

MNDNR Tier One Metadata Record

Stockpile database – CE_db1.mdb

| Field | Description | | | | | | |
|--|---|--|-----------|---------------|--|----------------------------|-------------------|
| Main ID Information | | | | | | | |
| Title | Inventory of Publicly Owned Stockpiles and Natural Aggregate Resources at the Former LTV Mine and Vicinity | | | | | | |
| Filename | CE_db1.mdb | | | | | | |
| Abstract | <p>The data contained in this database is for the Former LTV Mine at Hoyt Lakes, Minnesota, and surrounding lands.</p> <p>This database was taken from Project 350, Stockpile Ownership, Composition, and Use. It was created for that project using a structured data modeling methodology, beginning with a Business Object Model. That was then converted into a Conceptual/Logical Data Model, which in turn was used to develop the Physical Data Model. Diagrams of the models can be found in the appendices section of the project report. Relationships between the tables may be viewed in Access 2000 using the 'relationships' button or using the menu choice: tools, relationships. The resulting components of the database are listed below.</p> <p>Six tables from the database were used for the current project. They are: stockpile, mined/piled stockpile material, observation, stockpile photo location, X, Y coordinates, and test results-sieve. The other tables listed here remain with the database, but are empty for this project.</p> <p>TABLES</p> <p>The core of the database consists of 34 related tables and three domain tables for lookup values.</p> <table><tr><td>Field Observation of Stockpile (Observation)</td><td>Stockpile</td></tr><tr><td>Material Type</td><td></td></tr><tr><td>Geoglot and Stockpile Info</td><td>Stockpile Mine of</td></tr></table> | Field Observation of Stockpile (Observation) | Stockpile | Material Type | | Geoglot and Stockpile Info | Stockpile Mine of |
| Field Observation of Stockpile (Observation) | Stockpile | | | | | | |
| Material Type | | | | | | | |
| Geoglot and Stockpile Info | Stockpile Mine of | | | | | | |

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| | Origin | |
| | Information Source Location | Stockpile Photo |
| | Legal Description Sample Number | Test Name and |
| | Legal Entity | Test Results-Abrasion |
| | Mined/Piled Stockpile Material Assays | Test Results-Chem |
| | Natural Ore Mine Lumps | Test Results-Clay |
| | Observation | Test Results-Fine Agg |
| | Stockpile Photo Location FlatElong | Test Results- |
| | Property Ownership Particles | Test Results-LtWt |
| | Sample Coarse | Test Results-SGA- |
| | Sample Composition Fine | Test Results-SGA- |
| | Stockpile | Test Results-Sieve |
| | Stockpile Legal Description Soundness | Test Results- |
| | Stockpile Material Info Source | Test Type |
| | Stockpile Material Property Ownership Determination | Test Type |
| | Stockpile Material Sample Acquisition | X, Y Coordinates |
| | Domain Tables | |
| | ColorLookup | |
| | ExposureLookup | |
| | Means of Ownership | |

There are two miscellaneous reference tables.

Calumet Stockpiles

Virginia Stockpiles

FORMS

There are five forms that can be used to browse the data, though the forms were originally designed for data entry. Note: Some of the fields on the forms contain numeric codes instead of words. Use the drop down arrow on the right side of the field to look up what the code means. For example, see the 'Material Type' field on the 'Browse Stockpile Composition' form.

Browse Company Contact Info -View contact person's name and phone number for company, county, etc. when available

Browse Sample Results -View all test results by sample number

Browse Stockpile Composition -View information about stockpile material by Stockpile ID number (as referenced on plates III and IV) and stockpile name

Browse Stockpile Ownership* -View ownership information for each piece of stockpile as divided up by Public Land Survey forty acre parcels or government lots.

Browse Surface/Mineral Ownership* -View ownership information by forty, government lot or metes and bounds description

* The forms showing ownership, particularly stockpile ownership, can be quite confusing. If there are specific questions about what the information means, please get in touch with a contact person.

