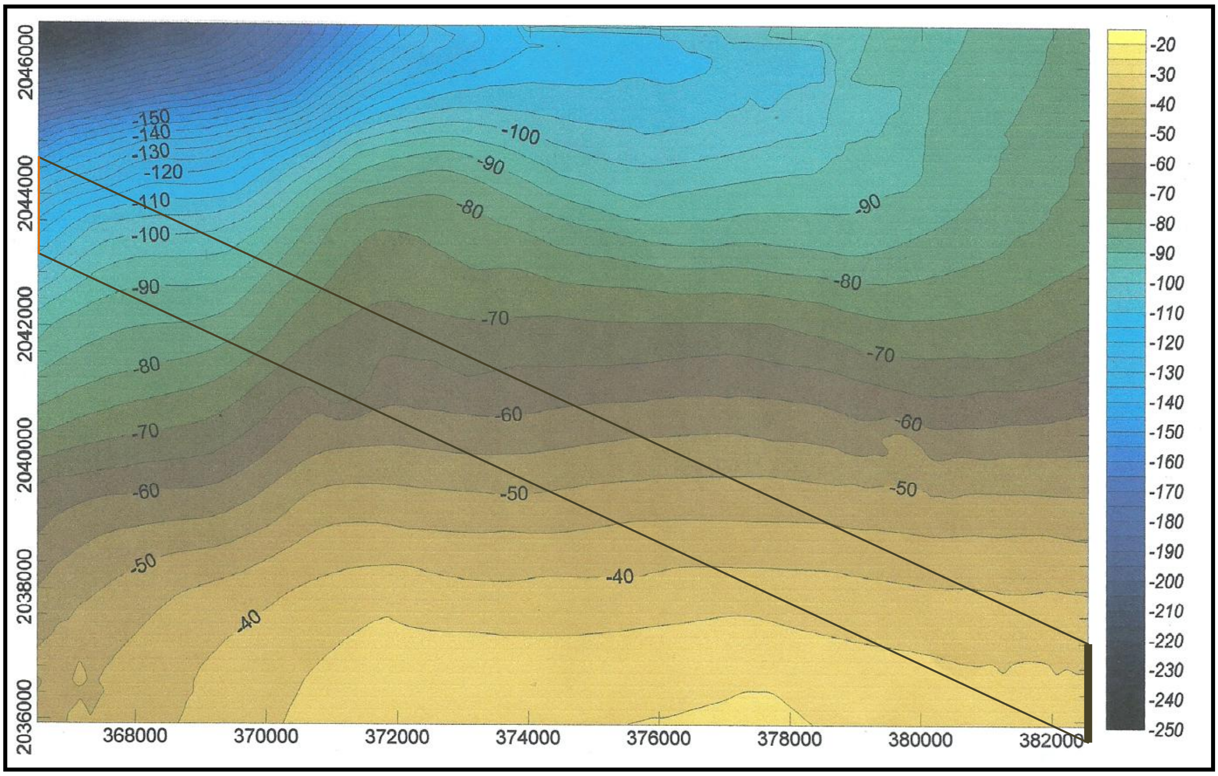


Figure 14.5.5.3: Color-filled Bathymetric Map of the Easternmost Segment of the JDVCRC Tenement Area



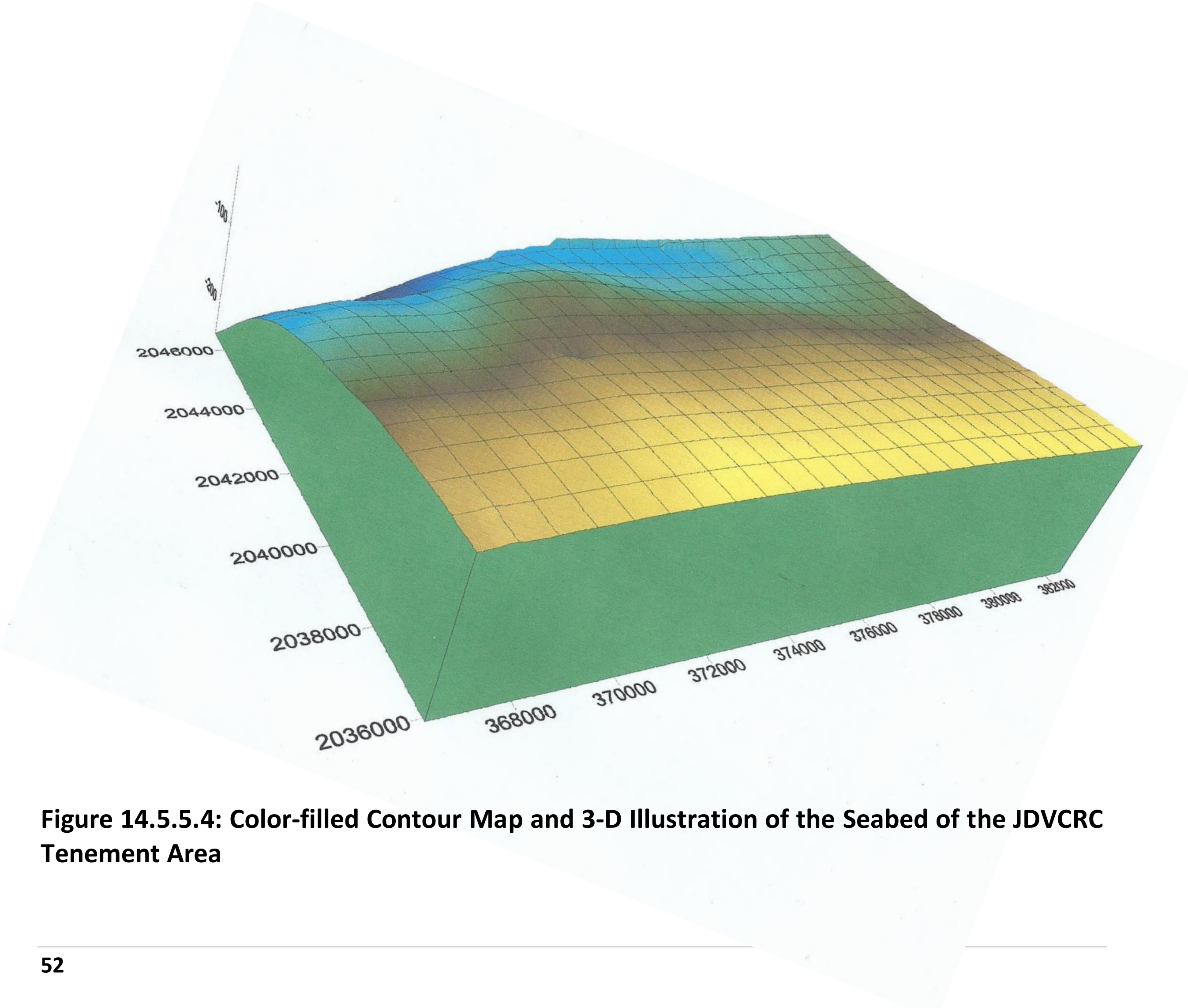


Figure 14.5.5.4: Color-filled Contour Map and 3-D Illustration of the Seabed of the JDVCRC Tenement Area

The most prominent seabottom topographic feature of offshore Cagayan is the submarine delta situated east of the mouth of the Cagayan River. As illustrated in Figures 14.5.5.3 and 14.5.5.4, the seabottom from the coast of Buguey and vicinity gently slopes toward the north to about 100-meter isobath but becomes steeper further offshore. The latter defines the flanks of the delta.

Huge quantity of riverine sediments transported by Cagayan River to Babuyan Channel is believed to have caused the delta built up. The deflection of part of Kuroshio Current towards the Babuyan Channel coupled by the constriction on its exit as well as the opposing northeasterly current from the West Philippine Sea and South China Sea have caused the clockwise circulation toward the delta area. Subsequently, the resulting strong undercurrent could have also caused the migration of very fine sediments towards the deeper part of Babuyan Channel.

In the seismic reflection profiling method, sound pulses are continuously emitted by the seismic source (multi-electrode sparker) towed behind the survey vessel. As the pulses reach the sea floor, some signals are reflected back towards the sea surface (so called as direct arrivals) while the rest are refracted down towards the sub-bottom. The refracted pulses are again partially reflected and further refracted as these encounter surfaces of high density contrast (or more precisely, varying acoustic impedance). Most of the reflected sound waves are then received by the hydrophones contained in a streamer likewise towed about 15 meters behind the survey platform and a few centimetres (ideally +/- 10 cms.) below the water surface. Electrical signals are then created in response to the pressure changes caused by the arriving pulses. These are transmitted into the onboard noise/wave band pass filtering system to eliminate unwanted signals. The "sound images" of the sub-bottom profiles are then printed on a continuous roll of thermal paper through a graphic recorder. The horizontal scale is in meters, i.e. numbered fix marks every 50 m., while the vertical scale is in milliseconds. The travel time are converted to depth using the velocity of sound waves in marine sediments of 1,540 meters/sec. Using these values, sections showing the various sediment units and the probable acoustic basement surface can be delineated.

Analysis and interpretation of marine geophysical data gathered in the tenement area led to the identification and mapping of seismo-stratigraphic units and subsequently led to the delineation of areas that may potentially contain economic concentrations of magnetite sand, particularly along the eastern segment of the tenement area. These areas predominantly consist of layers or horizons with progradational characteristics of sediments exhibiting sigmoidal to oblique reflection characteristics.

In most instances, these layers are overlain by fluviatile to shallow marine sediment sequences. Figure 14.5.5.5 shows the generalized seismo-stratigraphy of nearshore sedimentary sequences, showing the several progradational sediments (Units 2 and 3) representing stages of delta build up along coastal environment. The progradational sequences consisting of mostly of fine to coarse grained sand grade into finer sediments (clay and silt) seaward (Unit 1). The latter unit in offshore Cagayan generally consist of silty fine sand as the fine sediments are washed away by the circulating under current in the Channel.

In some instances, the most recent prograded sediments lie on top of the previously formed sequence giving rise to thick deposits of sand bearing horizons.

