

**COMPUTERIZATION OF SOLID MINERAL EXPLORATION
ACTIVITY FOR GEOLOGICAL INFORMATION STORAGE,
RETRIEVAL AND ANALYSIS.**

(A CASE STUDY OF NATIONAL IRON ORE MINING PROJECT ITAKPE)

BY

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**A PROJECT SUBMITTED TO THE DEPARTMENT OF
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IN PARCIAL FULFILMENT OF THE REQUIREMENT FOR THE
AWARD OF POST - GRADUATE DIPLOMA IN COMPUTER SCIENCE.**

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CERTIFICATION

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I hereby declare that this project has been written by me and it is a record of my personal effort. It has not been presented before for the purpose of a first or higher degree

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DATE

DEDICATION

This project is dedicated to God the father, Son and the Holy Ghost
And Chief Ogwu Adigwe (ABOR) AMANE EKANYI

ACKNOWLEDGEMENT

My special thanks goes to God the Father, Son and the Holy Ghost for the special wisdom and understanding given to me in the course of my academic career.

Great thanks especially to my supervisor Prof. K.R Adeboye who continuously assisted, encouraged me and had the time to go through my work. Also gave all the necessary ideas, views, meaningful contributions, thought and made all necessary corrections that needed to be made.

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My lovely thanks to my able wife Mrs. A.G. Ogwu for her support both morally and financially in making my dreams come true and making me what I am today.

Also my family member namely: Anthonia, Monica and Martina.

I particularly want to acknowledge the following:

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The brethren of the DLBC Ekanyi – Ibayi

Bro. H. Attah, Bro Patrick O.N. Bro Solomon E. and Bro Moses A. who have been a source of encouragement as their prayers were unfailingly rendered and answered by the almighty God.

May the God lord never forget your labour or love and reward you accordingly (AMEN).

ABSTRACT

This project present an analysis of a generalized solid mineral exploration system in determining the location of minerals and the use of each mineral explored based on the percentage composition of the element present in the mineral. Computerized geological reports are designed in view of the requirement identified.

The design of the mineral exploration system is centered adequate security for the data handling and preparation of reports, accurate field and laboratory report keeping and presentation of report in general acceptable formats.

The system is divided into main separate modules;

- (a) The entry of:
 - i. Zones / Department project result entry
 - ii. Laboratory analysis result entry
- (b) Deletion of unwanted record (s)
- (c) Retrieval and editing of record (s) and
- (d) Report and forms

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of various geological processes taking place in the earth. More than two thousand (2000) minerals are recognised at present.

The geochemical process involved in ore formation are diverse. The processes fall into four principal categories;

1. Cooling processes
2. Heating processes
3. Weathering processes
4. Oxidation and reduction.

Cooling Processes: Materials crystallising from the magma at different temperatures may settle out in band for example chromite deposit. At a later stage in the cooling process residual molten magma, may inject into rock crevices. The magnetite deposit at Kiruna, Sweden were formed in this way.

Heating Processes: Ores formed by evaporation of seawater are called evaporites. They consist of the more soluble minerals such as sodium chloride, gypsum, $\text{CaSO}_4 \cdot \text{H}_2\text{O}$ and chili nitrates.

Weathering and transport: Weathered materials in solutions or in suspension can be deposited in sufficient concentration to become an ore body. Iron deposits have occurred in this way, such as the detailed magnetite iron-sand of New Zealand.

Oxidation and Reduction: The geochemistry of iron is dominated by oxidation and reduction and the pH of the surrounding medium. Iron is immobilized in oxidizing conditions and in alkaline reducing conditions, but is mobilized in acidic reducing condition.

1.3 OBJECTIVE OF THE STUDY

The project treats the retrieval of information of mineral exploration to cater or give additional guide for future exploration.

The objectives of this project are as follows: -

- i. To develop a computerised mineral exploration reporting system.
- ii. To provide accurate security to the nature of information collected and held.
- iii. To provide a means of generation summaries of the exploration activities covered within a period for better management information.

- iv. To provide an opportunity for exploration information procedure in preparation of a field report, laboratory analysis result and determining the appropriate use(s) of the mineral.
- v. To provide interactive and batch mode of processing for the preparation of the exploration activities reports which can be monthly, quarterly or yearly.

1.4 SCOPES AND LIMITATIONS

The scope of this study will be centered around the solid mineral exploration activities.

Among the solid minerals we will now discuss briefly the formation of an ore deposit of the more important metals like iron ore.

The processes which have produced most iron ore is the leaching of SiO_2 from primary precambrian banded-iron-formation, which were formed from marine chemical precipitation.

Although hematite and magnetite are quantitatively and economically the most important ore minerals of sedimentary iron concentrations, they are no means the only ones. As a class, such iron concentrations contain a wide variety of iron bearing species – oxides, hydroxides, carbonates, silicates and sulphides – and many individual deposit have been found to possess a substantial range of these compound.

Oxides: The principal oxides are hematite, magnetite and limonite.

Hematite occurs in a wide variety of forms as layer interbedded with fine silica (chert) as oolites, as replacement of fossils and sometimes simply as an earthy matrix to other minerals. The first type of occurrence is general in precambrian ore.

Carbonates: Principally siderite (FeCO_3). This is usually impure and in most instance is $(\text{Fe, Mg, Ca, Mn}) \text{CO}_3$ with Fe highly dominant.

Carbonates: Next in importance to the carbonates. Though of rather lesser overall importance – are the silicates. Some of these are doubtless primary, in the sense that they formed at the time of sedimentation, which others have almost certainly formed during diageneses or metamorphism.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 PREAMBLE

The Itakpe iron ore originated from rock and its deposited in layers which are intercalated with waste the deposit is about 4km in extent with division into North-South axis pit for convenience. The deposit was initially about 400m above the sea level which has now been brought down to about 360m/320m above the sea level. After the exploration activities which involves surface and subsurface mapping by the geologist it proceed to mining activities with blast hole drilling, blasting and handling the blasted materials to the primary crusher of the beneficiation plant while the crushed iron ore (hematite, magnetite and limonite) passes a series of separation method (gravity and magnetic) where minerals like mica, are removed leaving the concentrated yard of the beneficiation plant.

In March 1992 the National Iron Ore Mining Company (NIOMCO) which is now known as National Iron Ore Mining Project (NIOMP) was designated a project to facilitate supervision and funding since there was an urgent need to produce Iron Ore Concentrate for the major steel plant. Soon after this change the tempo of this work increased culminating in the commissioning of the beneficiation plant in December 1992 and the delivery of the first batch of the concentrate to Ajaokuta Steel Complex on the 7th day of April 1993.

The corporate objective of the (NIDMP) include: - The production and supply 100% of Iron Ore requirement for the Ajaokuta Steel Plant amounting to 2,150,000 metric ton per year of 63% to 64% iron concentrates, as well as Delta Steel company and Aladja Steel Complex according to specification.

The National Iron Ore mining project is divided into various department for administrative convenience. The divisions are: -

1. The Vocational Training Centre V.T.C. The Centre is established to cater for the local training need of the project personnel and places great emphasis in recruiting, training and retraining of staff needed for the project.