QUERIES AND REPORTS

There are 12 queries and four reports in the database that serve as examples of

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| | <p>commonly requested information that were created during the project. The queries should be especially helpful for those who would like a "road map" of how the relationships work between some of the tables.</p> <p>Queries: Reports:</p> <p>Check mineral own dataentry Check Stockpile Ownership dataentry</p> <p>Check Ownership dataentry CheckOwnership</p> <p>Check Stockpile Ownership dataentry Sieve/Gradations Results</p> <p>Check surface own dataentry Test Results-Chem Assays</p> <p>Example-get mineral ownership</p> <p>Example-get surface ownership</p> <p>Example-Single Samples and Test Name</p> <p>Example-Single Samples by Material Type</p> <p>Example-'State' owned stockpiles</p> <p>Example-Stockpile info (complex)</p> <p>Example-Stockpile with Material type</p> <p>The database was designed to mirror the real-world, complex relationships that exist in the world of stockpiles. Who owns it, what is there, where is it-these are all questions that have answers in the data and in the related ArcView shapefiles.</p> |
| <i>Place Keywords</i> | Stockpile, Mesabi Iron Range, Hoyt Lakes, Aurora, Minnesota |
| <i>Theme Keywords</i> | Stockpile Inventory, Surface Ownership, Aggregate, Sand and Gravel, Crushed rock aggregate, Rip rap, Decorative Stone, Stockpile Material, Public Stockpiles |
| <i>Time Period of Content</i> | October 1, 2002 thru January 3, 2003 |
| <i>Parent Theme</i> | None |
| <i>Spatial Extent of the Data</i> | Part of St. Louis County, in the area around north of the towns of Hoyt Lakes and Aurora, Minnesota. |
| <i>Contact Person</i> | Glenn Melchert |
| <i>Contact Person Organization/Division</i> | Minnesota Department of Natural Resources, Division of Lands and Minerals |
| <i>Contact Person Position</i> | Industrial Minerals Geologist |

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| <i>Contact Address</i> | 1525 Third Avenue East |
| <i>Contact City</i> | Hibbing, MN |
| <i>Contact Zip Code</i> | 55746 |
| <i>Contact Voice Phone</i> | 218-262-7343 |
| <i>Contact Fax Phone</i> | 218-262-7328 |
| Additional ID Information | |
| <i>Originator</i> | Minnesota Department of Natural Resources, Division of Lands and Minerals |
| <i>Purpose</i> | <p>This project was funded in part by an East Range Economic Adjustment Planning Grant, U.S. Department of Commerce, Economic Development Administration, and the Iron Range Resources and Rehabilitation Agency, in cooperation with the Arrowhead Regional Development Commission and East Range Economic Adjustment Response Team.</p> <p>This portion of the project focuses on an inventory of publicly owned stockpiles. The project's purpose is to collect data on stockpile material type within the evaluation area. The data may be used to determine the suitability of stockpile materials for future uses such as crushed rock aggregate, rip rap, railroad ballast, decorative stone and flagstone. Surrounding public lands within the approximately 103 square mile evaluation area were checked for natural sand and gravel and concentrations of glacial boulders.</p> <p>Ownership of stockpiles involved a review of DNR engineering records. Ownership of surface lands was determined from the State's AS400 Land Database, a 2002 edition of the plat book (Cloud Cartographics, Inc.), and Tax Forfeit information from the St. Louis County Land Department. The stockpile inventory was based upon pre-existing information at the DNR and field work. The various aspects of the stockpile inventory were entered into a pre-existing database designed in Microsoft Access 97. To further facilitate the use of stockpiled material, accessibility was examined by mapping mining roads, and railroad lines. The potential use of stockpiles was qualitatively determined in the field.</p> |
| <i>Progress</i> | Complete |
| <i>Currentness Reference</i> | This project ran from October 1, 2002, through January 3, 2003. |
| <i>Maintenance Frequency</i> | None planned |
| <i>Access Constraints</i> | N/A |
| <i>Use Constraints</i> | N/A |
| <i>Associated Data Sets</i> | ArcView shapefiles: Merge_wp_ltv1, Stockpiles_3, Public lands Excel spread sheets that correspond to the 6 database tables. |
| Data Quality | |
| <i>Attribute Accuracy</i> | Integrity constraints are placed on most relationships in the database |
| <i>Logical Consistency</i> | Fully normalized model, denormalized to facilitate application development |
| <i>Lineage</i> | Raw data was collected and entered into the database. There is one exception, the stockpile outlines were, in part, taken from a Mesabi Range Mining features coverage (still in progress at the Minnesota Department of Natural Resources, Division of Lands and Minerals, Hibbing). |