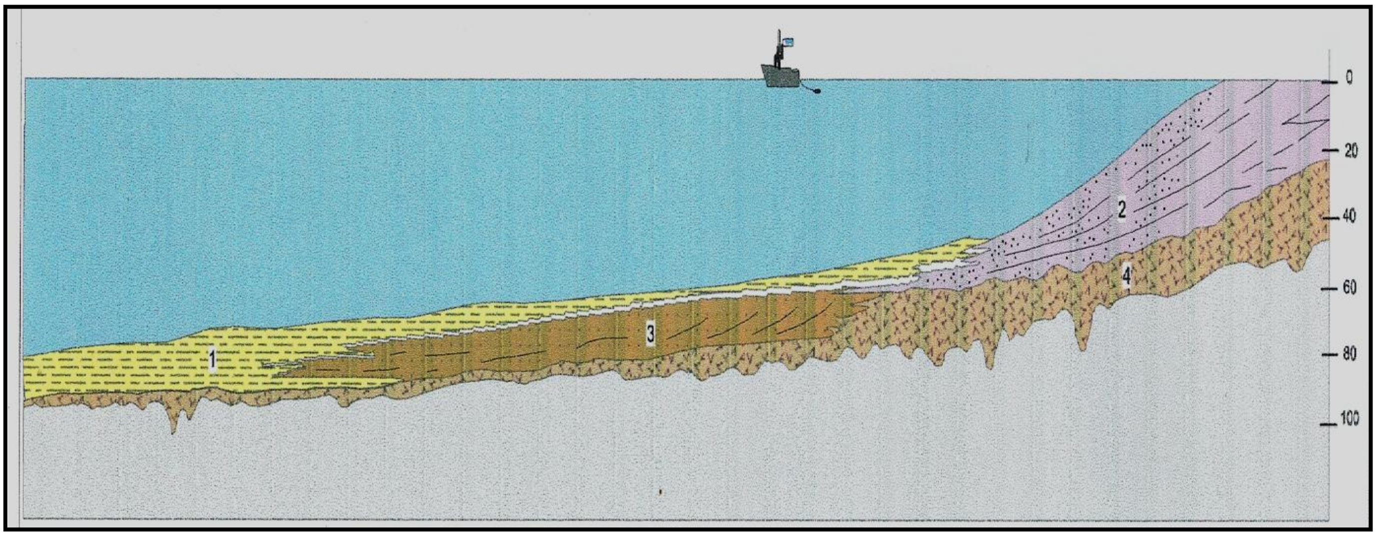


Figure 14.5.5.5: Generalized Seismo-stratigraphy of Coastal and Nearshore Sediments

The Cagayan River, as it flows into the Babuyan Channel considerably loses its velocity causing the deposition of its bedload and suspended load. The delta deposits progrades or advance its edges into the Channel. Figure 14.5.5.6 graphically illustrates the delta deposition.

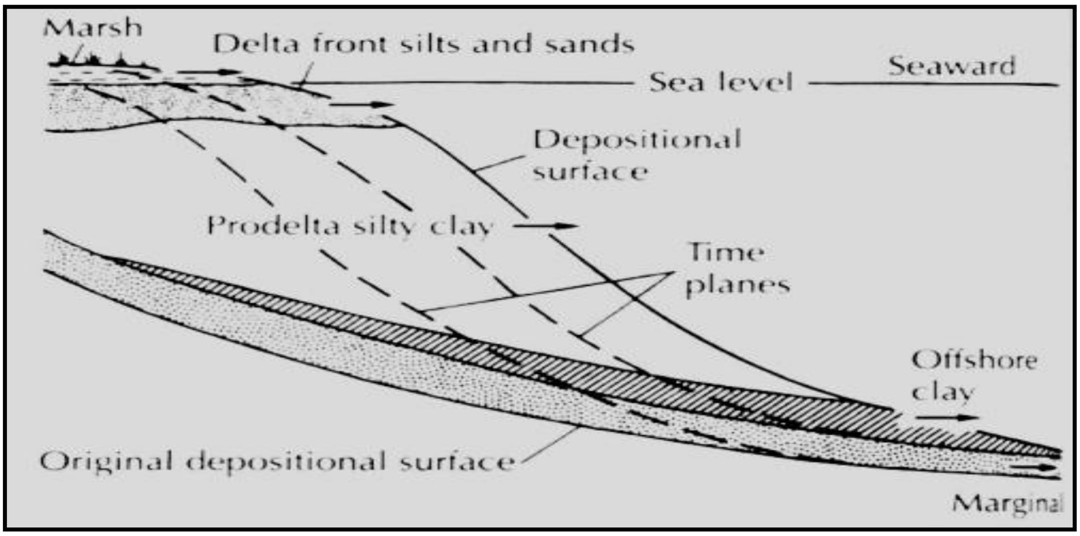


Figure 14.5.5.6: Schematic Diagram of Sediment Progradation in Deltas

The progradational sequences serve as a good target for magnetite sand deposits. Prospective areas were identified based on seismic reflection patterns and internal reflection characteristics. The following reflection characteristics were considered in the assessment:

- Parallel to sub-parallel reflection pattern – Fine-grained horizontally layered marine sediments consisting mostly of silt to silty fine grained sand. This unit is interpreted to correspond to the Holocence mud sequence. Nevertheless, the finer component of this sequence appears to have been washed away due to the influence of the Kuroshio Current.

- Oblique to sigmoidal reflection pattern - Prograded sediments consisting chiefly of sand derived from delta building and wave concentrated deposits;

- Chaotic reflection characteristics – channel filled sediments deposited in fluvial environment;

Results of data interpretation reveal that the unconsolidated sediment section underlying the contract area was deduced to be divided into four (4) distinct units characterized by their different internal seismic reflection patterns and separated by distinct reflection horizons. For purposes of identification, these units have been designated as **Unit 1**, **Unit 2**, **Unit 3 and Unit 4** (from top to bottom).

Unit 1:

Unit 1 generally consists of recent sediments of beach deposits along the shore grading into finer sediments offshore. It is characterized by parallel to divergent reflection patterns. Due to the influence of the Kuroshio Current flowing from the East Philippine Sea and deflected towards the Babuyan Channel, the finer sediments particularly on the eastern part of the area are transported towards the west. This unit generally consists of silt to fine grained sand with variable amounts of magnetite sand.

Unit 2:

This unit is inferred to generally comprise of fine to medium sand of fluviatile to shallow marine origin. The internal reflection pattern consists of sigmoidal to chaotic patterns. There appears to be a gradational change to Unit 1 sediments which are characterized by a weak parallel reflection pattern with some oblique reflections nearer "shore". This unit is inferred to consist of shallow marine sediments deposited nearshore or at the shoreline.

Unit 3:

Characterized by parallel to seaward dipping/sigmoidal reflections and consists of the prograded shoreline deposits characterizing the eastern part of the contract area. It is deduced to consist essentially of fine to medium – grained sand materials.

This Unit together with Unit 2 is believed to host valuable detrital mineral deposits particularly magnetite sand accumulations. Representative seismic profiles in the eastern and western parts of the area are shown in Figures.

Unit 4:

The oldest unconsolidated sediment sequence in the area is Unit 4 that generally shows parallel to divergent and in some places hummocky reflection patterns. It is inferred to consist predominantly of older mud to silty sediment sequences. Underlying this unit is the acoustic basement which in, some instances coincide with the bedrock. In seismology, the term acoustic basement is generally referred to as the surface, below which strata cannot be penetrated by seismic signals or cannot be imaged by seismic data. The acoustic basement surface covered by the survey, so far, is interpreted to be a relatively strong and irregular reflector.

Based on the analysis and interpretation of seismic reflection data gathered in the area, the seismo-stratigraphic units that can be considered as the most promising targets for magnetite sand exploration are Units 2 and 3.

The exploration targets considered for the boring operation are the submerged prograded sediment sequence. The prograded sediments are characterized by inclined beddings that result from the deposition and accumulation of relatively coarse and heavy materials along the shore in a high-energy environment such as those in deltaic environment. The winnowing action of waves and tides bring forth concentration of comparatively heavy sediment grains along the shore and wash away the lighter and often fine grained factions of sediments. They are also affected by longshore currents which cause deposition of magnetite sand parallel to the shoreline. It is characterized by oblique to sigmoidal reflection character and often has a high amplitude signal indicating sharp impedance contrast owing to the high density and sound velocity variations between the sediment types. The fluviatile and shallow marine sediment sequence was also included in the exploration target based on the internal reflection characteristics.

A comprehensive analysis of the bathymetric and high-resolution seismic data led to a broader understanding of the geological and mineralization setting of the JDVCRC tenement area. More importantly, prospective sites were identified and delineated based on seismic reflection characteristics and internal reflection patterns. The priority exploration targets that were identified consist of areas where prograded sediment sequences have been identified.

The prograded sediments are characterized by inclined beddings that result from the deposition and accumulation of relatively coarse and heavy materials along the shore in a high-energy environment such as those in deltaic environment. The winnowing action of waves and tides bring forth concentration of comparatively heavy sediment grains along the shore and wash away the lighter and often fine grained factions of sediments. They are also affected by longshore currents which cause deposition of magnetite sand parallel to the shoreline. It is characterized by oblique to sigmoidal reflection character and often has a high amplitude signal indicating sharp impedance contrast owing to the high density and sound velocity variations between the sediment types.

Aside from identifying and delineating potential exploration targets, the thickness of potential sand bearing sediments were obtained from the seismo-stratigraphic interpretation. The vertical extents or thicknesses of potential sand-bearing horizons within tenement area are presented in Figure 14.5.5.7.

Table 14.5.5.1 shows the tabulation of the individual thicknesses of Unit 1 and the combined Units 2 and 3. It will be observed in the tabulation and in the contour map in Figure 14.5.5.7 that the sediments are thicker in the eastern portion of the tenement, which is identified here as Parcel A. The area to the west is called Parcel B-1. The sediments are observed to be thinning out going westward to Parcel B-1. On the average, the thicknesses of the sediments per Unit are as mathematically computed follows:

	Unit 1 (meters)	Unit 2 (meters)	Total (meters)
Parcel A	6.8	19.0	25.8
Parcel B-1	3.0	6.8	9.80

These thicknesses were determined from the meticulous interpretation of the seismic reflection profiles of the seismic reflection survey lines shown in Appendix 3.