2. Main mine workshop. The building has been completed and awaiting the supply and installation of workshop equipment.
3. Mine laboratory. The building has been completed and the necessary equipment for quality control have been installed.
4. Locomotive workshop. Construction work have been completed with facilities put in place for the maintenance of locomotive and wagons.
5. Explosive magazine. Construction work for an additional explosive magazine is in progress.
6. Fire fighting/security facilities fully operational.

2.2 IRON ORE AS A SOLID MINERAL

Iron Ores both in geological time and in geographic distribution are widely dispersed. If the iron formation contain much iron it is known as Iron Ore. The deposit vary in depth from a few feet to hundred of feet beneath the earth surface. They were formed as early as 25 million years ago. Geographically iron ore deposit are located in nearly all areas of the earth crust altogether few deposit ore of commercial importance.

Most of the mineral deposits came into existence as the silicate shell separated by gravity and crystallization. Later chemical processes caused further changes and the creation of other mineral deposits. As the composition of the liquid changed due to solidification and segregation, the composition of the gas phase also slowly changed until the gas separated into gaseous and liquid phases. This transition into an atmosphere and hydrosphere produce further separations and local concentrations in the silicate shell, thus creating more deposits of minerals. During the following millions of years further changes occurred through evaporation, underground water action, vegetation decay, oxidation and various chemical actions

Condensation of gases from early volcanoes, action of underground water, weathering, decay, grinding action of earth quakes, intrusion of minerals bearing sea-water into porous rock and evaporation contribute to the continuing formation of various types of ores.

2.3 METHODS OF PROCESSING IRON ORE

Prior to extraction of a metal from its ore it is often necessary to process the ore by crushing and sorting to a correct size, also the ore may need to be enriched. Many sorting processes make use of the physical properties of the crushed ore.

The mined iron ore is never charged into the blast furnace like that. That would amount to bad practice and beside would damage the charging crane and furnace if tolerated.

The first major step to be taken after the ore has been obtained is grinding otherwise called Ore Comminution which involves the use of crushers, grinders etc. to break the Ore down to manageable size, meaning a size that both man and machine can handle comfortably.

After crushing the Ore, the Ore is beneficiated accordingly. The need to beneficiate an Ore lies in: -

1. Enhancing the concentration of the sought after metal.
2. Increasing the Ore's reducibility in the furnace.
3. Reducing the gangue in the Ore.
4. Reducing the slag volume during Ore smelting
5. Enhancing blast furnaces thermal efficiency.
6. Enhancing blast furnace's through put.

2.4 LIMITATION

With the help of the National Iron Ore Mining Project Itakpe, the project has been able to go to the extents of beneficiating Iron Ore concentrate to produce billets which is developed by the Itakpe servicing areas like Ajaokuta, Aladja, Delta etc. for further production of the semi finished-product to a finished product like steel bar, wire coil etc. for various application.

The details of this series of production will be discussed in the proceeding chapters.

CHAPTER THREE

3.0 SYSTEM ANALYSIS

3.1 PRELIMINARY STUDY

The establishment of the objective of the system was the first step taken in the analysis phase.

It was observed that mineral record keeping and retrieval has not been easy and hence there is a drastic need for a new system based on the following objectives.

- i. To save time
- ii. To reduce management cost
- iii. To reduce the use of out dated equipment in exploring mineral.
- iv. To reduce duplication.

3.2 FEASIBILITY STUDY

The reason for feasibility study is to determine whether a solution to the problem is feasible. Usually investigation is made toward the project in sufficient depth to be able to provide information that justifies the development of the new system.

This is to prevent wasting many months of effort and many thousands of naira if the project is too large or simply impossible to carry out.

During the study, information was collected on the difficulties with the existing systems; These are: -

- i. Misplacement of files
Files are misplaced after accessing it for particular information which enhanced delay in accessing the files thereby delaying the management decisions based on the files.
- ii Slow access to files
Access to information contained in the files is also slow because of the volume of paper work and manual filings involved.
- iii. There is less security and file privacy.
Files are not normally property kept and there is lack of data.

3.3 INVESTIGATION AND FACTS RECORDING

This study is more comprehensive than the feasibility study. The purpose of this study is to fully understand the existing system and identify the basic information requirement.

The study was concluded.

i. Interviewing, asking officers in charge of exploration and laboratory records.

ii. Studying how the existing system works. The factor considered include characteristics of mineral exploration establishment affected by the system, analysed report and forms associated with, and some of its basic strength operation, for example the statistical record in individual mineral file and the general mineral lists are updates if there are: -

iii. New mineral explored.

iv. Detailed exploration carried out

v. Replacement of old information of some mineral incase of some better and new discoveries.

3. Going through the existing record with the company. Data and other information are processed and reports produced. Such reports are regularly requested for by any various bodies such as: -

i. Geological survey department.

ii. National steel and raw material exploration agency.

iii. Other mining companies.

For necessary information of a mineral and location statistical data and other information on mineral are also provided from time to time at seminar, conference, such as Nigeria mining and geosciences society (NMGS)

Basically Individual mineral file is made up of the Following entities

i. File number

ii. Zone (department involved in the exploration)

iii. mineral name

iv. Date of exploration

v. Method of exploration

vi. Mineral location

- vii. Name of officer involved
- viii. Previous works
- ix. Recommendations/field report

And the laboratory analysis of this minerals will be included in its file which is basically made up of:

- i. Parameter
- ii. Percentage composition of each parameter. However the only entries or field that are required in the report that is regularly produced are:

- i. File number
- ii. Zones/department involved in the exploration
- iii. Mineral name
- iv. Method of exploration
- v. Mineral location
- vi. Recommendation report
- vii. Officer involved
- viii. Laboratory report

Here are report layout from the administrative department

‘NAME OF THE ESTABLISHMENT’

MINERAL EXPLORATION

- i. File name
- ii. Zone name
- iii. Mineral name
- iv. Mineral location
- v. Method of exploration
- vi. Cost of production
- vii. Recommendation / Reports
- viii. Officer involved in the exploration
- ix. The result from laboratory is collected and file into the mineral name file

Below is the laboratory analysis result from layout

ESTABLISHMENT NAME

LABORATORY ANALYSIS RESULT OF (MINERAL NAME)

Content	Sample Code		
	Sample 1	Sample 2	Sample 3
Item coded			
Parameter 1	% Composition		
Parameter 2	% Composition		

This analysis was carried out by

And supervised by

At

In the process of acquiring knowledge from the establishment, a systematic interview over a period of time was conducted. During this interview, the interviewer presented series of realistic problems and also questions were asked on how the establishment could evaluate the cases in question. The best thing is to determine how they could be organised and then address the problems.

3.4 DATA ANALYSIS

The purpose of this stage is to ensure that all feasible alternatives are alternatively produced. The mineral explored considered is limited or selected because of the limited time.

At this stage the in order to make a proper assessment of the existing system, all facts relating to the objective set up were examined. It is necessary to investigate the potentials for a new lower cost and effective management system to improve record keeping.

The existing system is an important sources of information for the development of the proposed system.

The old manual system has been in use from the inception present.

The flow of data in the system is difficult to describe, therefore special graphical techniques called the flow – chart are developed. The two types of data flow – chart that are used are system flow – chart and hierachical chart as shown in figures 3.1 and 3.2 respectively.