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| Spatial Reference | |
| <i>Horizontal Coordinate Scheme</i> | UTM |
| <i>Ellipsoid</i> | GRS80 |
| <i>Horizontal Datum</i> | NAD83 |
| <i>Horizontal Units</i> | Meters |
| <i>Altitude Datum</i> | N/A |
| <i>UTM Zone Number</i> | 15 |
| Data Organization | |
| <i>Native Dataset Environment</i> | Microsoft Access2000 |
| <i>Transfer Size</i> | 2.16 mb |
| Entities -- Attributes | |
| <i>Entity-Attribute Overview</i> | |
| <i>Entity-Attribute Detailed Citation</i> | Tables listed in alphabetical order below |

| Table Name | Field Name | Key | Definition | Valid Values | Description |
|---------------------------------------|------------|----------------|------------------|--------------------|---|
| Field Observation of Stockpile | | | | | This table ties an observation comment to a particular stockpile and an x, y coordinate. |
| | ObsID | primary key | number (long), 4 | 7, 8, 9, 10, ...97 | Unique identification number associated with every observation. |
| | ObsFeat | | text, 15 | | The type of feature that is being observed. |
| | | | | "geologic" | Observation about the geology (i.e., a stockpile, the grain size, a concentration of boulders). |
| | | | | "physical" | Observation about the physical geography. Mostly things made by humans (i.e., roads, abandoned railroad tracks, bridges). |
| | | | | "other" | Other features that are not geology or physical |

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| | | | | | (i.e., vegetation). |
| | ExpsrTyp | | text, 30 | | Further defines the type of exposures. This is the same list of values in the 'ExposureLookup' table. |
| | | | | "surface" | Any exposure along the surface of a stockpile. |
| | | | | "cut exposure" | Exposures that are the result of a stockpile being "cut" into by a bulldozer or backhoe. |
| | | | | "dig" | Exposures from digging into a stockpile. |
| | | | | "road cut" | Exposures along sides of roads. |
| | | | | "anthill" | Exposure of stockpile material by observing ant hills. |
| | | | | "road" | Exposure along a road or noting that a road exists at a location. |
| | ObservTx | | text, 200 | | Observation comments |
| | ObsWypT | foreign key (links to 'Observation') | number (long), 4 | 1, 15, 16, 20, ...195 | The GPS waypoint number associated with a geographic location. Corresponds to sample site #. |
| | StudyArea | foreign key (links to 'Observation') | text, 10 | "Calumet", "Virginia", "LTV Mine", "LTV Vicinity" | Project study area where observation was made. |
| | StkplID | foreign key (links to 'Mined/Piled Stockpile Material') | number (long), 4 | | Unique identification number for each stockpile. (Used interchangeably with "Stkp_Uniq") |
| | XYIDNm | foreign key (links to 'X, Y Coordinates') | number (long), 4 | 10, 11, 13, ...308 | Unique identification number for each x, y coordinate. |
| Geoglot and Stockpile Info | | | | | Reference/summary table used to enable data entry for stockpile ownership. Contains list of all stockpiles on a given forty acre parcel or government lot. |
| | Stkp_Uniq | foreign key (links to "StkplID" in 'Mined/Piled | number (long), 4 | 113, 114, 302, 305, ... | Unique identification number for each stockpile. (Used interchangeably with |

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| | | Stockpile Material' table) | | | "StkplID") |
| | StkName | | text, 50 | "1009", "Cretaceous Ore Dump No. 2", "Columbia Fine Tailings", ... | Local name for stockpile. Usually named by mining company/builder of stockpile. (See 'Stockpile' table) |
| | MatTyp | | text, 35 | "Glacial Overburden", "Taconite Rock (boulders)", ... | Stockpile material type as defined for this project. (See 'Stockpile Material Type' table for definitions) |
| | STKPLSID | primary key | number (double), 8 | | Unique identification number for each piece of stockpile per forty acre parcel or government lot. (E.g. For the part of stockpile 353(stkp_uniq) in the SWNW of section 15, stkplsid = 7132. For one part stockpile 347 (stkp_uniq) in the SWNW of section 15, stkplsid = 7126 and the other part of stockpile 347 in the SWNW of section 15, stkplsid = 7123.) |
| | GEOGLOT | | number (double), 8 | | A 14-digit composite identifier that uniquely defines a portion of land to the government lot level. (Consists of fields: COUN, TOWN, RDIR, RANG, SECT, FORT, GLOT from 'Legal Description' table) |
| | Entered | | yes/no | | Indicator that ownership information was entered for this stockpile piece into 'Stockpile Material Property Ownership' table. |
| Information Source | | | | | Table contains information sources used in the course of the project. |
| | InfoSrcID | primary key | number (long), 4 | 1-9 | Unique identification number for the nine different information sources. |