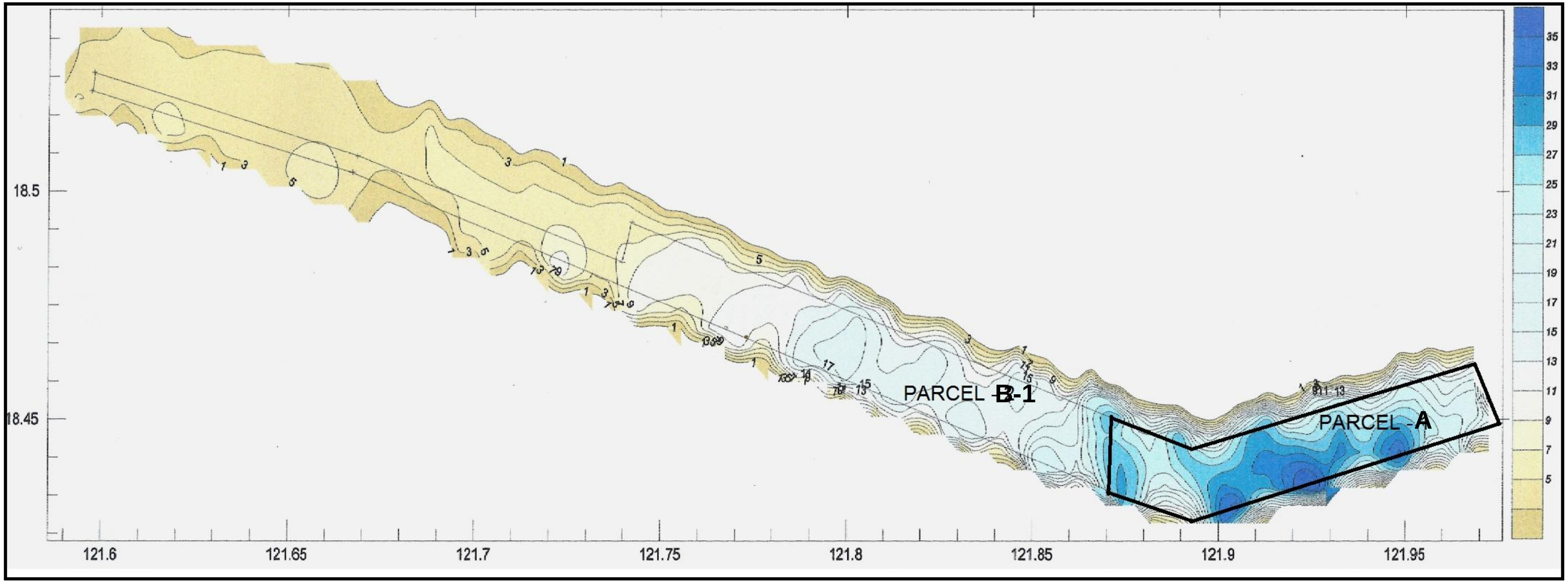


Figure 14.5.5.7: Color-filled Contour Map Showing the Various Thicknesses of Identified Sand-bearing Horizons Consisting of Seismo-stratigraphic Units 1, 2 and 3.

__Table 14.5.5.1: Thickness of sand bodies in the eastern segment of MPSA-338-2010-II-OMR__

Point No.	Longitude	Latitude	Water depth (colar elev)	Unit 1	Unit 2 & Unit 3	Total sand thickness	Location
901	121.678745	18.508683	180	1.0	3.8	4.8	Parcel B-1
902	121.681433	18.513528	190	0.9	3.7	4.6	Parcel B-1
903	121.682125	18.51704	195	0.7	3.3	4.0	Parcel B-1
904	121.674991	18.521238	197	0.7	2.5	3.2	Parcel B-1
905	121.670545	18.519224	187	0.8	3.6	4.4	Parcel B-1
906	121.670051	18.515851	178	0.9	3.7	4.6	Parcel B-1
907	121.667705	18.510204	169	1.0	4.1	5.1	Parcel B-1
908	121.667136	18.507325	165	1.1	4.4	5.5	Parcel B-1
909	121.666372	18.50393	160	1.2	4.6	5.8	Parcel B-1
910	121.601676	18.522564	166	0.8	3.0	3.8	Parcel B-1
1000	121.612249	18.519739	171	1.1	2.9	4.0	Parcel B-1
1003	121.588355	18.52116	165	1.1	3.2	4.3	Parcel B-1
1004	121.589128	18.518147	169	1.1	3.7	4.8	Parcel B-1
1005	121.590033	18.529024	170	1.0	2.5	3.5	Parcel B-1
1007	121.591289	18.532933	172	0.8	2.2	3.0	Parcel B-1
1010	121.592826	18.536579	176	0.7	2.1	2.8	Parcel B-1
1015	121.599909	18.516571	163	1.1	3.7	4.8	Parcel B-1
1017	121.600935	18.519318	169	0.9	3.3	4.2	Parcel B-1
1018	121.601676	18.525408	173	0.7	2.7	3.4	Parcel B-1
1020	121.603702	18.531405	176	0.9	2.3	3.2	Parcel B-1
1021	121.6046	18.535861	183	0.7	2.6	3.3	Parcel B-1
1024	121.610767	18.536979	188	0.8	2.5	3.3	Parcel B-1
1025	121.611217	18.516946	168	1.1	3.2	4.3	Parcel B-1
1026	121.612402	18.523079	177	1.0	2.8	3.8	Parcel B-1
1027	121.6136328	18.512712	166	1.2	3.8	5.0	Parcel B-1
1030	121.6164978	18.52939	182	0.8	2.7	3.5	Parcel B-1
1031	121.616498	18.533091	178	0.7	2.7	3.4	Parcel B-1
1033	121.621833	18.511749	168	1.3	3.7	5.0	Parcel B-1
1036	121.6235608	18.517274	176	1.2	3.0	4.2	Parcel B-1
1037	121.624746	18.523688	182	1.1	2.6	3.7	Parcel B-1
1038	121.62603	18.529493	180	1.0	2.6	3.6	Parcel B-1
1049	121.639149	18.505016	150	1.3	4.1	5.4	Parcel B-1
1051	121.644251	18.506318	155	1.1	3.9	5.0	Parcel B-1
1052	121.645003	18.50873	156	1.1	3.5	4.6	Parcel B-1
1053	121.645398	18.512399	158	1.1	2.9	4.0	Parcel B-1
1054	121.646782	18.51824	166	1.0	2.9	3.9	Parcel B-1
1055	121.648152	18.52116	169	0.8	2.9	3.7	Parcel B-1
1056	121.648808	18.524939	179	0.7	2.9	3.6	Parcel B-1
1057	121.652448	18.527855	175	0.7	2.3	3.0	Parcel B-1

1058	121.654719	18.504305	165	1.2	4.4	5.6	Parcel B-1
1059	121.656465	18.501891	156	1.4	4.4	5.8	Parcel B-1
1060	121.656744	18.509221	165	1.0	4.2	5.2	Parcel B-1
1061	121.657997	18.515757	168	0.9	3.5	4.4	Parcel B-1
1062	121.658324	18.526591	185	0.6	2.5	3.1	Parcel B-1
1063	121.659931	18.5018	156	1.3	4.7	6.0	Parcel B-1
1064	121.660269	18.521238	175	0.8	3.6	4.4	Parcel B-1
1065	121.66101	18.523205	178	0.7	3.2	3.9	Parcel B-1
1066	121.676783	18.49515	138	1.1	5.4	6.5	Parcel B-1
1067	121.67945	18.521138	185	1.0	2.3	3.3	Parcel B-1
1068	121.675831	18.500439	168	1.2	4.9	6.1	Parcel B-1
1069	121.67694	18.503368	177	1.3	4.7	6.0	Parcel B-1
1070	121.677736	18.506021	168	1.1	3.9	5.0	Parcel B-1
1071	121.688417	18.491051	140	1.5	4.5	6.0	Parcel B-1
1072	121.689037	18.502058	169	1.3	4.2	5.5	Parcel B-1
1073	121.690716	18.507514	178	1.1	4.0	5.1	Parcel B-1
1075	121.688279	18.499081	172	1.4	4.3	5.7	Parcel B-1
1077	121.697371	18.492148	150	1.4	4.9	6.3	Parcel B-1
1080	121.698753	18.495801	155	1.7	4.1	5.8	Parcel B-1
1081	121.701173	18.501704	166	1.6	3.6	5.2	Parcel B-1
1084	121.704098	18.48642	150	1.7	5.6	7.3	Parcel B-1
1085	121.704876	18.510089	170	1.1	2.5	3.6	Parcel B-1
1097	121.717529	18.506646	160	1.1	2.8	3.9	Parcel B-1
1098	121.71839	18.485198	110	2.0	6.1	8.1	Parcel B-1
1099	121.719572	18.482478	109	2.2	6.0	8.2	Parcel B-1
1100	121.719602	18.488199	112	1.8	6.0	7.8	Parcel B-1
1102	121.721646	18.493453	115	1.5	5.2	6.7	Parcel B-1
1103	121.722812	18.496392	120	1.3	4.1	5.4	Parcel B-1
1104	121.72301	18.481223	100	2.3	6.2	8.5	Parcel B-1
1105	121.720491	18.490727	130	1.6	5.5	7.1	Parcel B-1
1107	121.723997	18.498687	135	1.1	3.9	5.0	Parcel B-1
1108	121.724617	18.504051	150	1.1	2.9	4.0	Parcel B-1
1109	121.724985	18.500981	130	0.9	3.6	4.5	Parcel B-1
1110	121.72617	18.480427	68	2.3	6.4	8.7	Parcel B-1
1120	121.738494	18.47382	105	2.6	6.4	9.0	Parcel B-1
1122	121.740095	18.47789889	108	2.4	6.3	8.7	Parcel B-1
1123	121.740174	18.499119	180	1.3	3.2	4.5	Parcel B-1
1124	121.741724	18.482291	117	2.5	5.7	8.2	Parcel B-1
1127	121.743946	18.487497	133	2.2	5.6	7.8	Parcel B-1
1130	121.744285	18.49685	170	1.5	3.4	4.9	Parcel B-1
1131	121.744588	18.490165	142.5	2.0	4.0	6.0	Parcel B-1
1132	121.747205	18.49466	160	1.2	3.9	5.1	Parcel B-1
1133	121.7480217	18.493817	1150	1.4	3.9	5.3	Parcel B-1
1135	121.750217	18.472889	93.6	2.7	6.3	9.0	Parcel B-1