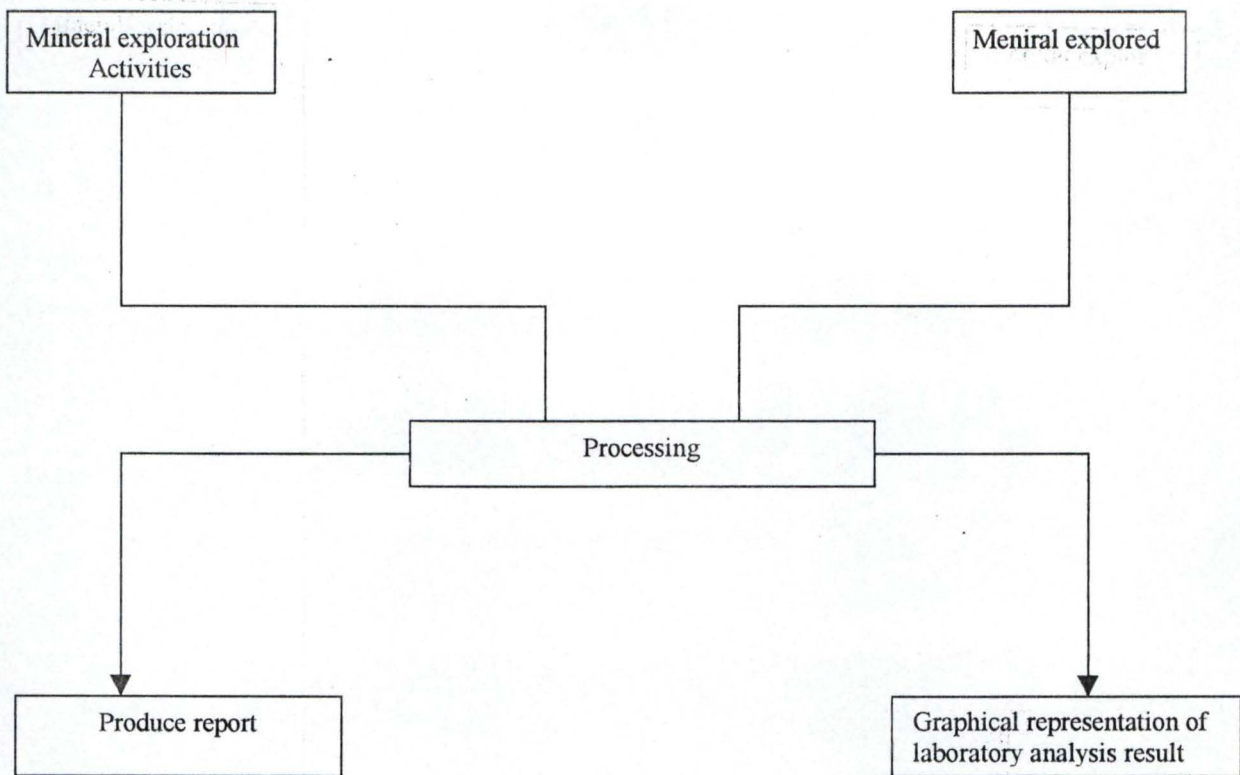


FIGURE 3.1

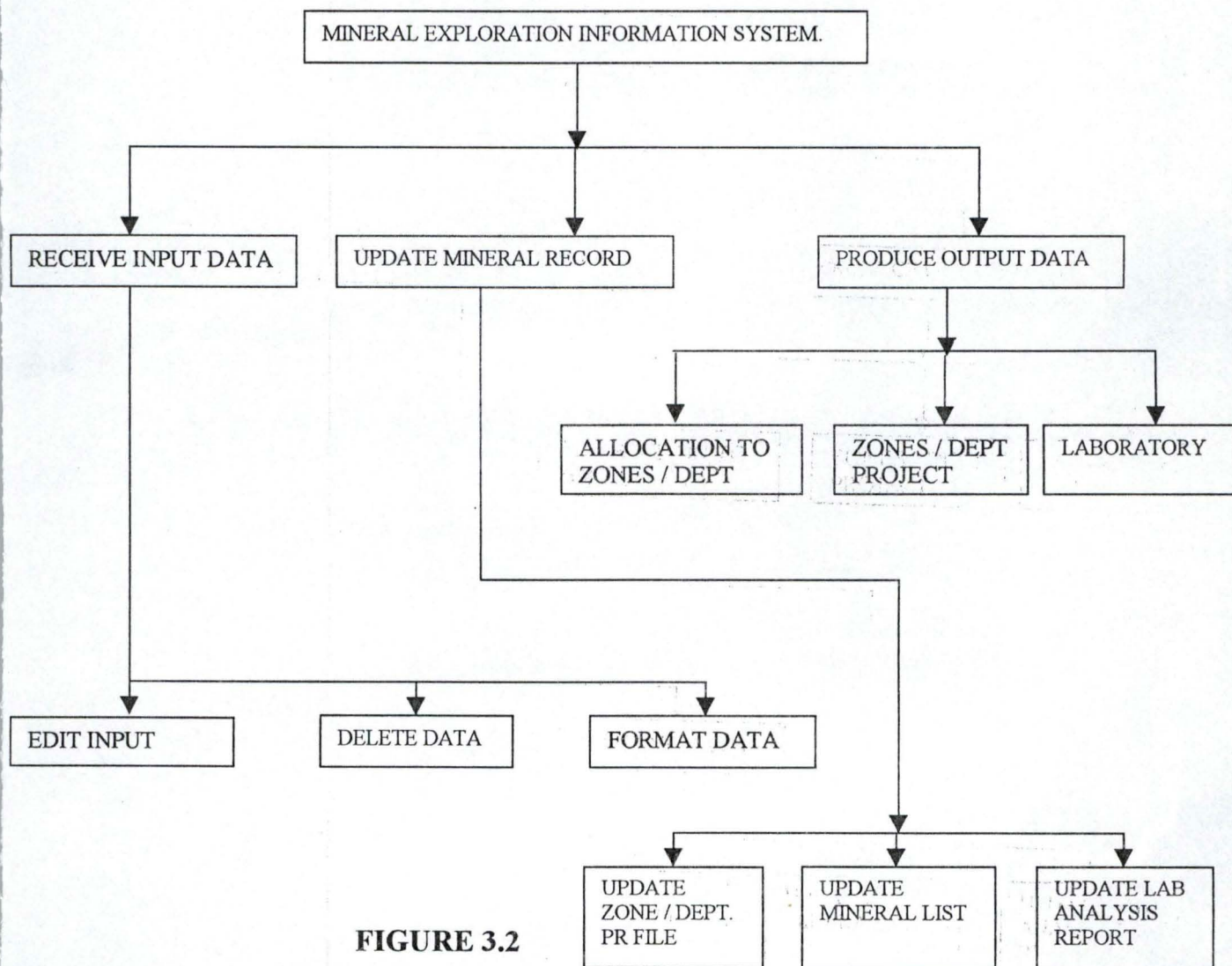


FIGURE 3.2

CHAPTER FOUR

4.0 SYSTEM DESIGN

4.1 INPUT TO MINERAL EXPLORATION REPORTING SYSTEM

Input to (MEMS) referred to here as a transaction which is measured in the exploration activity carried out.

The underlisted below are the characteristics of the field report and laboratory analysis result and as well as the basic system for entry of exploration carried out.