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| | InfoSrc | | text, 30 | | Information sources used to make determinations about stockpile characteristics or material type. |
| | | | | "Field Check" | In the field observations. |
| | | | | "1997 color infrared air photo" | <p>1997 and 1995 color infrared air photos, 1:15,840 scale.</p> <p>The following photos were used in Virginia: 1997</p> <p>SLS-18-9, SLS-19-9</p> <p>SLS-18-10, SLS-19-10</p> <p>SLS-18-11, SLS-19-11</p> <p>The following air photos were used in Calumet: 1995</p> <p>ITA-34-45, ITA-34-46, ITA-34-47, ITA-35-48, ITA-35-49, ITA-35-50, ITA-35-51, ITA-36-45, ITA-36-46, ITA-36-47, ITA-36-48, ITA-37-47, and ITA-37-48.</p> |
| | | | | "1961 black & white air photo" | <p>1961 black and white aerial photography. This set was acquired only for the Virginia study area, 1:15,840 scale.</p> <p>CIR-34A-1, CIR-34A-2, CIR-34A-3, CIR-34A-4, CIR-34A-5, CIR-11A-152, CIR-11A-153, CIR-11A-154, and CIR-11A-155,</p> |
| | | | | "USX Plates" | These plates were used in both study areas. They were produced by the United States Steel Corporation and |

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| | | | | | published in 1967. The plates gave some indication about the material type of stockpiles and the name of some stockpiles. Plates 5, 6, 24 and 25 were used. |
| | | | | "GNIOP Plates" | These plates were used for both study areas. They were produced by Great Northern Iron Ore Properties in 1955 and 1959. The plates give some indication about stockpile material type and stockpile names. |
| | | | | "company" | Information gathered directly from mining companies and/or stockpile owners. |
| | | | | "MN-DNR records" | All information about state owned stockpiles, from the Minnesota Department of Natural Resources, Division of Lands and Minerals. |
| | | | | "1947 black & white air photo" | 1947 black and white aerial photography. This set was acquired only for the Virginia study area, 1:15,840 scale. 8-53, 8-54, 8-55, 7-137, 7-138, and 7-139. |
| | | | | "1966 black & white air photo" | 1966 black and white aerial photography. This set was only acquired for the Calumet study area, 1:15,840 scale. ITA-5-53-94, ITA-5-53-95, ITA-5-53-96, ITA-5-53-97, ITA-5-36-41, ITA-5-36-42, ITA-5-36-43, ITA-5-36-44, ITA-5-36-45, ITA-4-37-139 ITA-4-37-140, ITA-4-37-141, ITA-4-37-142, and ITA-4-37-143. |
| Legal Description | | | | | Public land survey legal description for lands in the study areas. Used to |

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| | | | | | describe surface and mineral ownership parcels. |
| | LDID | primary key | number (long), 4 | | Unique identification number for each forty acre parcel or government lot. |
| | COUN | | number (double), 8 | | Two digit County Code |
| | | | | 31 | Itasca |
| | | | | 69 | St. Louis |
| | TOWN | | number (double), 8 | 56 and 58 | Three digit township number, townships extend east to west. |
| | RDIR | | number (double), 8 | | Range direction, ranges extend north to south. |
| | | | | 0 | West |
| | RANG | | number (double), 8 | 23, 24, 17 | Two digit range number |
| | SECT | | number (double), 8 | 3, 4, 5, 7, 8, 9, 13, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 26, 27, 28, 29 | PLS section number |
| | FORT | | number (double), 8 | | A combination of a code for the quarter section and a code for the quarter of the quarter section. The FORT_DESC field contains the corresponding text for the numeric values in the FORT field, as seen in the description column below. |
| | | | | 0 | Meandered water body (used in combination with GLOT = 99 to identify meandered water bodies) |
| | | | | 11 | NENE |
| | | | | 12 | NWNE |
| | | | | 13 | SWNE |
| | | | | 14 | SENE |
| | | | | 21 | NENW |

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| | | | | 22 | NWNW |
| | | | | 23 | SWNW |
| | | | | 24 | SENW |
| | | | | 31 | NESW |
| | | | | 32 | NWSW |
| | | | | 33 | SWSW |
| | | | | 34 | SESW |
| | | | | 41 | NESE |
| | | | | 42 | NWSE |
| | | | | 43 | SWSE |
| | | | | 44 | SESE |
| | GLOT | | number (double), 8 | | Two-digit government lot ID, if applicable (unique only within a section) |
| | | | | 0-7 | Government lot number |
| | | | | 99 | Meandered water body (used in combination with FORT = 0 to identify meandered water bodies) |
| | PARC | | number (double), 8 | 0-3 | Entry number, if quarter- quarter section has more than one entry (used when the parcel's ownership is divided by partial description/metes and bounds) |
| | METEBNDS | | text, 250 | | Partial description for a portion of the quarter- quarter section. |
| | FORT_DESC | | text, 40 | See above, under FORT description | This field contains the corresponding text for the numeric values in the FORT field. This IS NOT necessarily the legal description for the parcel, especially in the case of government lots, where the FORT and FORT_DESC are for locational reference only. See the 'Description' column of the FORT field. |
| | GEOPARC | | number | | A 16-digit composite |