1138	121.751353	18.475417	96.2	2.4	5.6	8.0	Parcel B-1
1139	121.752192	18.478367	101.3	2.3	7.7	10.0	Parcel B-1
1140	121.753081	18.480755	106	2.6	8.4	11.0	Parcel B-1
1141	121.754414	18.484079	114	2.7	8.3	11.0	Parcel B-1
1143	121.756192	18.488105	125.7	2.5	7.5	10.0	Parcel B-1
1144	121.757148	18.491006	133.2	2.3	6.7	9.0	Parcel B-1
1147	121.760339	18.469096	88	3.1	6.9	10.0	Parcel B-1
1148	121.761179	18.491897	135	2.2	5.8	8.0	Parcel B-1
1149	121.761796	18.47159389	90	3.3	4.7	8.0	Parcel B-1
1150	121.762907	18.474575	94.1	3.4	6.6	10.0	Parcel B-1
1151	121.762956	18.467364	84.5	3.2	7.8	11.0	Parcel B-1
1154	121.763796	18.476728	96	3.0	6.0	9.0	Parcel B-1
1157	121.765553	18.482379	105	3.6	5.4	9.0	Parcel B-1
1158	121.766344	18.489787	124	2.4	4.6	7.0	Parcel B-1
1159	121.766561	18.466287	79.7	4.1	7.9	12.0	Parcel B-1
1161	121.768191	18.487216	111.8	2.8	5.2	8.0	Parcel B-1
1162	121.771881	18.46578	74.5	4.9	7.6	12.5	Parcel B-1
1164	121.77298	18.470594	78.2	4.6	6.7	11.3	Parcel B-1
1165	121.774379	18.473865	69.1	4.5	7.3	11.8	Parcel B-1
1166	121.776091	18.476775	80	4.2	7.6	11.8	Parcel B-1
1167	121.776782	18.479443	100	3.7	7.4	11.1	Parcel B-1
1168	121.777918	18.482206	85	3.4	6.9	10.3	Parcel B-1
1170	121.781931	18.486023	88.5	3.2	6.9	10.1	Parcel B-1
1171	121.781967	18.465687	70	4.5	8.0	12.5	Parcel B-1
1172	121.782856	18.463616	67.2	4.7	8.3	13.0	Parcel B-1
1173	121.784339	18.468594	69.6	4.4	7.7	12.1	Parcel B-1
1174	121.78513	18.459779	64	5.1	8.1	13.2	Parcel B-1
1175	121.785373	18.471279	63.4	4.3	7.8	12.1	Parcel B-1
1176	121.786119	18.473845	72.6	4.2	8.3	12.5	Parcel B-1
1179	121.787744	18.4764	74	3.7	9.3	13.0	Parcel B-1
1180	121.788096	18.458747	62.6	5.3	8.8	14.1	Parcel B-1
1181	121.78859	18.478346	74.7	3.4	8.4	11.8	Parcel B-1
1183	121.794029	18.459122	63.6	5.5	8.3	13.8	Parcel B-1
1184	121.794806	18.46282	78.7	5.2	10.3	15.5	Parcel B-1
1185	121.795759	18.465857	68.6	5.3	12.2	17.5	Parcel B-1
1186	121.797373	18.469423	71.8	5.1	11.5	16.6	Parcel B-1
1187	121.798144	18.4559785	61.6	5.7	9.8	15.5	Parcel B-1
1190	121.799892	18.477338	78.6	3.8	12.4	16.2	Parcel B-1
1192	121.804163	18.45484	60.8	6.1	8.1	14.2	Parcel B-1
1193	121.804261	18.477062	78.6	3.9	11.9	15.8	Parcel B-1
1195	121.805965	18.459916	64.6	6.3	8.7	15.0	Parcel B-1
1197	121.807672	18.464451	68.2	5.6	10.0	15.6	Parcel B-1
1198	121.809619	18.469798	72.3	5.0	9.2	14.2	Parcel B-1
1199	121.8097684	18.46144753	65.7	5.8	8.2	14.0	Parcel B-1

1200	121.809817	18.474481	77.2	3.8	11.7	15.5	Parcel B-1
1201	121.810755	18.450924	56.2	6.5	8.1	14.6	Parcel B-1
1204	121.814853	18.451298	55.7	6.3	8.7	15.0	Parcel B-1
1206	121.816631	18.456544	60.4	6.0	9.3	15.3	Parcel B-1
1208	121.818945	18.462123	65.4	5.7	9.5	15.2	Parcel B-1
1209	121.818945	18.458886	62.9	6.1	9.9	16.0	Parcel B-1
1210	121.820329	18.46578	69	5.1	8.9	14.0	Parcel B-1
1211	121.821421	18.468955	72.1	4.2	8.5	12.7	Parcel B-1
1214	121.825519	18.448676	52.3	5.6	8.4	14.0	Parcel B-1
1215	121.826655	18.46946944	72.8	4.3	7.0	11.3	Parcel B-1
1217	121.827448	18.453026	56	5.3	8.6	13.9	Parcel B-1
1218	121.827646	18.445054	49.1	5.9	9.1	15.0	Parcel B-1
1219	121.8276918	18.45570113	58.7	5.3	8.7	14.0	Parcel B-1
1221	121.829815	18.459026	62	4.0	9.0	13.0	Parcel B-1
1222	121.830259	18.467831	70.8	3.7	6.9	10.6	Parcel B-1
1223	121.831839	18.464037	66.5	4.2	8.0	12.2	Parcel B-1
1225	121.832827	18.443899	42.9	6.2	9.1	15.3	Parcel B-1
1227	121.83694	18.445805	49.1	6.0	9.6	15.6	Parcel B-1
1228	121.838111	18.450549	54	5.7	8.3	14.0	Parcel B-1
1231	121.840302	18.45462	57.6	5.4	8.8	14.2	Parcel B-1
1232	121.84129	18.458091	60.7	4.8	8.7	13.5	Parcel B-1
1233	121.842407	18.461229	64.6	4.4	8.6	13.0	Parcel B-1
1235	121.844333	18.463009	61.7	4.2	8.3	12.5	Parcel B-1
1237	121.847035	18.441096	45.8	5.5	11.7	17.2	Parcel B-1
1238	121.847591	18.443195	47.4	5.7	11.2	16.9	Parcel B-1
1239	121.84841	18.462406	66	4.5	8.6	13.1	Parcel B-1
1240	121.848826	18.438558	43.2	5.7	12.6	18.3	Parcel B-1
1241	121.848925	18.446896	50.8	5.5	10.5	16.0	Parcel B-1
1243	121.850307	18.449566	5.7	5.2	9.5	14.7	Parcel B-1
1244	121.85085	18.451955	56.4	5.0	9.0	14.0	Parcel B-1
1245	121.851969	18.461093	65.4	4.7	8.8	13.5	Parcel B-1
1246	121.852184	18.437293	42.5	5.5	14.5	20.0	Parcel B-1
1248	121.852233	18.454578	59	5.8	7.9	13.7	Parcel B-1
1249	121.853863	18.458184	63.8	5.2	8.8	14.0	Parcel B-1
1251	121.85632	18.436518	42.3	5.7	16.3	22.0	Parcel B-1
1252	121.858297	18.437738	43.6	5.6	15.4	21.0	Parcel B-1
1253	121.858949	18.43987	45.1	5.4	14.8	20.2	Parcel B-1
1254	121.85978	18.443272	48	5.3	12.9	18.2	Parcel B-1
1255	121.860699	18.433304	40.6	6.2	16.8	23.0	Parcel B-1
1256	121.861319	18.446427	51.2	6.5	11.1	17.6	Parcel B-1
1258	121.86245	18.449743	55.3	5.7	13.4	19.1	Parcel B-1
1259	121.863636	18.452463	58.4	5.4	14.7	20.1	Parcel B-1
1260	121.864084	18.455889	62.3	5.0	16.0	21.0	Parcel B-1
1262	121.866899	18.456872	63.7	4.7	15.6	20.3	Parcel B-1

1263	121.868972	18.436122	43.3	7.7	21.3	29.0	Parcel B-1
1264	121.869565	18.455046	61.4	4.8	17.3	22.1	Parcel B-1
1266	121.869886	18.430184	38.5	8.0	24.2	32.2	Parcel A
1267	121.870404	18.439682	45.3	7.2	19.2	26.4	Parcel A
1268	121.871645	18.442709	48.6	7.1	22.9	30.0	Parcel A
1269	121.872528	18.445584	50.8	6.8	18.4	25.2	Parcel A
1271	121.873029	18.453214	59	5.1	19.9	25.0	Parcel A
1272	121.874157	18.448395	54	6.1	18.4	24.5	Parcel A
1273	121.874997	18.451018	56.9	5.6	20.7	26.3	Parcel A
1274	121.875396	18.428313	38.1	8.6	21.4	30.0	Parcel A
1277	121.879193	18.430361	39	7.0	14.0	21.0	Parcel A
1278	121.88028	18.433265	41.6	7.5	15.9	23.4	Parcel A
1280	121.881514	18.43809	44.8	7.2	17.3	24.5	Parcel A
1281	121.882719	18.440458	46.9	6.3	15.7	22.0	Parcel A
1282	121.885119	18.444507	50	6.0	17.0	23.0	Parcel A
1284	121.88665	18.449144	54	5.3	18.9	24.2	Parcel A
1286	121.890205	18.448067	52.3	5.5	21.0	26.5	Parcel A
1287	121.891439	18.445209	49.6	5.7	22.3	28.0	Parcel A
1288	121.891898	18.450893	55	5.2	21.3	26.5	Parcel A
1289	121.892612	18.424582	36.8	8.8	15.2	24.0	Parcel A
1290	121.892822	18.441228	45.7	6.3	21.1	27.4	Parcel A
1291	121.89347	18.439086	44.2	6.8	21.2	28.0	Parcel A
1292	121.894409	18.435288	40.6	7.1	19.9	27.0	Parcel A
1293	121.89534	18.430408	38.4	7.3	14.7	22.0	Parcel A
1295	121.898019	18.424692	36.8	8.6	16.4	25.0	Parcel A
1297	121.902041	18.451074	52.8	4.8	16.4	21.2	Parcel A
1298	121.902648	18.425724	36.3	9.1	21.9	31.0	Parcel A
1299	121.903842	18.444989	46.7	6.1	18.9	25.0	Parcel A
1300	121.903917	18.447899	48.6	5.2	16.8	22.0	Parcel A
1301	121.904319	18.441725	43.8	6.7	20.3	27.0	Parcel A
1302	121.904319	18.435825	39.1	7.9	22.1	30.0	Parcel A
1303	121.905505	18.434137	38.2	8.3	22.7	31.0	Parcel A
1304	121.905961	18.425498	36.2	8.5	23.5	32.0	Parcel A
1305	121.906172	18.428021	36.7	8.6	24.4	33.0	Parcel A
1306	121.90637	18.432428	38.5	8.1	24.9	33.0	Parcel A
1307	121.90661	18.450384	50.9	5.3	14.7	20.0	Parcel A
1308	121.906963	18.430599	37.3	8.5	25.5	34.0	Parcel A
1309	121.908336	18.452803	53.2	5.6	16.4	22.0	Parcel A
1310	121.910426	18.451874	52	5.8	17.2	23.0	Parcel A
1312	121.914017	18.451306	51.7	6.1	18.9	25.0	Parcel A
1313	121.91484	18.44719	47.2	5.9	21.1	27.0	Parcel A
1314	121.915736	18.454478	55	5.6	18.4	24.0	Parcel A
1316	121.916561	18.442009	42.1	7.1	24.3	31.4	Parcel A
1317	121.917159	18.438815	39.7	7.6	25.6	33.2	Parcel A