1. A particular reference number that must have a zone's/department's code as well as sample/mineral name. Every exploration activity must be recorded to file that receives the information, another for the laboratory analysis result of the sample. This gives an easy reference incase of query on the report and a means of recoupling the report.
2. Entries are grouped by headquarters entries zone's/department entries, with full consideration the main heading required in the output.

The above characteristics guarantee an added advantage of sorting each activity into the main exploration sub-heading in the process of production of various statement required.

The reason for this approach is that, it is found more advantageous to first identify the main exploration sub-headings and then group them under the main exploration reports.

This approach makes entries of activities and the manipulation of the records easy to accomplish.

4.2 DESIGN FEATURES AND PROGRAM SUITES

Under this topic description is made briefly on these important points:

1. Mineral/sample number code and
2. System structure

MINERAL / SAMPLE NUMBER CODE

Preliminary investigation indicated a critical need for coded form of mineral/sample numbering for laboratory analysis taking into consideration the set up of laboratory analysis procedure and necessary data for translating the field work and laboratory analysis to any of the mineral exploration report required.

SYSTEM STRUCTURE

The system is divided into different modules:

- (a) Recording and reporting of transaction, where all the transactions are input into the system and report generation.
- (b) Viewing of records entered
- (c) Deletion of unwanted record(s)
- (d) Processing and reports.

This module takes care of the processing of the mineral explored record and related graph on laboratory analysis result on percentage composition of the mineral explored.

The above points are justified following the basic reasons below.

1. The unwanted or wrong entries of data can be removed from the database.
2. It takes maintenance and changes in the program modules easier to accomplish.
3. The recording and accumulation of data for geological and management report can be done in many ways but immediate recording of transactions guards against an enormous accumulation of data which may have to be revalidated.
4. By this structure it is possible to monitor the system regularly and prevent any loss of muddling up of data.

4.3 DATA ENTRY

- i. Data entry is through the keyboard/visual display unit.
- ii. Error reports are displayed on the terminal VDU if VDU is used.
- iii. Modules within the data entry are:
 - (a) Input headquarters entry, zone's/department's entry and laboratory analysis result entry.
 - (b) Edit all the inputs
 - (c) Update and validate database file.
 - (d) Sort and file exploration activities.

4.4 SECURITY AND INTEGRITY OF THE SYSTEM

The security and integrity of the system is designed to take ample of the following.

- i. Data handing
- ii. Data preparation
- iii. Storage and manipulation
- iv. Programmimg standards

4.5 DATA PREPARATION

The data collection is expected to be made through headquarters allocation to zone's and department's, zone's/department's field report, and laboratory analysis redsult reports. Although visual checks and hand checks will have to be used. Data entered through keyboard/VDU are displayed directly under the data entered for further security.

The data entered into the system is pruned of further errors of transposition and punching through validation.

4.5 DATA VALIDATION

Before any of the numeric fields if written it is validated and if the field is not, numeric, the transaction is rejected and can be immediately, entered if VDU is used (incase batch, the whole batch is rejected).

This only guards against alphabetic being written in place of numeric fields, it does not guard against wrong numeric values being entered.

The following checks are built into many part of the program:

- i. Format checks, that data items are prepared in the appropriate character set.
- ii. Range, check that the value of an item is within an expected range; this only guard against out of range, not wrong but within range values.
- iii. Check-code, verification for the mineral/sample number for identification during laboratory analysis.

4.5.1.1 ACCESS AND SECURITY

Access to the system is restricted by password to restrict initial and subsequent access for selected changes to information of these files, which are very sensitive or viewing record inside this files.

4.5.1.2 OTHER DESIGN FEATURES

- (i) The system is designed in a modular fashion with each program easy to change with little effect on the entire system
- (ii) All program is written in Dbase iii plus.

JUSTIFICATION

It is found that Database management system are being employed widely in all areas of life be it business, report or science environment.

Dbase iii plus has implicit file handling facilities like sort, search and merge.

It is a query language designed for file handling. Any authomated information is based on a stored on a collection of stored item. (a database) that need to be accessed.

Thus database management might simply be system designed to manipulate and maintain control of any database.

In actual practice, database management system are concerned with the storage, maintenance and retrieval of data facts available in the system in explicit form. That is information does not appear as natural language text but it is available instead in form of specific data elements stored in tables. In a database environment each item or record is thus separated into several fields, and each field contain the value for a specific characteristics or attribute identifying the corresponding record, specific value of this characteristics, that is specific names (like mineral names) or specific social security number, (code for each mineral or sample for laboratory analysis) are used as identifier for the individual records.

The process of concern on database management (Dbase iii plus) include the storage and retrieval of data, the updating or deleting of data, protection of data unintentional or deliberate changes or misuse, and perhaps even that transmission of data to remove users or other management system.

The output of the system may consist of individual records, tables or arrangement of the database.

In order to be suitable for the database processing, each search must state a specific value of certain record identifier.

A user may for example wish to retrieve the exploration activities carried out on a specific mineral and its location. The retrieved information will consist of all records which match the stated the search request exactly.

In information retrieval, as opposed to database management, it is often difficult to formulate precise information request, and the retrieved information may include items that may or may not match the information required exactly. This information contained in the database management system include a good deal numerical data and statistical or computational facilities may be provide to manipulate the numbers.

There is a report writing facility which will facilitate the printing of reports and other listings.

(iii) Processing and hardware requirement the mode of processing mainly on-line update. The primary store requirement depends very much on the size of the resident system software and the application program.

Thus, it is difficult to estimate the size both at this stage with some sort of programs over lay about 64 kilobyte store will be considered sufficient.