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| | | | (double), 8 | | identifier uniquely identifying each ownership parcel. (Consists of fields: COUN, TOWN, RDIR, RANG, SECT, FORT, GLOT, PARC, given in this order.) |
| | GEOGLOT | | number (double), 8 | | A 14-digit composite identifier that uniquely defines a portion of land to the government lot level. (Consists of fields: COUN, TOWN, RDIR, RANG, SECT, FORT, GLOT, given in this order.) |
| | GEOFORT | | number (double), 8 | | A 12-digit composite identifier that uniquely defines a portion of land to the forty acre level (1/4-1/4 section). (Consists of fields: COUN, TOWN, RDIR, RANG, SECT, FORT, given in this order.) |
| | GEOSECT | | number (double), 8 | | A 10-digit composite identifier that uniquely defines a portion of land to the section level. (Consists of fields: COUN, TOWN, RDIR, RANG, SECT, given in this order.) |
| | GEORANG | | number (double), 8 | | An eight-digit composite identifier that uniquely defines a portion of land to the township-range. (Consists of fields: COUN, TOWN, RDIR, RANG, given in this order.) |
| | RightofWay | | text, 1 | null or "y" | "y" indicates the parcel is a right-of-way |
| Legal Entity | | | | | List of owners and contact information |
| | LEID | primary key | number (long), 4 | 1 - 32 | Unique identification number for each owner. |
| | LEName | | text, 50 | Some names need further explanation (not a complete list) | Name of owner. |

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| | | | | "Private" | One individual owner |
| | | | | "Many private" | More than one individual owner |
| | | | | "State-DNR" | State ownership, Department of Natural Resources administration |
| | | | | "State-PCA" | State ownership, Pollution Control Agency administration |
| | | | | "GNIOP" | Great Northern Iron Ore Properties |
| | | | | "USX" | USX Corporation (formerly U.S. Steel Corporation) |
| | | | | "Undetermined" | Parcel was not researched; or if mineral interest, nonregistered severed minerals when the State means of ownership is noted. |
| | rank | | number (long), 4 | 1-32 | Number used for data entry purposes, to move most common owners to top of a drop down list. |
| | ConFName | | text, 15 | | First name of contact person |
| | ConLName | | text, 20 | | Last name of contact person |
| | ConPhoneNm | | text, 12 | | 10-digit phone number of contact person |
| Mined/Piled Stockpile Material | | | | | Stockpile composition information. Table is not complete because a lot of information was unavailable. |
| | StkColorDS | | text, 30 | "red", "buff", "brown", and "red-brown", "brown banded", "brown thin laminations", "brownish gray", "gray", "gray banded", "pale green", "reddish purple", "pale green, gray, thin brown" | Color of material observed in stockpiles. This is the same list of values in the 'ColorLookup' table. |
| | StkComTx | | text, 200 | | Various comments and observations made about |

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| | | | | | an individual stockpile. |
| | MinGrnMod | | text, 1 | | Modifiers used to approximate the minimum grain size (rock particle) observed within a stockpile |
| | | | | "<" | Less than |
| | | | | ">" | Greater than |
| | | | | "~" | Approximately |
| | MinGrnNm | | number (double), 8 | Ex: 1, 2, 3, 4, ... | Number used to quantify the diameter of the minimum grain size (rock particle) observed within a stockpile. |
| | MinGrnUt | | text, 10 | | Unit of measurement used to describe the minimum grain size of a stockpile. |
| | | | | "mm" | Millimeters |
| | | | | "inches" | Inches |
| | | | | "feet" | Feet |
| | | | | "mesh" | Mesh is the size of a sieve's openings. This unit was used to quantify very small rock particles. |
| | MaxGrnMod | | text, 1 | | Modifiers used to approximate the maximum grain size (rock particle) observed within a stockpile |
| | | | | "<" | Less than |
| | | | | ">" | Greater than |
| | | | | "~" | Approximately |
| | MaxGrnNm | | number (double), 8 | Ex: 1, 2, 3, 4, ... | Number used to quantify the diameter of the maximum grain size (rock particle) observed within a stockpile. |
| | MaxGrnUt | | text, 10 | | Unit of measurement used to describe the maximum grain size of a stockpile. |
| | | | | "mm" | Millimeters |
| | | | | "inches" | Inches |
| | | | | "feet" | Feet |