1318	121.917608	18.436685	38.5	7.5	24.5	32.0	Parcel A
1319	121.918745	18.432843	37	8.7	25.9	34.6	Parcel A
1322	121.924819	18.45219	52.6	5.3	15.7	21.0	Parcel A
1323	121.925313	18.432328	36.4	8.8	26.3	35.1	Parcel A
1326	121.925906	18.454954	51.8	6.1	14.2	20.3	Parcel A
1327	121.926843	18.445913	44.6	7.3	17.7	25.0	Parcel A
1328	121.928226	18.440385	39.4	8.0	21.2	29.2	Parcel A
1329	121.929993	18.457706	59.8	5.5	14.1	19.6	Parcel A
1330	121.930349	18.434717	38.2	7.7	23.3	31.0	Parcel A
1331	121.931881	18.45589083	55	6.0	13.6	19.6	Parcel A
1334	121.936012	18.454901	55.1	5.3	14.7	20.0	Parcel A
1336	121.936736	18.451998	52.2	5.1	16.9	22.0	Parcel A
1337	121.937043	18.447298	45.7	6.4	17.7	24.1	Parcel A
1338	121.937516	18.433286	37.5	6.6	20.9	27.5	Parcel A
1339	121.93799	18.443928	42.6	6.6	19.6	26.2	Parcel A
1340	121.939058	18.440372	39.3	7.0	20.2	27.2	Parcel A
1343	121.946889	18.45809	62.1	6.3	12.7	19.0	Parcel A
1344	121.946988	18.4383	38.7	7.4	24.6	32.0	Parcel A
1345	121.947254	18.461614	68.5	4.8	13.0	17.8	Parcel A
1346	121.947633	18.454907	57.0	6.9	14.1	21.0	Parcel A
1348	121.948668	18.451337	52.1	7.3	19.1	26.4	Parcel A
1349	121.949164	18.447974	48.2	7.5	22.7	30.2	Parcel A
1350	121.950645	18.440385	39.9	8.0	26.1	34.1	Parcel A
1351	121.950815	18.436876	37	8.3	24.8	33.1	Parcel A
1352	121.953695	18.463073	75.1	4.6	10.6	15.2	Parcel A
1354	121.957666	18.461279	75.5	5.0	8.1	13.1	Parcel A
1356	121.959545	18.454057	58.2	6.0	11.2	17.2	Parcel A
1358	121.9608621	18.45053649	52.1	6.5	14.5	21.0	Parcel A
1359	121.961114	18.448021	47.5	7.0	15	22.0	Parcel A
1360	121.962102	18.443571	40.1	7.5	16.6	24.1	Parcel A
1369	121.970447	18.459732	92.5	4.8	10.2	15.0	Parcel A
1372	121.972175	18.451159	65.1	5.2	12.4	17.6	Parcel A
1374	121.974299	18.446475	55.3	6.7	19.1	25.8	Parcel A
1375	121.974436	18.449652	70.0	6.4	16.8	23.2	Parcel A
1376	121.976193	18.444264	55.3	14.0	22	36.0	Parcel A
1377	121.958842	18.457577	55	5.4	11.4	16.8	Parcel A
1378	121949855	18.444678	43.6	8.3	24.2	32.5	Parcel A
1379	121.927436	18.44343	42.2	5.9	18.1	24.0	Parcel A
1380	121.929362	18.437855	38.5	8.0	22.0	30.0	Parcel A
1381	121.915774	18.444475	44.6	6.3	22.9	29.2	Parcel A
1382	121.915056	18.439557	44	7.5	24.5	32.0	Parcel A
1383	121.904019	18.438534	41.1	7.8	22.2	30.0	Parcel A
1384	121.895754	18.428502	37.6	6.5	16.5	23.0	Parcel A
1385	121.894318	18.433494	39.3	6.1	19.9	26.0	Parcel A

14.6 Sample Preparation, Analysis and Security

14.6.1 Security and Chain of Custody of Samples

The company implements strict protocol in the security and chain of custody of samples. In the exploration platform all samples are sealed and labeled with pre-numbered stubs and each batch transported to the Aparri Office for shipment to Intertek-Manila is covered by individual Chain of Custody Form. Samples for analysis are provided with double labels: aside from the labels previously written in the two sides outside the plastic sample bags, the same sample ID detached from the sample stubs is placed in a smaller plastic "ice candy wrapper," sealed and placed inside the sample bag, which is again sealed using a thermo sealer.

Whenever a dispatch is scheduled, the Manila office promptly requests for a sample transport certification (for samples less that 2 tons) from MGB-Tuguegarao. The issued MGB certifications are sent electronically to the Aparri office. Using the QAQC guide for sampling as basis, the Intertek sample submission form (Chain of Sample Custody Form) is filled out. Sack per sack, samples are checked against the QAQC guide for sampling. After checking, the samples are put back into their respective sacks and sealed with cable ties. A designated sample hauler loads the sacks of primary samples inside the truck. A copy of the MGB certificate and 3 copies of the Intertek sample submission form are handed to the sample hauler. One receiving copy signed by the hauler is duly retained and filed. Upon return of the hauler, the received copy signed by Intertek and/or MGB representatives is collected and filed.

14.6.2 Preparation and Assay Facility

The sample preparation and assay facilities of Intertek Testing Services Philippines, Incorporated (Intertek) are located in Warehouse 7, Philcrest 1 Compound, KM 23, West Service Road, Cupang, Muntinlupa City. Intertek is renowned for providing high quality analytical services, expert inspection, quality geo-analytical and advisory services to the minerals exploration and mining industries. With its extensive network of minerals laboratory located in key mining locations across the world, including Australia/Pacific, South East Asia, Africa, Europe, the Americas and China, Intertek is the laboratory of choice. On the other hand, the assay laboratory of the Mines and Geosciences Bureau is located in the Petrochemistry Building of the MGB Compound at Visayas Avenue in Quezon City. The main equipment used in the physical analysis is the Dings Davis Tube which can be set at variable magnetic intensity.

For analytical analysis (chemical assaying), Intertek uses the commercial-grade Panalytical Axios Wavelength Dispersive XRay Flourescence (WDXRF) machine both in Intertek Jakarta and in Intertek Muntinlupa, Metro Manila. These produce the very high-quality results simultaneously for 13 elements. XRF analyzes the total amount of metal in the sample, in which the metals are dispersed in the borate glass, eliminating any matrix effect, unlike other methods such as those involving acid digestion which may only partially and not wholly dissolve all the metals in the sample, leaving part of the metals in the insoluble residue. Thus XRF results in highly accurate values.

To check loss on ignition (LOI), a Barnstead Thermoline Furnace is used to determine the water content of the sample from the minerals' crystal lattices.

14.6.3 Sample Preparation

Drying, crushing, splitting, pulverizing and assays are performed by Intertek Testing Services (Intertek) in Manila. The field samples are determined for the wet weight, using digital scales, and dried at a thermostat-controlled LPG-fired drying oven. This entails anywhere from 6 to 16 hours, averaging 12 hours at 105 degrees Celsius.

At the laboratory, after the samples are weighed individually, the bulk samples are homogenized using an aluminum spatula, then sun-dried or air-dried; then rolled and quartered. One quarter is set aside and becomes the raw sample for analysis. The other splits are saved for MGB and JDVCRC use as explained in the preceding discussions.

14.6.4 Analytical Methods Used

The method used for determining the magnetic fraction is through a Dings Davis Tube (DDT) using 3,000 Gauss as previously determined to be the ideal setting by previous experimentation. For chemical analysis, the analytical method used is the XRF method as explained above.

14.6.5 Quality Assurance/Quality Control (QAQC)

During the core sampling operation, no duplicates were taken, nor standards inserted for every particular number of regular samples. However, in the laboratory, Intertek has its own QA/QC protocols by making repeat analyses and inserting pre-determined standards for internal quality control. While JDVCRC has started implementing QA/QC protocols by utilizing unique, pre-numbered sample stubs, it has yet to insert company duplicates and standards in its sample batches.

14.6.5.1 Data Quality and Errors: Accuracy and Precision

Data accuracy is measured by repeated determinations of samples with known values, in this case, the 14 elements mentioned in the preceding discussions. To test the accuracy of the methods of sampling and physical (DDT) and chemical (XRF) analyses, the results of analyses of the field standards, laboratory replicates were tabulated and compared and the result shows that the standards and the laboratory replicates gave very low absolute relative differences between the known (expected) and the assayed values for Fe; and consequently, very low percentage of error (0.1% and 0.35%, respectively).

Data precision, on the other hand, can be measured from the repeatability of the results of analysis of the drilling samples, i. e., from field duplicates and from twin holes, however, as there are no available data for the field duplicates or twin holes, precision errors cannot be computed now. However, it is being recommended that in future drilling operation, strict implementation of these QA/QC procedures should be observed.

The summary of the relative absolute relative differences and percentages of error are tabulated in Table 14.6.5.1.1. The percentage errors for the other minerals are also enumerated in the table, including the detection limit for each mineral.

In summary, these minimal errors represent the following:

- Errors sample preparation and analysis;
- Natural Geological Variability; and
- Analytical errors.