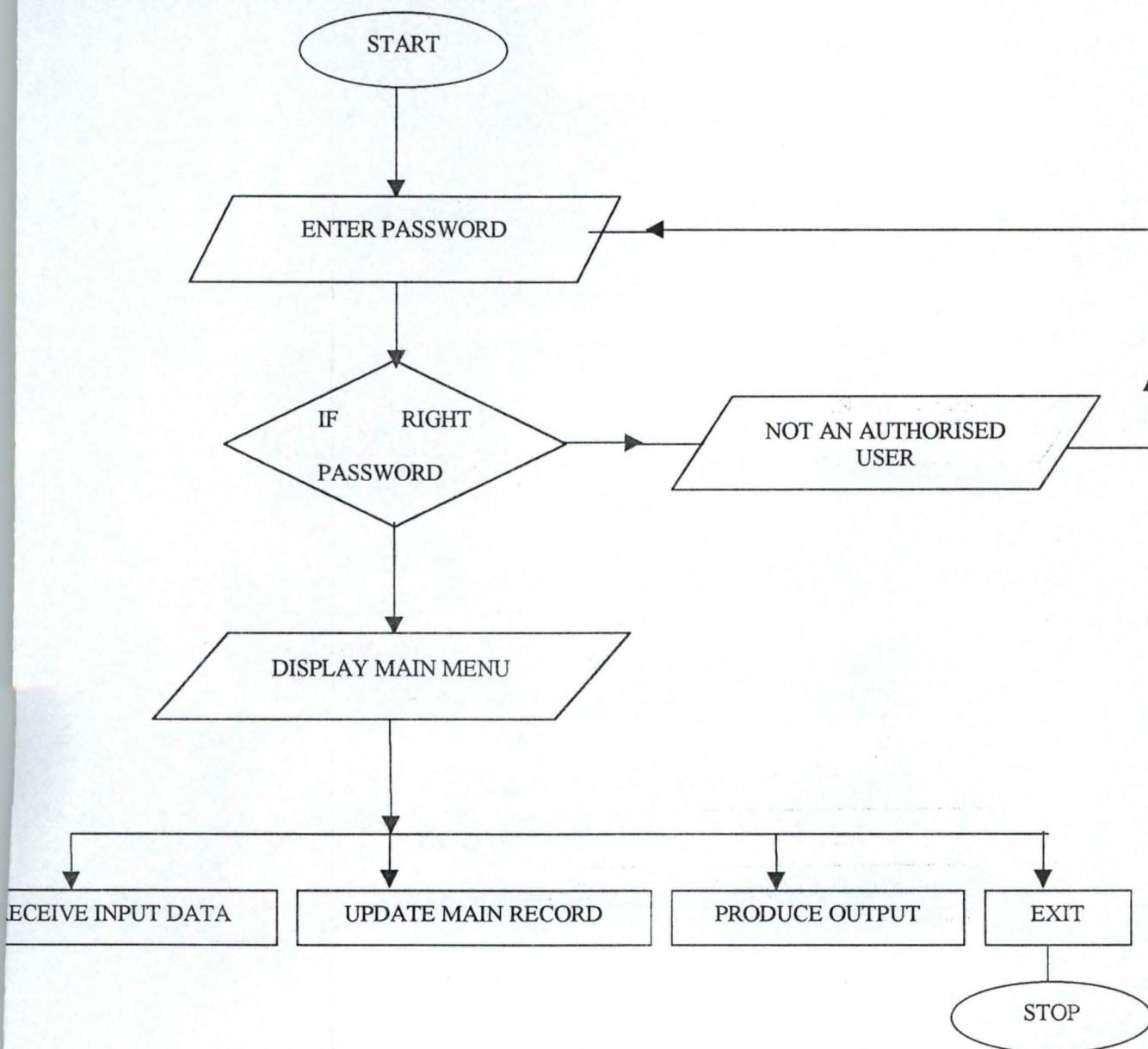
CHAPTER FIVE

5.0 IMPLIMENTATION

5.1 USER'S MANUAL

The following are the steps taking in using the system;

- i. Initiation of control modules, conversational formats and system message.
 - ii. New input entries
 - iii. Amendment to program facilities
1. Initiation of control module



CONVERSATIONAL FORMAT AND SYSTEM MESSAGE THROUGH VDU

The entry of data through VDU is made explicit by a conversation format.

On entry into the mineral exploration information system is made possible by entering a password, the main menu will appear showing options. If any of the options is choosing e.g. ADD to record PRG, the following are displayed in this form.

NATIONAL IRON MINING PROJECT IJAKPE KOGI STATE MINERAL EXPLORATION INFORMATION SYSTEM DATA ENTRY

1. RECEIVE INPUT DATA
2. UPDATE MINERAL RECORD
3. PRODUCE OUTPUT
4. EXIT TO MAIN MENU

Select your choice

If any of the above options of the submenu is choosing, the format for entry will be displayed as follows

N. I. O. M. P ITAKPE KOGI STATE

Mineral exploration information system

INPUT MAIN MENU

1. EDIT DATA
2. DELETE DATA
3. FORMAT DATA
4. RETURN TO MAIN MENU

Select your choice

N. I. O. M. P ITAKPE KOGI STATE

Mineral exploration information system

UPDATE MENU

Update Zones / Department project file

Update Mineral list

Update laboratory analysis results

Return to main menu.

Select your choice

N. I. O. M. P. ITAKPE KOGI STATE

Mineral exploration information system

OUTPUT / REPORT MENU

Allocation to Zones / Department project reports.

Laboratory analysis results.

RETURN TO MAIN MENU

Select your choice.

File Specification

Mineral DBF

S/N	Field Name	Field Description	Field Type	Width
1.	FILE NO	FILE NUMBER	CHARACTER	5
2.	ZONE	ZONE	CHARACTER	10
3.	DEPT.	DEPARTMENT	CHARACTER	15
4.	M NAME	MINERAL NAME	CHARACTER	20
5.	EX DATE	DATE OF EXPLORATION	DATE	10
6.	ME. EXPL	METHOD OF EXPLORATION	CHARACTER	70
7.	M. LOCATION	MINERAL LOCATION	CHARACTER	20
8.	OFFICERS	NAME OF OFFICARS INVOLVED	CHARACTER	20

S/N	Field Name	Field Description	Field Type	Width
1.	ZONE DPT.	ZONES / DEPARTMENT	CHARACTER	25
2.	M. NAME	MINERRAL NAME	CHARACTER	20
3.	S. NAME	SAMPLE NUMBER	CHARACTER	5
4.	M. LOCATION	MINERAL LOCATION	CHARACTER	20
5.	M. ANALYSIS	METHOD OF ANALYSIS	DATE	20
6.	P. COMPL	PERCENTAGE COMPOSITION	CHARACTER	5
7.	COLOUR	MINERAL COLOURON	CHARACTER	10
8.	NATURE	NATURE OF MINERAL	CHARACTER	15

PROGRAM LIST

1. MINERAL. PRG – Mineral exploration information system
2. INPUT M. PRG - Input Menu
3. UPDITEM. PRG – Update menu
4. OUTPUTM. PRG - Output / Report menu
5. EDITDAT. PRG - DATA ENTRY / edit program
6. DELDAT. PRG - Mineral data deletion program
7. FORMATD. PRG - Data formatting program
7. UPDAPROJ. PRG - Project file update program
9. UPDLMIN. PRG - Mineral list update program
10. UPDLAB. PRG - Lab analysis update program
11. ALLOCREP. PRG - Allocation to Zones / department report
12. MINLIST. PRG - Zone / department project report
13. LABREP. PRG - Laboratory analysis result report

DATABASE FILES LIST

1. MINERAL DBF Mineral exploration master file
2. LAB DBF Laboratory result file

NATIONAL IRON ORE MINING PROJECT ITAKPE KOKI STATE
MINERAL EXPLORATION INFORMATION SYSTEM MINERAL DATA
INPUT FORM

File Number:

Zones / Dept:

Mineral Name

Date of exploration:

Method of exploration:

Mineral location:

Officers involved:

(s)ave /exit (A)bandon (C)ontinue

NIOMP ITAKPE KOGI STATE (MEIS)

PROJECT FILE UPDATE

File Number:

Zones / Dept:

Mineral Name

Date Of Exploration:

Mineral Location:

Method Of Exploration:

(U)Pdate (E)Xit Without Updating

NIOMP ITKPE KOGI STATE (MEMS)

LABOTORY RESULTS ENTRY FORM

File Number:

Zones / Dept:

Mineral Name

Sample Number:

Mineral Location:

Method analysis:

Percentage composition:

Colour of mineral:

Nature of mineral:

(S)ave / exit save / (C)ontinue (A)bondon

REPORT LAYOUT

1. Allocation to Zones / Department Report

NIOMP ITAKPE KOGI STATE

File No Mineral Name data of exploration Method of exploration

Mineral of exploration

2. Zone / Department project Report

NIOMP ITAKPE KOGI STATE

File No Mineral Name Date of Exploration, Method of Exploration, Method of location

3. Laboratory Analysis Report

NIOMP ITAKPE KOGI STATE

File No Zone / Department Mineral Name Sample No Mineral Location

Method of Analysis

4. Laboratory Results

NIOMP ITAKPE KOGI STATE

File No Zone Name Percentage Composition Colour Nature

5.2 SYSTEM RECOMMENDATION

For the effective and efficient mineral exploration record keeping and retrieval, a computerized information system is proposed for the exploration companies. This will involve purchase a computer system and consequently money involving and also greater degree of system studies so far, we reckon that a micro computer system (Personal Computer; PC) should be is purchased

This recommendation is based on the following:

1. The volume of transaction as represented by the number of input documents and frequency
2. The processing requirements which will be largely batch processing basis.
3. The volume, number and frequency of output documents and report.