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| | | | | "mesh" | Mesh is the size of a sieve's openings. This unit was used to quantify very small rock particles |
| | AvgGrnMod | | text, 1 | | Modifiers used to approximate the estimated predominant grain size (rock particle) observed within a stockpile |
| | | | | "<" | Less than |
| | | | | ">" | Greater than |
| | | | | "~" | Approximately |
| | AvgGrnNm | | number (double), 8 | Ex: 1, 2, 3, 4, ... | Number used to quantify the diameter of the predominant grain size (rock particle) observed within a stockpile. |
| | AvgGrnUt | | text, 10 | | Unit of measurement used to describe the predominant grain size of a stockpile. |
| | | | | "mm" | Millimeters |
| | | | | "inches" | Inches |
| | | | | "feet" | Feet |
| | | | | "mesh" | Mesh is the size of a sieve's openings. This unit was used to quantify very small rock particles |
| | StkSortIn | | text, 15 | "poor", "moderately-poor", "moderate", "moderately-well", and "well" | Describes the degree of sorting of sediment grains. If a stockpile contains all the same sized sediment it is described as being well sorted. If a stockpile contains both large and small grains sizes, it is described as being poorly sorted. |
| | StkVolNm | | number (long), 4 | 23450 | Volume of a stockpile, this information was gathered from DNR records. |
| | StkVolUt | | text, 50 | "tons" or "loose cubic yards" | Describes the unit of measurement for volume. |
| | StkEVolNm | | number (long), 4 | 50000 | Estimated volume of a stockpile calculated using Surfer® and the |

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| | | | | | Mesabi Range Elevation dataset. |
| | StkEVolUt | | text, 50 | "tons" or "loose cubic yards" | Describes the unit of measurement for estimated volume of a stockpile. |
| | StkFePct | | number (double), 8 | 42 | Percentage of iron in a stockpile. All percentages are based on DNR records. |
| | StkMagFePct | | number (double), 8 | 42 | Percentage of magnetic iron in a stockpile. All percentages are based on DNR records. |
| | StkSilPct | | number (double), 8 | 42 | Percentage of silica in a stockpile. All percentages are based on records kept by stockpile owners and/or mining companies. |
| | StkAlPct | | number (double), 8 | 42 | Percentage of aluminum in a stockpile. All percentages are based on records kept by stockpile owners and/or mining companies. |
| | StkGravPct | | number (double), 8 | | A gross estimation of the percent of gravel that may be present in a stockpile. All estimations are based on field observations. |
| | StkSandPct | | number (double), 8 | | A gross estimation of the percent of sand that may be present in a stockpile. All estimations are based on field observations. |
| | AggPotIn | | text, 50 | "High", "Moderate", "Limited" | The overall rating a stockpile has for natural aggregate potential if an overburden stockpile. If a rock stockpile, this rating refers to the crushed rock aggregate potential (based on qualitative estimates of soundness). This rating does not exclude any material from being used. |
| | AggPot2 | | Text, 50 | "Large riprap", "small riprap". | Potential uses of the stockpile materials. |

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| | | | | “flagstone” | Riprap must be competent. 3 feet is the division between small and large riprap. |
| | AggPot3 | | Text, 50 | “Large riprap”, “small riprap”, “flagstone” | Same as AggPot2. |
| | AggPot4 | | Text, 50 | “Large riprap”, “small riprap”, “flagstone” | Same as AggPot2. |
| | StkplID | primary key | number (long), 4 | 113, 114, 302, 305, ... | Unique identification number for each stockpile. (Used interchangeably with "Stkp_Uniq") |
| | MatTypID | foreign key (links to 'Stockpile Material Type') | number (long), 4 | 1-11 | Unique identification number for each stockpile material type. (See 'Stockpile Material Type' table for definitions) |
| Natural Ore Mine | | | | | Table contains a list of all potential natural ore mine/property names that were the original setting for stockpiled materials in the two study areas. Determinations are based on records kept by stockpile owners and/or mining companies. |
| | MineID | primary key | number (long), 4 | 1 - 62 | Unique identification number for each mine/property name. |
| | MineName | | text, 50 | Ex. "Draper", "Walker-Hill #6", ... | Mine/property names data maintained by DNR Lands and Minerals division, published in the 2000 Skillings Minnesota Mining Directory. |
| Observation | | | | | Table refers to locations where observations were made. Observations are usually, but not always, tied to a particular stockpile. |
| | ObsWyp | primary key (composite) | number (long), 4 | 1, 15, 16, 20, ...195 | The GPS waypoint number associated with a geographic location. Provides link to actual |