Table 14.6.5.1.1: Summary of Accuracy Errors

Mineral	Original Analysis	Replicate Analysis	Absolute Difference	% Error	Actual Standard	Expected Standard	Absolute Difference	% Error	Detection Limit
Fe	60.50	60.71	0.210	0.35	58.8	58.74	0.060	0.10	0.010
Al_20_3	2.42	2.42	0.000	0.00	3.08	3.08	0.000	0.00	0.010
As	<0.005	<0.005	-	-	<0.005	<0.005	-	-	0.005
BaO	0.025	0.024	0.001	4.00	0.005	0.005	0.000	0.00	0.005
CaO	0.69	0.69	0.000	0.00	0.04	0.04	0.000	0.00	0.010
Cl	0.023	0.019	0.004	17.39	0.008	0.012	0.004	50.00	0.005
Co	0.011	0.012	0.001	9.09	<0.005	<0.005	-	-	0.005
Cr_20_3	0.052	0.055	0.003	5.77	0.009	0.006	0.003	33.33	0.005
Cu	0.008	0.008	0.000	0.00	<0.005	<0.005	-	-	0.005
K_20	0.07	0.07	0.000	0.00	0.01	0.01	0.000	0.00	0.010
MgO	1.52	1.51	0.010	0.66	0.09	0.09	0.000	0.00	0.010
MnO	0.67	0.67	0.000	0.00	0.19	0.19	0.000	0.00	0.010
Na_20	0.13	0.13	0.000	0.00	0.02	0.02	0.000	0.00	0.010
Ni	0.006	0.006	0.000	0.00	<0.005	<0.005	-	-	0.005
P_20_5	0.208	0.210	0.002	0.96	0.102	0.102	0.000	0.00	0.001
Pb	<0.005	<0.005	-	-	<0.005	<0.005	-	-	0.005
SO_3	0.012	0.012	0.000	0.00	0.062	0.062	0.000	0.00	0.001
SiO_2	2.92	2.91	0.010	0.34	5.02	5.07	0.050	1.00	0.010
Sn	<0.005	<0.005	-	-	<0.005	0.006	-	-	0.005
Sr	<0.005	<0.005	-	-	<0.005	<0.005	-	-	0.005
Ti_20	6.61	6.63	0.020	0.30	0.15	0.15	0.000	0.00	0.010
V_20_5	0.575	0.574	0.001	0.17	0.01	0.005	0.005	50.00	0.005
Zn	0.068	0.067	0.001	1.47	<0.005	<0.005	-	-	0.005
Zr	0.010	0.010	0.000	0.00	<0.005	0.007	-	-	0.005
LOI	-2.22	-2.31	0.090	-4.05	-	-	-	-	-
Average	3.54	3.54	0.006	0.16	4.51	3.98	0.530	11.77	

14.6.6 Statement of the CP on the quality of sample security, preparation and analysis

Based on this CP's personal observations of current practices as well as from documentary sources including the many QA/QC checks undertaken in connection with this report, it is this CP's view that the sealed samples from drilling, as delivered to the laboratory, are of sufficient integrity because measures are undertaken to prevent/minimize sample contamination, losses, mislabeling; and for doubtful results, holes are redrilled, and from retrieved properly labeled stored pulps, repeat determinations are likewise conducted.

The samples were analyzed in reputable ISO-accredited laboratories with known credibility, where sample preparation and analysis procedures have been standardized and enforced as a matter of routine. While no field duplicates and standards were inserted in the batches of samples delivered to the laboratory, the company's assigned laboratory has implemented its internal QA/QC protocols inserting regular laboratory replicate and standard samples.

15.0 MINERAL RESOURCES ESTIMATE

15.1 Database Used in the Estimation of Resources

The database used was provided by JDVCRC in Excel format consisting of drilling data as of July 31, 2015 with the detailed information listed in Table 15.1.1.

Table 15.1.1: List of Database Information in Excel Spreadsheet

Data Group	Contents
Hole and Sample Description	Hole ID, Sample Number, From (m), To (m), Length Run (m)
Assay Analysis (XRF)	%Fe, %Al_2O_3, %CaO, %Cr_2O_3, %K_2O, %MgO, %P_2O_5, %SiO_2, %V_2O_5, %As, %BaO, %Cl, %Co, %Cu, %MnO, %Na_2O, %Ni, %Pb, %SO_3, %Sn, %Sr, %TiO_2, %Zn, %Zr and %LOI.
Density Data	Moisture Content (%), Wet Density (g/cm^3), Dry Density (g/cm^3)
Physical Analysis	%MF
Geology	Color, Dominant Grain Size Classification, Grain Size Descriptor, Roundness, sorting, % Lithics, % Biogenic Matter, Other Minerals, Oversize, Date logged, Name of Logger
Hole Location	UTM (East), UTM (North), Grid (North), Grid (East), Tenement
Assay Analysis of Laboratory Replicates	%Fe, %Al_2O_3, %CaO, %Cr_2O_3, %K_2O, %MgO, %P_2O_5, %SiO_2, %V_2O_5, %As, %BaO, %Cl, %Co, %Cu, %MnO, %Na_2O, %Ni, %Pb, %SO_3, %Sn, %Sr, %TiO_2, %Zn, %Zr and %LOI.
Assay Analysis of Standard	%Fe, %Al_2O_3, %CaO, %Cr_2O_3, %K_2O, %MgO, %P_2O_5, %SiO_2, %V_2O_5, %As, %BaO, %Cl, %Co, %Cu, %MnO, %Na_2O, %Ni, %Pb, %SO_3, %Sn, %Sr, %TiO_2, %Zn, %Zr and %LOI.
Sieve Analysis	% by weight for +75µm, +53 µm, +38 µm AND -38 µm.

15.2 Integrity of Database

The undersigned CP conducted random checks on the data used in the database utilizing the actual digital copy of the individual core log sheets containing the laboratory results and performed validation and verification of the said data as to the correctness and encoding errors. Further, all the digital results in Excel were also compared to the original core logs and laboratory results by Mr. Largo. Thus the database as provided “as is” to the CP is deemed to be accurate.

15.3 Data Verification and Validation

The Project database essentially consists of ten (10) drillholes. The database provided to Mr. Liwanag was supplied as Excel spreadsheets. Considering the very few data, validation and verification as to the correctness of the encoded data as compared to the original data sheets was done very easily by Mr. Largo. The data were then imported to Mapinfo to produce drawing and table files for the polygon computation of the areas and volumes.

15.4 Grade Compositing

The database provided by JDVCRC contains assay data for %MF in 5-meter intervals, however, considering that the collar elevations of the drill holes are different, it became necessary to composite the drillholes based on 5-meter thick levels starting from the Zero elevation.

15.5 Cut-off Grades used in Estimation

Considering the nature of the mining method to be used which is dredging, where selective mining is not practicable, the mineral resource is reported starting from 0% Fe grade level. It has been discussed earlier that setting of cut-off grades is impractical in the offshore dredging method of mining because all the materials within the dredge’s path are suctioned and fed into the magnetic separators. This is unlike the conventional surface mining which can be selective. It was therefore discussed and agreed with JDVCRC to use 0% MF as the cut-off grade in resource estimation.

15.6 Mineral Resource Estimation Method Used

The mineral resource estimation method used is the conventional Polygon Method. Considering the very limited number of data, it is not practical to use the geostatistical methods such as Inverse Distance Weighing (IDW) or the Kriging Method. The conventional polygon method is the basic advisable method for limited database.

The basic formula used for the polygon method is:

Tonnage = Area x Thickness x Specific Gravity;

wherein the area is equal to the square of the radius of influence multiplied by the value of pi (π).

The specific gravity is 1.69 DMT/m3 as determined by the Mines and Geosciences Bureau Laboratory in Quezon City.

15.7 Mineral Resource Categories Used

The mineral resource categories used are Indicated, and Inferred. The Indicated Resource is based on drillholes with 2,000-meter spacing; while the Inferred Resource is based on 4,000-meter drillhole spacing. The indicated resources are those within Parcel A which has been prioritized for mining; while the inferred resources are those within Parcel B-1 of the 4,999.2358-hectare area. The justification for the resource classification is based on the result of the interpretation of the seismic reflection profiling data which show the consistency of the magnetite sand bearing sand horizon (Units 2 and 3) which is about 19 meters thick in Parcel A thinning out to about 7 meters towards Parcel B-1.

15.8 Mineral Resource Estimates

Results of estimation show a combined indicated resource of **606,457,972.52 DMT** with an average grade of 25.47% MF, which at 100% recovery, is equivalent to **154,466,259.02 DMT** of magnetite concentrate; and an inferred resource of **63,179,310.69 DMT** with an average grade of 47.71% MF, which at 100% recovery is equivalent to **30,140,910.80 DMT** of magnetite concentrate. The summary of the resources is tabulated in detail by resource category in Table 15.8.1.

Table 15.8.1: Summary of Mineral Resources by Resource Category and Grade Group

Level	Hole-ID	Volume (m^3)	Tonnage (DMT)	Grade (%MF)	DMT Conc.
INDICATED					
0-5	GN18	14,134,498.64	23,887,302.69	26.58	6,349,245.06
	GN30	6,260,618.75	10,580,445.68	3.23	341,748.40
	GN33	11,977,837.40	20,242,545.20	22.56	4,566,718.20
	GN48	13,066,734.48	22,082,781.26	24.87	5,491,987.70
	GN58	11,252,573.11	19,016,848.56	24.94	4,742,802.03
	GN68	10,862,507.44	18,357,637.57	26.98	4,952,890.62
Sub Total		**67,554,769.80**	**114,167,560.95**	**23.16**	**26,445,391.99**
5-10	GN18	21,167,829.31	35,773,631.53	43.87	15,693,892.15
	GN30	11,600,678.95	19,605,147.43	21.01	4,119,041.47
	GN33	16,404,741.02	27,724,012.32	41.89	11,613,588.76
	GN48	15,073,202.66	25,473,712.50	46.55	11,858,013.17
	GN58	14,792,031.51	24,998,533.24	47.29	11,821,806.37
	GN68	14,539,173.62	24,571,203.41	43.15	10,602,474.27
Sub Total		**93,577,657.05**	**158,146,240.41**	**41.55**	**65,708,816.19**
10-15	GN18	22,232,822.30	37,573,469.69	24.89	9,352,036.61
	GN30	7,183,350.15	12,139,861.75	20.71	2,514,165.37
	GN33	18,130,900.05	30,641,221.08	23.63	7,240,520.54
	GN48	15,950,498.10	26,956,341.79	25.41	6,849,606.45
	GN58	14,510,689.13	24,523,064.63	27.89	6,839,482.73
	GN68	19,498,536.83	32,952,527.24	23.89	7,872,358.76