4. Changed to graphical representation for easier understanding and clearing for interpretation

5.3 CONCLUSION

In conclusion therefore it has been found that newly designed system has the following advantage over the manual system:

It saves time, it reduces management cost, it reduces duplications and also reduces the use of old equipment.

We hereby want to conclude that mineral exploration management system (MEMS) could be an attractive idea for keeping exploration record for feature retrieving and updating mineral information, and this will result in improvement and enhancement of management capabilities as micro - computers become cheaper.

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4. **James A. Sennn** Analysis and Design of Information System
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2nd Edition, 1987.
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APPENDIX


```

*****
*****
***** PROGRAM : MINERAL EXPLORATION INFORMATION SYSTEM
***** COMPANY : NATIONAL IRON ORE MINING PROJECT
***** ADDRESS : ITAKPE, KOGI STATE
***** PROGRAMMER: GABRIEL ELOJO OGWU
***** REG.NO. : PGD/MCS/99/760
***** DEPT. : MATHEMATICS/COMPUTER SCIENCE
***** PURPOSE : IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE
AWARD OF ***** PGD-COMPUTER SCIENCE
***** DATE : AUGUST, 2000
*****
*****

```

```

SET TALK OFF
SET ECHO OFF
SET STAT OFF
DO WHILE .T.
CLEAR
@ 2,9 TO 19,70 DOUBLE
@ 3,20 SAY " NATIONAL IRON ORE MINING PROJECT"
@ 4,20 SAY " ITAKPE, KOGI STATE"
@ 6,20 SAY " MINERAL EXPLORATION INFORMATION SYSTEM"
@ 7,20 SAY " MAIN MENU"
@ 8,10 TO 8,69
@ 10,24 SAY "RECEIVE INPUT DATA"
@ 12,24 SAY "UPDATE MINERAL RECORD"
@ 14,24 SAY "PRODUCE OUTPUT"
@ 16,24 SAY "EXIT"
SET COLO TO W+
@ 18,14 SAY "DEVELOPED BY:- GABRIEL ELOJO OGWU (PGD/MCS/99/760)"
SET COLO TO R+
@ 10,24 SAY "R"
@ 12,24 SAY "U"
@ 14,24 SAY "P"
@ 16,24 SAY "E"
SET COLOR TO W+
@ 20,24 SAY "Enter your choice."
SET COLOR TO
I=0
DO WHILE I=0
I=INKEY()
IF UPPER(CHR(I)) $ "RUPE"
EXIT
ENDIF
I=0
ENDDO
DO CASE
CASE UPPER(CHR(I)) $ "R"
DO INPUTM
CASE UPPER(CHR(I)) $ "U"
DO UPDATM
CASE UPPER(CHR(I)) $ "P"
DO OUTPUTM
CASE UPPER(CHR(I)) $ "E"
EXIT
ENDCASE
ENDDO
CLEAR
CLEAR ALL
RETURN

```

***** INPUT MENU PROGRAM

```
SET TALK OFF
SET ECHO OFF
SET STAT OFF
PUBLIC I
DO WHILE .T.
CLEAR
@ 2,9 TO 19,70 DOUBLE
@ 3,20 SAY "      NATIONAL IRON ORE MINING PROJECT"
@ 4,20 SAY "      ITAKPE, KOGI STATE"
@ 6,20 SAY "  MINERAL EXPLORATION INFORMATION SYSTEM"
@ 7,20 SAY "      INPUT MENU"
@ 8,10 TO 8,69
@ 10,30 SAY "EDIT MINERAL DATA"
@ 12,30 SAY "DELETE MINERAL DATA"
@ 14,30 SAY "FORMAT MINERAL DATA"
@ 16,30 SAY "RETURN TO MAIN MENU"
SET COLO TO W+
@ 18,14 SAY "DEVELOPED BY:- GABRIEL ELOJO OGWU (PGD/MCS/99/760)"
SET COLO TO R+
@ 10,30 SAY "E"
@ 12,30 SAY "D"
@ 14,30 SAY "F"
@ 16,30 SAY "R"
SET COLOR TO W+
@ 20,30 SAY "Enter your choice."
SET COLOR TO
I=0
DO WHILE I=0
I=INKEY()
IF UPPER(CHR(I)) $ "EDFR"
EXIT
ENDIF
I=0
ENDDO
DO CASE
CASE UPPER(CHR(I)) $ "E"
DO EDITDAT
CASE UPPER(CHR(I)) $ "D"
DO DELDAT
CASE UPPER(CHR(I)) $ "F"
*DO FORMATD
CASE UPPER(CHR(I)) $ "R"
EXIT
ENDCASE
ENDDO
CLEAR
CLEAR ALL
RETURN
```

***** UPDATE MENU PROGRAM

```
SET TALK OFF
SET ECHO OFF
SET STAT OFF
PUBLIC I
DO WHILE .T.
CLEAR
@ 2,9 TO 19,70 DOUBLE
@ 3,20 SAY "      NATIONAL IRON ORE MINING PROJECT"
@ 4,20 SAY "      ITAKPE, KOGI STATE"
@ 6,20 SAY " MINERAL EXPLORATION INFORMATION SYSTEM"
@ 7,20 SAY "      UPDATD MENU"
@ 8,10 TO 8,69
@ 10,26 SAY "ZONE/DEPT. PROJECT FILE UPDATE"
@ 12,26 SAY "MINERAL LIST UPDATE"
@ 14,26 SAY "LABORATORY ANALYSIS RESULT UPDATE"
@ 16,26 SAY "RETURN TO MAIN MENU"
SET COLO TO W+
@ 18,14 SAY "DEVELOPED BY:- GABRIEL ELOJO OGWU (PGD/MCS/99/760)"
SET COLO TO R+
@ 10,26 SAY "Z"
@ 12,26 SAY "M"
@ 14,26 SAY "L"
@ 16,26 SAY "R"
SET COLOR TO W+
@ 20,26 SAY "Enter your choice."
SET COLOR TO
I=0
DO WHILE I=0
I=INKEY()
IF UPPER(CHR(I)) $ "ZMLR"
EXIT
ENDIF
I=0
ENDDO
DO CASE
CASE UPPER(CHR(I)) $ "Z"
DO UPDPROJ
CASE UPPER(CHR(I)) $ "M"
* DO UPDPROJ
CASE UPPER(CHR(I)) $ "L"
DO UPDLAB
CASE UPPER(CHR(I)) $ "R"
EXIT
ENDCASE
ENDDO
CLEAR
CLEAR ALL
RETURN
```