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| | | | | | coordinate in the 'X, Y Coordinate' table. |
| | StudyArea | primary key (composite) | text, 10 | "Calumet" or "Virginia" | Project study area where observation was made. |
| | FeatType | | text, 16 | "Photo", "Observation" or "Sample" | Type of feature related to a waypoint. Sometimes a photo and observation or photo and sample share the same waypoint number. |
| Photo | | | | | Table refers to locations where photos were taken. Photos are usually, but not always, tied to a particular stockpile. |
| | PhotoNm | primary key | number (long), 4 | Ex: 19, 20, 21, ...347 | Unique identifier that corresponds to photographs taken of the stockpiles. These photographs (in .jpg format) are included as part of the data from this project. |
| | FeatType | | text, 16 | "Photo", "Observation" or "Sample" | Type of feature related to a waypoint. Sometimes a photo and observation or photo and sample share the same waypoint number. |
| | PhotoWypt | | number (long), 4 | 1, 15, 16, 20, ...195 | The GPS waypoint number associated with a geographic location. Provides link to actual coordinate in the 'X, Y Coordinate' table. |
| | StudyArea | | text, 10 | "Calumet" or "Virginia" | Project study area where photo was taken. |
| Property Ownership | | | | | Surface and Mineral Ownership information, including: interest fractions, acres, link to owner name and link to legal description. |
| | PropOwnID | primary key | number (long), 4 | | Unique identification number for each property ownership record. |
| | PropType | | text, 20 | "surface" or "mineral" | Ownership record is for one of two property types. |
| | IntNumer | | number | Ex. 1, 8, 46, ... | Numerator of the |

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| | | | (long), 4 | | undivided, fractional interest owned by the particular owner. |
| | IntDenom | | number (long), 4 | Ex. 1, 2, 108, ... | Denominator of the undivided, fractional interest owned by the particular owner. |
| | AcresNm | | number (double), 8 | 40, ... | Number of acres each owner owns. |
| | StMeanOwn | | text, 50 | | If the State is the owner, the way in which ownership was acquired by the state is noted. This is the same list of values as in the 'Means of Ownership' lookup table. |
| | | | | "Trust Fund" | State granted ownership by the U.S. government |
| | | | | "Acquired" | State acquired the property by purchase or gift |
| | | | | "Exchange" | State acquired private land in exchange for State land |
| | | | | "Reversionary Deed" | State has ownership of the property only until a specified date or event occurs. Upon this date or event, the property goes back to the owner who deeded the property to the State. |
| | | | | "Tax Forfeit" | The surface or minerals were forfeited to the State for nonpayment of taxes (real estate taxes or severed mineral interest taxes) |
| | | | | "Nonregistered Severed Minerals" | State will have absolute ownership of all minerals upon the completion of a forfeiture action. Forfeiture action taken due to mineral owner's failure to timely file required statement of severed mineral interest. The owner will be listed as "Undetermined" since the State's ownership is not absolute. |

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| | LEID | foreign key (links to 'Legal Entity') | number (long), 4 | | Unique identification number for each owner. |
| | LDID | foreign key (links to 'Legal Description') | number (long), 4 | | Unique identification number for each forty acre parcel or government lot. |
| Sample | | | | | Table refers to locations where samples were taken. Samples are usually, but not always, tied to a particular stockpile. (Ex. SampleNm 11, 12 and 13 are not tied to a stockpile) |
| | SampleNm | primary key (links to 'Stockpile Material Sample Acquisition') | text, 4 | | Unique identifier that corresponds to samples taken from the stockpiles. |
| | | | | "1" - "82" | Single sample numbers |
| | | | | "A1" - "A8", "B9", "C10" - "C19", "D20" - "D29", "E30" - "E32" | Composite samples of single samples. E.g., "A1" consists of single samples "53", "54", "55", "56" and "57". A's represent coarse tailings, B's represent Cretaceous ore, C's represent fine tailings, D's represent glacial overburden, E's represent natural ore and taconite mixed-sized rock. |
| | | | | "ZZ1" - "ZZ10" | Composite samples of composite samples. E.g., "ZZ1" consists of composite samples "A1", "A2", "A3" and "A4". |
| | SampType | | text, 10 | "single" or "composite" | See descriptions above for "SampleNm" field |
| | SampleNumeric | | number (long), 4 | 1 - 82 | Numeric version of "SampleNm" field. Used for sorting purposes. |
| | FeatType | | text, 16 | "Photo", "Observation" or "Sample" | Type of feature related to a waypoint. Sometimes a photo and observation or photo and sample share the same waypoint number. |