Level	Hole-ID	Volume (m^3)	Tonnage (DMT)	Grade (%MF)	DMT Conc.
Sub Total		**97,506,796.56**	**164,786,486.19**	**24.68**	**40,668,170.45**
15-20	GN18	13,339,693.38	22,544,081.81	12.58	2,836,045.49
	GN33	19,433,900.05	32,843,291.08	11.65	3,826,243.41
	GN48	17,519,498.10	29,607,951.79	12.66	3,748,366.70
	GN58	18,284,781.30	30,901,280.40	10.24	3,164,291.11
	GN68	22,483,264.39	37,996,716.82	13.56	5,152,354.80
Sub Total		**91,061,137.22**	**153,893,321.90**	**12.17**	**18,727,301.51**
	GN68	9,150,510.69	15,464,363.07	18.86	2,916,578.87
Sub Total		**9,150,510.69**	**15,464,363.07**	**18.86**	**2,916,578.87**
Grand Total		**358,850,871.32**	**606,457,972.52**	**25.47**	**154,466,259.02**
			INFERRED		
0-5	GN01	5,452,567.28	9,214,838.69	59.20	5,455,184.51
	GN02	9,049,637.80	15,293,887.88	45.20	6,912,837.32
	GN03	9,851,788.01	16,649,521.73	46.70	7,775,326.65
	GN04	13,030,214.43	22,021,062.39	45.40	9,997,562.32
Sub Total		**37,384,207.51**	**63,179,310.69**	**47.71**	**30,140,910.80**

The resources are shown graphically in the level plans in Figures 15.8.1 to 15.8.5.