***** OUTPUT MENU PROGRAM

```
SET TALK OFF
SET ECHO OFF
SET STAT OFF
PUBLIC I
DO WHILE .T.
CLEAR
@ 2,9 TO 19,70 DOUBLE
@ 3,20 SAY "      NATIONAL IRON ORE MINING PROJECT"
@ 4,20 SAY "      ITAKPE, KOGI STATE"
@ 6,20 SAY "  MINERAL EXPLORATION INFORMATION SYSTEM"
@ 7,20 SAY "      OUTPUT MENU"
@ 8,10 TO 8,69
@ 10,26 SAY "ALLOCATION TO ZONES/DEPT. REPORT"
@ 12,26 SAY "ZONES/DEPT. PROJECTS REPORT"
@ 14,26 SAY "LABORATORY ANALYSIS RESULTS REPORT"
@ 16,26 SAY "RETURN TO MAIN MENU"
SET COLO TO W+
@ 18,14 SAY "DEVELOPED BY:- GABRIEL ELOJO OGWU (PGD/MCS/99/760)"
SET COLO TO R+
@ 10,26 SAY "A"
@ 12,26 SAY "Z"
@ 14,26 SAY "L"
@ 16,26 SAY "R"
SET COLOR TO W+
@ 20,26 SAY "Enter your choice."
SET COLOR TO
I=0
DO WHILE I=0
I=INKEY()
IF UPPER(CHR(I)) $ "AZLR"
EXIT
ENDIF
I=0
ENDDO
DO CASE
CASE UPPER(CHR(I)) $ "A"
DO ALLOCREP
CASE UPPER(CHR(I)) $ "Z"
DO ANALREP
CASE UPPER(CHR(I)) $ "L"
DO LABREP
CASE UPPER(CHR(I)) $ "R"
EXIT
ENDCASE
ENDDO
CLEAR
CLEAR ALL
RETURN
```

**** MINERAL DATA DELETION

USE MINERAL

USE LAB

DO WHILE .T.

CLEAR

@06,10 TO 21,67

@4,15 SAY " MINERAL DATA DELETION"

STORE SPACE(20) TO MN,MZD,MM,ML,MO

STORE SPACE(5) TO MFN

STORE SPACE(10) TO MD

STORE 0 TO MCOST

@8,15 SAY "FILE NUMBER [XXXXX]=Exit " GET MFN PICT "@!"

READ

IF MFN = "XXXXX"

EXIT

ENDIF

SELE 1

LOCATE FOR FILE_NO = MFN

IF EOF()

@22,1 SAY ""

? CHR(7)

WAIT+"

FILE NUMBER DOES NOT EXIST! PRESS ANY KEY."

@23,10 SAY SPACE(50)

LOOP

ENDIF

@10,15 SAY "ZONE/DEPT " GET ZONE_DEPT

@12,15 SAY "MINERAL NAME " GET M_NAME

@14,15 SAY "DATE OF EXPLORATION " GET EX_DATE

@14,50 SAY "COST " GET COST

@16,15 SAY "METHOD OF EXPLORATION " GET ME_EXPL

@18,15 SAY "MINERAL LOCATION " GET M_LOCATION

@20,15 SAY "OFFICERS INVOLVED " GET OFFICERS

K=SPACE(1)

@22,15 SAY " [S]ave [D]elete" GET K PICT "!"

READ

IF K = "D"

DELETE

@21,1 SAY ""

WAIT + "

Record deleted, press any key..."

PACK

ENDIF

SELE 2

LOCATE FOR FILE_NO = MFN

DELETE

PACK

ENDDO

CLEAR

CLOSE DATABASE

RETURN

```

**** MINERAL DATA ENTRY
USE MINERAL
USE LAB
DO WHILE .T.
CLEAR
@06,10 TO 21,67
@4,15 SAY "          MINERAL DATA INPUT FORM"
STORE SPACE(20) TO MN,MZD,MM,ML,MO
STORE SPACE(5) TO MFN
STORE SPACE(10) TO MD
STORE 0 TO MCOST
@8,15 SAY "FILE NUMBER   [XXXXX]=Exit " GET MFN PICT "@!"
READ
IF MFN = "XXXXX"
    EXIT
ENDIF
SELE 1
LOCATE FOR FILE_NO = MFN
IF .NOT. EOF()
    @22,1 SAY ""
    ? CHR(7)
    WAIT+"          FILE NUMBER ALREADY EXISTS ! PRESS ANY KEY."
    @23,10 SAY SPACE(50)
LOOP
ENDIF
@10,15 SAY "ZONE/DEPT          " GET MZD PICT "@!"
@12,15 SAY "MINERAL NAME          " GET MN PICT "@!"
@14,15 SAY "DATE OF EXPLORATION    " GET MD PICT "99/99/9999"
@14,50 SAY "COST " GET MCOST PICT "999,999.99"
@16,15 SAY "METHOD OF EXPLORATION    " GET MM PICT "@!"
@18,15 SAY "MINERAL LOCATION        " GET ML PICT "@!"
@20,15 SAY "OFFICERS INVOLVED       " GET MO PICT "@!"
READ
K=SPACE(1)
@22,15 SAY "   [S]ave/Exit [C]ontinue [A]bandon" GET K PICT "!"
READ
IF K = "A"
    LOOP
ENDIF
APPEND BLANK
REPLACE FILE_NO WITH MFN, ZONE_DEPT WITH MZD, M_NAME WITH MN
REPLACE EX_DATE WITH MD, ME_EXPL WITH MM, M_LOCATION WITH ML
REPLACE OFFICERS WITH MO, COST WITH MCOST
SELE 2
APPE BLANK
REPLACE FILE_NO WITH MFN, ZONE_DEPT WITH MZD, M_NAME WITH MN
REPLACE M_LOCATION WITH ML
IF K = "S"
    EXIT
ENDIF
ENDDO
CLEAR
CLOSE DATABASE
RETURN

```

**** MINERAL DATA UPDATE

USE MINERAL

DO WHILE .T.

CLEAR

@06,10 TO 21,67

@4,15 SAY " MINERAL DATA UPDATE FORM"

STORE SPACE(20) TO MN,MZD,MM,ML,MO

STORE SPACE(5) TO MFN

STORE SPACE(10) TO MD

STORE 0 TO MCOST

@8,15 SAY "FILE NUMBER [XXXXX]=Exit " GET MFN PICT "@!"

READ

IF MFN = "XXXXX"

EXIT

ENDIF

LOCATE FOR FILE_NO = MFN

IF EOF()

@22,1 SAY ""

? CHR(7)

WAIT+"

FILE NUMBER DOES NOT EXIT ! PRESS ANY KEY."

@23,10 SAY SPACE(50)

LOOP

ENDIF

MZD=ZONE_DEPT

MN=M_NAME

MD=EX_DATE

MM=ME_EXPL

ML=M_LOCATION

MO=OFFICERS

MCOST=COST

@10,15 SAY "ZONE/DEPT " GET MZD PICT "@!"

@12,15 SAY "MINERAL NAME " GET MN PICT "@!"