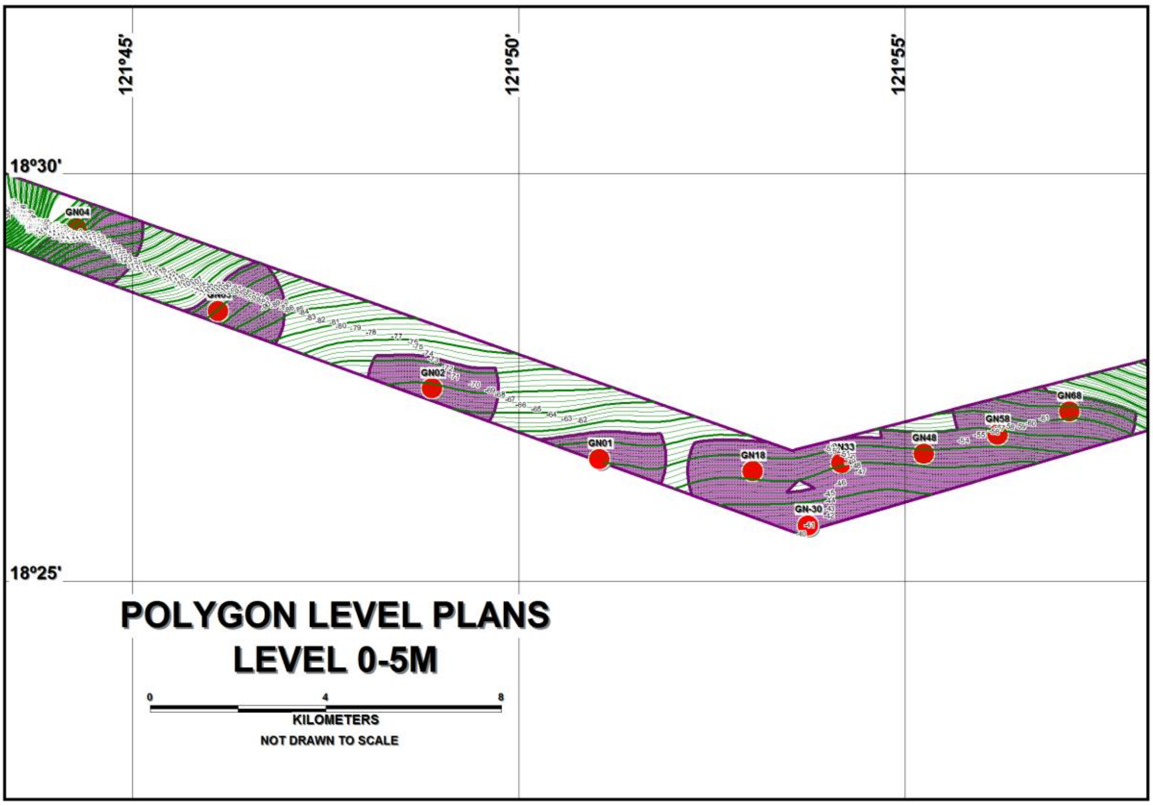


Figure 15.8.1: Polygon Plan for Level 0 to 5 meters

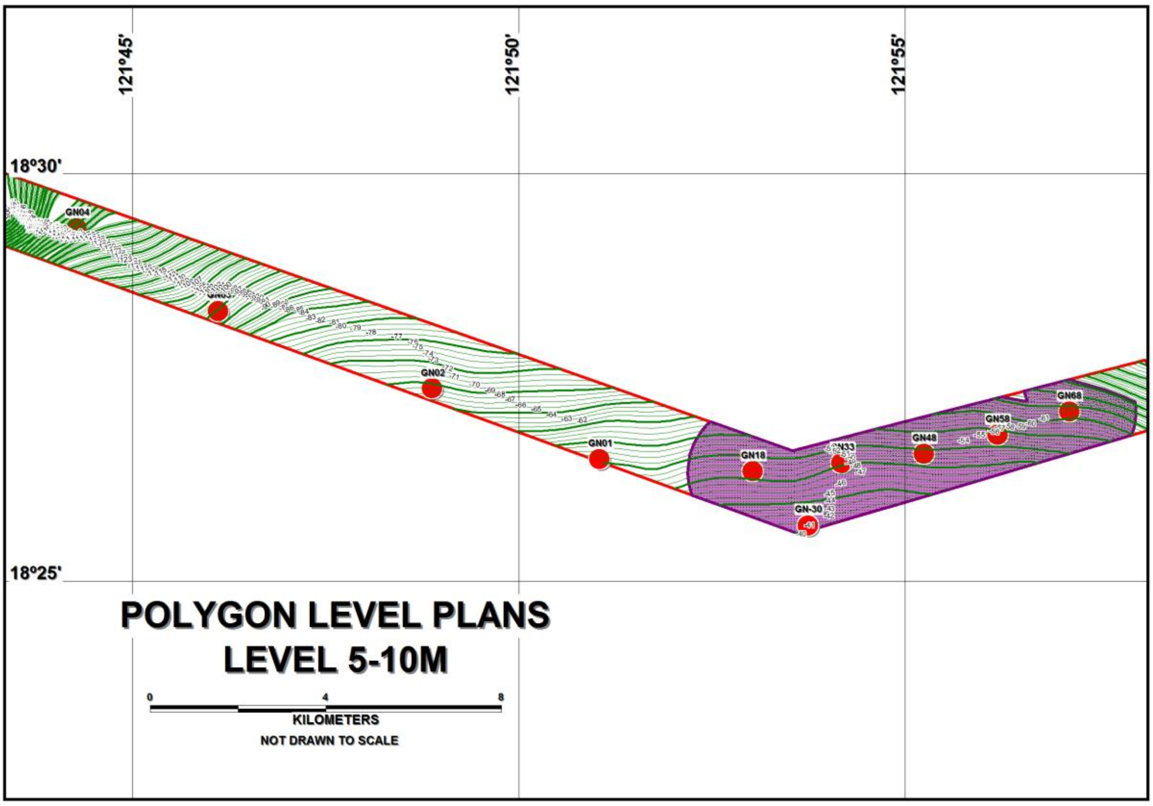


Figure 15.8.2: Polygon Plan for Level 5 to 10 meters

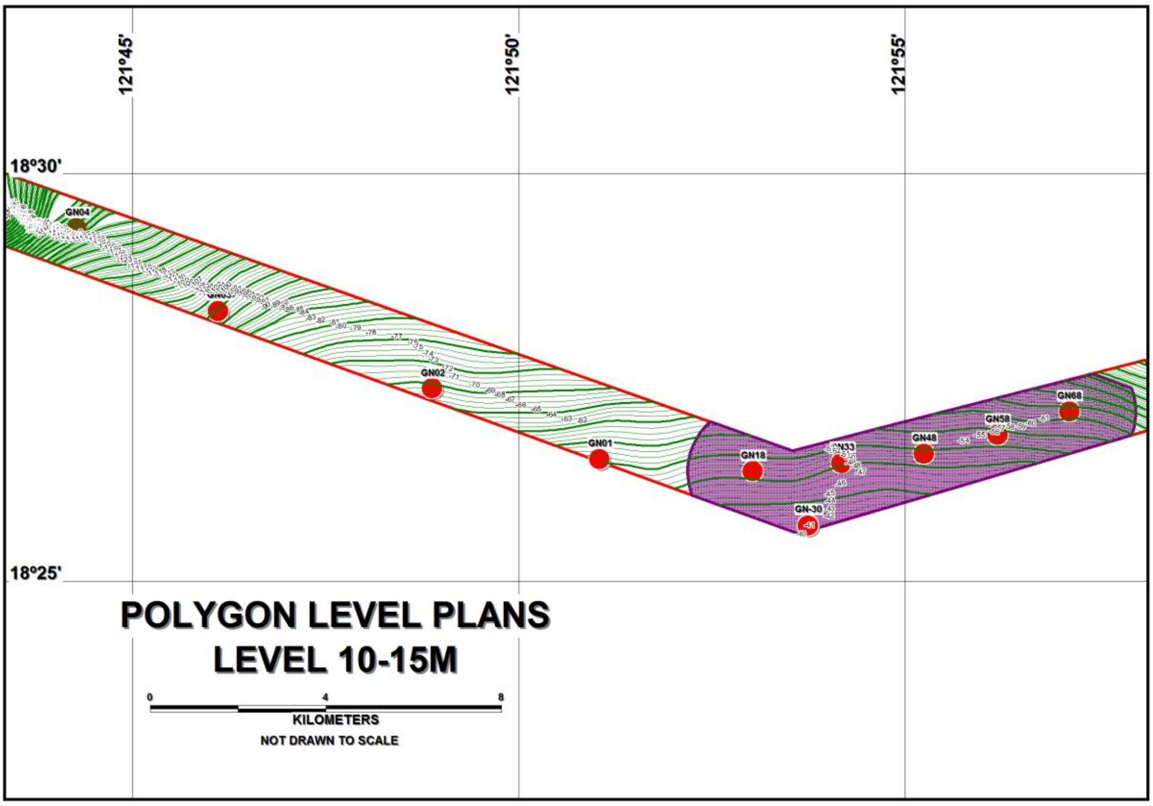


Figure 15.8.3: Polygon Plan for Level 10 to 15 meters

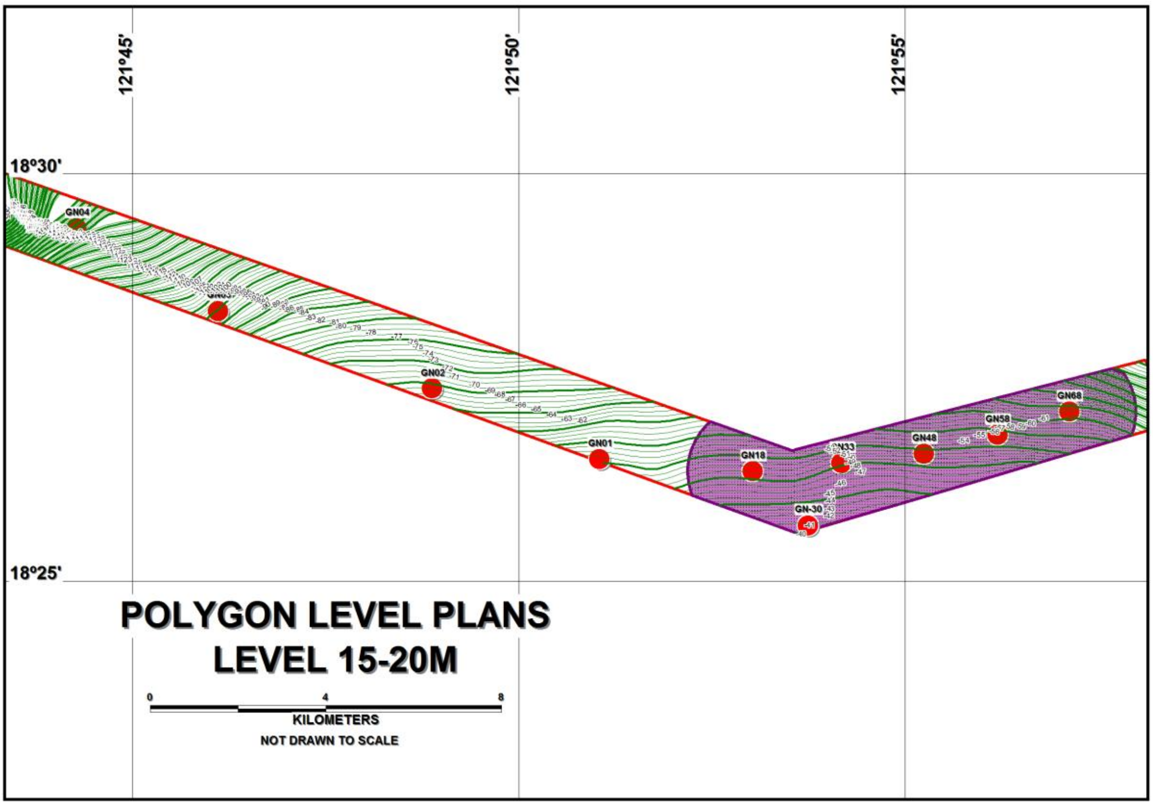


Figure 15.8.4: Polygon Plan for Level 15 to 20 meters

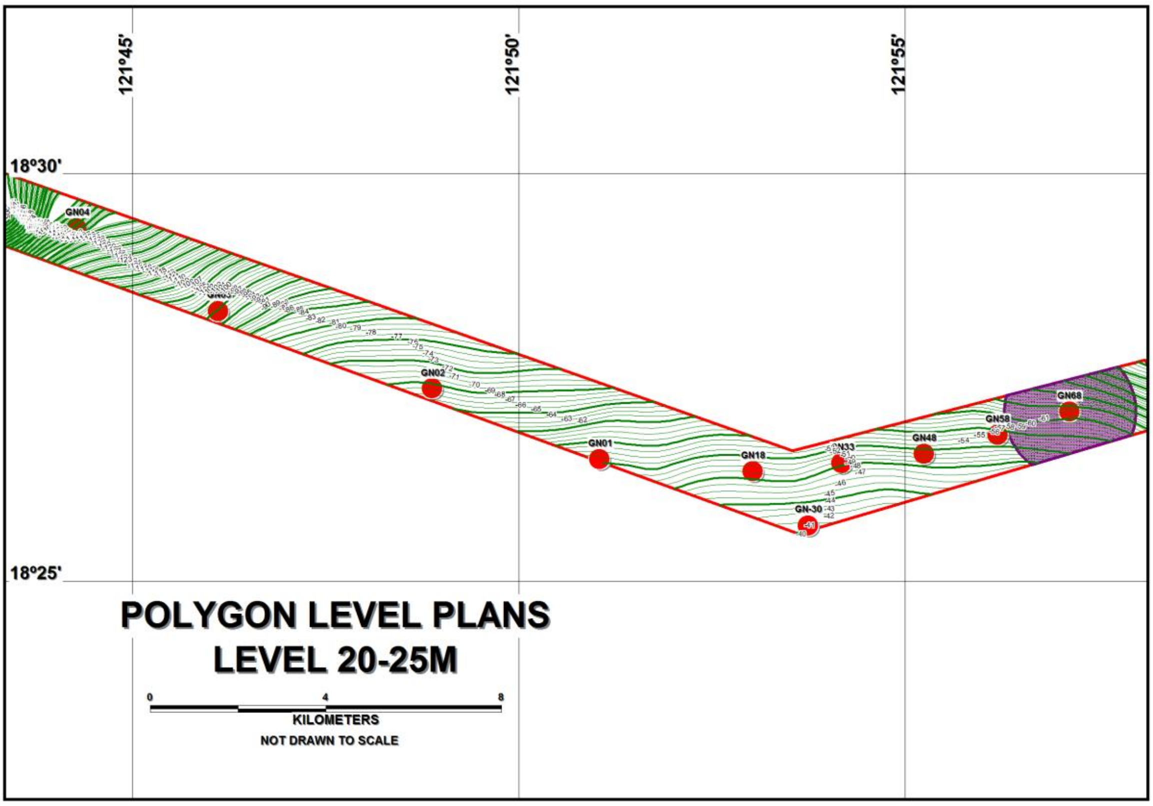


Figure 15.8.5: Polygon Plan for Level 20 to 25 meters

16.0 INTERPRETATION AND CONCLUSIONS

16.1 Data Synthesis

All the assay and related geological information from the samples indicate that the JDVCRC magnetite sand resources are largely accurate, with almost negligible percentage of error in accuracy due to natural geological variability, sample preparation and analysis and analytical errors.

16.2 Adequacy of Data, Overall Data Integrity and Areas of Uncertainty

As presented and tested, the data is highly accurate, and that the database, although not large, is of acceptable integrity. The sources of error/uncertainty have been identified, and their contribution to the uncertainty in estimation have been quantified and interpreted in a manner considered to be acceptable.

The method of estimation used is very simple, and the detailed procedures have been performed to produce a largely unbiased and accurate estimate on the conservative side as a minimum.

The Polygon Method performed enabled the classification of the resources within the ore envelope to be in conformity to PMRC classification of indicated, and inferred resources which correspond to the level of confidence and certainty of estimate related to each class. This classification is based on intelligent correlation of the result of the seismic reflection survey and the result of the drilling exploration, which were proven to confirm each other. Although the best way to validate the accuracy of the resource is through ore reconciliation during the actual mining operation, it can also be initially attained by drilling in-fill holes to further upgrade the resources to measured category.

16.3 Overall Conclusions

At 0% MF cutoff, and at the average bulk in-situ densities utilized for the raw sand, the deposit contains in excess of 600 million metric tonnes of indicated resources with an average grade of about 25% MF, which at 100% recovery, is equivalent to about 150 million metric tonnes of magnetite concentrate; and an inferred resource of about 60 million metric tonnes with an average grade of 47% MF, which at 100% recovery is equivalent to about 30 million metric tonnes of magnetite concentrate.

With judicious choice of an economic mining method, the deposit can meet most market specifications of magnetite, perhaps lasting many years in as-yet-to-be-determined annual production rate to be set by a PMRC CP in mining.

16.4 Attainment of Project Objectives

As set out above, it is this PMRC CP's view that the project objective is attained, which is to have a reliable estimate of the mineral resources within the JDVCRC tenement as of the data cutoff date, and consistent with all the checks, assumptions, qualifications, limitations of the method used in arriving at this estimate. This resource can now be used in the preparation of the mining project feasibility.

The results of this estimate provide the basis for establishment of mineral reserves by a PMRC Mining CP, which include the modifying factors, mainly economic and technological, to make the resource into an economically-viable, socially- and environmentally-acceptable operation.

17.0 RECOMMENDATIONS

Based on the results of the offshore exploration activities by JDVCRC, an indicated mineral resource of 606,458,000 DMT with an average grade of 25.47% MF was estimated in the 4,999.2358 portion of the MPSA Contract Area situated in Parcel A (Gonzaga, Cagayan), which will yield more than 150,000,000 DMT of magnetite concentrate which is about 60% Fe. In Parcel B-1 (Buguey and Aparri, Cagayan), the inferred resources consist of additional 63,000,000 DMT with an average of 47% MF content that can yield about 30,000,000 DMT of magnetite concentrate.

The estimates provide a firm basis for transforming resources into reserves, hence eventual mineral production, lasting many years, depending on the production rate and mine plan that can be set and designed by a PMRC CP Mining Engineer. Optimization of the resultant block model will provide basis for proper mine planning and scheduling that will maximize the value of the resources and reserves. The block model from this estimation also provides the basis for grade control, reconciliation, to meet customer specifications.

While a substantial portion of the tenement is still not drill tested, it is recommended that JDVCRC may file a Partial Declaration of Mining Project Feasibility for Parcels A and B-1 of the MPSA Contract Area embracing an area of 4,999.2358 hectares situated in Gonzaga, Buguey and Aparri (portion), for commercial operations. The total resources can be significantly upgraded; additional resources can be determined by deeper drilling and closer spaced drill holes, implementing a stricter compliance to QA/QC protocols.

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