@14,15 SAY "DATE OF EXPLORATION " GET MD PICT "99/99/9999"

@14,50 SAY "COST " GET MCOST PICT "999,999.99"

@16,15 SAY "METHOD OF EXPLORATION " GET MM PICT "@!"

@18,15 SAY "MINERAL LOCATION " GET ML PICT "@!"

@20,15 SAY "OFFICERS INVOLVED " GET MO PICT "@!"

READ

K=SPACE(1)

@22,15 SAY " [U]pdate/Exit [C]ontinue [A]bandon" GET K PICT "!"

READ

IF K = "A"

LOOP

ENDIF

REPLACE FILE_NO WITH MFN, ZONE_DEPT WITH MZD, M_NAME WITH MN

REPLACE EX_DATE WITH MD, ME_EXPL WITH MM, M_LOCATION WITH ML

REPLACE OFFICERS WITH MO, COST WITH MCOST

IF K = "U"

EXIT

ENDIF

ENDDO

CLEAR

CLOSE DATABASE

RETURN

**** LABORATORY DATA UPDATE

USE LAB

DO WHILE .T.

CLEAR

@03,10 TO 22,67

@2,15 SAY " LABORATORY DATA UPDATE FORM"

STORE SPACE(20) TO MN,MZD,MM,ML,MO,MNAT,MA,MSN

STORE SPACE(5) TO MFN

STORE SPACE(10) TO MD,MPC,MCL

@5,15 SAY "FILE NUMBER [XXXXX]=Exit " GET MFN PICT "@!"

READ

IF MFN = "XXXXX"

EXIT

ENDIF

SELE 1

LOCATE FOR FILE_NO = MFN

IF EOF()

@22,1 SAY ""

? CHR(7)

WAIT+" FILE NUMBER DOES NOT EXIT ! PRESS ANY KEY."

@23,10 SAY SPACE(50)

LOOP

ENDIF

MZD=ZONE DEPT

MN=M_NAME

ML=M_LOCATION

@7,15 SAY "ZONE/DEPT" " GET MZD PICT "@!"

@9,15 SAY "MINERAL NAME" " GET MN PICT "@!"

@11,15 SAY "MINERAL LOCATION" " GET ML PICT "@!"

CLEAR GETS

@13,15 SAY "SAMPLE NUMBER" " GET MSN PICT "@!"

@15,15 SAY "METHOD OF ANALYSIS" " GET MA PICT "@!"

@17,15 SAY "PERCENTAGE COMPOSITION" " GET MPC PICT "@!"

@19,15 SAY "COLOUR OF MINERAL" " GET MCL PICT "@!"

@21,15 SAY "NATURE OF MINERAL" " GET MNAT PICT "@!"

READ

K=SPACE(1)

@23,15 SAY " [U]pdate/Exit [C]ontinue [A]bandon" GET K PICT "!"

READ

IF K = "A"

LOOP

ENDIF

REPLACE FILE_NO WITH MFN, ZONE_DEPT WITH MZD, M_NAME WITH MN

REPLACE S_NUMB WITH MSN, M_ANALYSIS WITH MA, M_LOCATION WITH ML

REPLACE P_COMP WITH MPC, M_COLOUR WITH MCL, NATURE WITH MNAT

IF K = "U"

EXIT

ENDIF

ENDDO

CLEAR

CLOSE DATABASE

RETURN


```
***** ZONES/DEPT ALLOCATION REPORT
CH1=SPACE(1)
P=0
CLEAR
STORE 60 TO L
USE MINERAL
*SET DEVICE TO PRINT
DO WHILE .NOT. EOF()
IF L > 22
P=P+1

@ 1,20 SAY "      NATIONAL IRON ORE MINING PROJECT"
@ 2,20 SAY "      ITAKPE, KOGI STATE"
@ 4,20 SAY " ALLOCATION TO ZONES/DEPARTMENTS REPORT"
@6,01 SAY "DATE : "
@6,70 SAY "PAGE "+LTRIM(STR(P))
@7,01 SAY REPL('-',79)
@8,01 SAY "FILE NO"
@8,09 SAY "MINERAL NAME"
@8,30 SAY "EXPL.DATE"
@8,42 SAY "PROJ.COST"
@8,52 SAY "EXPL.METHOD"
@8,64 SAY "MINERAL LOCATION"
@9,01 SAY REPL('-',79)
L=10
@L,01 SAY FILE_NO
@L,09 SAY M_NAME
@L,30 SAY EX_DATE
@L,41 SAY COST PICT "999,999.99"
@L,52 SAY ME_EXPL
@L,68 SAY M_LOCATION
L=L+1
SKIP
ENDDO
CLOSE DATABASE
@L,1 SAY REPL('-',79)
WAIT
*SET DEVICE TO SCREEN
RETURN
```

```
***** Laboratory analysis report
CH1=SPACE(1)
P=0
CLEAR
STORE 60 TO L
USE LAB
*SET DEVICE TO PRINT
DO WHILE .NOT. EOF()
IF L > 22
P=P+1

@ 1,20 SAY "      NATIONAL IRON ORE MINING PROJECT"
@ 2,20 SAY "          ITAKPE, KOGI STATE"
@ 4,20 SAY "      LABORATORY RESULTS REPORT"
@6,01 SAY "DATE : "
@6,70 SAY "PAGE "+LTRIM(STR(P))
@7,01 SAY REPL('-',79)
@8,01 SAY "FILE NO"
@8,09 SAY "MINERAL NAME"
@8,30 SAY "% COMPOSITION"
@8,50 SAY "COLOUR"
@8,60 SAY "NATURE OF MINERAL"
@9,01 SAY REPL('-',79)
L=10
@L,01 SAY FILE_NO
@L,09 SAY M_NAME
@L,30 SAY P_COMP
@L,50 SAY M_COLOUR
@L,60 SAY NATURE
L=L+1
SKIP
ENDDO
CLOSE DATABASE
@L,1 SAY REPL('-',79)
WAIT
*SET DEVICE TO SCREEN
RETURN
```

***** LABORATORY ANALYSIS RESULTS

CH1=SPACE(1)

P=0

CLEAR

STORE 60 TO L

USE LAB

*SET DEVICE TO PRINT

DO WHILE .NOT. EOF()

IF L > 22

P=P+1

@ 1,20 SAY " NATIONAL IRON ORE MINING PROJECT"

@ 2,20 SAY " ITAKPE, KOGI STATE"

@ 4,20 SAY " LABORATORY ANALYSIS REPORT"

@6,01 SAY "DATE :"

@6,70 SAY "PAGE "+LTRIM(STR(P))

@7,01 SAY REPL('-',79)

@8,01 SAY "FILE NO"

@8,09 SAY "MINERAL NAME"

@8,30 SAY "SAMPLE NO."

@8,42 SAY "MINERAL LOC."

@8,60 SAY "ANALYSIS METHOD"

@9,01 SAY REPL('-',79)

L=10

@L,01 SAY FILE_NO

@L,09 SAY M_NAME

@L,30 SAY S_NUMB

@L,42 SAY M_LOCATION

@L,60 SAY M_ANALYSIS

L=L+1

SKIP

ENDDO

CLOSE DATABASE

@L,1 SAY REPL('-',79)

WAIT

*SET DEVICE TO SCREEN

RETURN