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| | SampWypt | | number (long), 4 | 3, ...41, ...174 | The GPS waypoint number associated with a geographic location. Provides link to actual coordinate in the 'X, Y Coordinate' table. |
| | StudyArea | | text, 10 | "Calumet" or "Virginia" | Project study area where photo was taken. |
| Sample Composition | | | | | This table lists the make up of composite samples. (Composite samples being one sample made up of several other samples) |
| | SampCompID | primary key | number (long), 4 | | Unique identifier for each sample composition record. |
| | ComSampNm | | text, 4 | "A1", ..."D21", ..."ZZ7", ... | Composite sample numbers from "SampleNm" field in 'Sample' table |
| | SampleNm | foreign key (links to 'Sample') | text, 4 | "1" - "82" or "A1", ..."D21", ... | Single sample numbers that are in a particular composite sample (E.g., Single samples "53", "54", "55", "56" and "57" make up composite "A1".) or composite sample numbers that are in a particular composite of composite sample (E.g., Composite samples "A1", "A2", "A3" and "A4" make up composite "ZZ1"). |
| Stockpile | | | | | Basic stockpile information, including: stockpile ID (used extensively throughout database and on the project report plates), stockpile name (if applicable) and estimated exposed surface acreage. |
| | StkplID | primary key | number (long), 4 | 113, 114, 1016, 1019, 5021, ... | Unique identification number for each stockpile. (Used interchangeably with "Stkp_Uniq"). The 4-digit values correspond to mining records. 3-digit values were assigned to unlabeled |

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| | | | | | stockpiles starting with 101. Values 1, 2, and 3 are non-public stockpiles. 99 refers to non-mine aggregate exploration. |
| | StkName | | text, 55 | "1009", "Cretaceous Ore Dump No. 2", "Columbia Fine Tailings", ... | Local name for stockpile. Usually named by mining company/builder of stockpile. |
| | StkPhotoIn | | yes/no | yes or no | Yes means the stockpile has been photographed. No means the stockpile has not been photographed. |
| | StkSampIn | | yes/no | yes or no | Yes means the stockpile has been sampled. No means the stockpile has not been sampled. |
| | StkPitIn | | yes/no | yes or no | Yes means the stockpile is in a pit. No means the stockpile is not in a pit. |
| | StkEAcre | | number | 5420 | The estimated exposed surface acreage of a stockpile determined in ArcView. If part of a stockpile is covered by another stockpile, the covered acreage is not included in this number. |
| Stockpile Legal Description | | | | | Public land survey legal description for lands in the study areas. Similar to the 'Legal Description' table used to define parcels for surface and mineral ownership purposes, <i>except</i> the legal description for stockpiles stops at the forty acre parcel or government lot level. |
| | GEOGLOT | primary key | number (double), 8 | | A 14-digit composite identifier that uniquely defines a portion of land to the government lot level. (Consists of fields: COUN, TOWN, RDIR, RANG, SECT, FORT, GLOT, given in this order, from 'Legal Description' table) |

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| | COUN | | number (double), 8 | | Two digit County Code |
| | | | | 31 | Itasca |
| | | | | 69 | St. Louis |
| | TOWN | | number (double), 8 | 56 and 58 | Three digit township number, townships extend east to west. |
| | RDIR | | number (double), 8 | | Range direction, ranges extend north to south. |
| | | | | 0 | West |
| | RANG | | number (double), 8 | 23, 24, 17 | Two digit range number |
| | SECT | | number (double), 8 | 3, 4, 5, 7, 8, 9, 13, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 26, 27, 28, 29 | PLS section number |
| | FORT_DESC | | text, 40 | See below, under FORT description | This field contains the corresponding text for the numeric values in the FORT field. This IS NOT necessarily the legal description for the parcel, especially in the case of government lots, where the FORT and FORT_DESC are for locational reference only. See the 'Description' column of the FORT field. |
| | FORT | | number (double), 8 | | A combination of a code for the quarter section and a code for the quarter of the quarter section. The FORT_DESC field contains the corresponding text for the numeric values in the FORT field, as seen in the description column below. |
| | | | | 0 | Meandered water body (used in combination with GLOT = 99 to identify meandered water bodies) |
| | | | | 11 | NENE |

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| | | | | 12 | NWNE |
| | | | | 13 | SWNE |
| | | | | 14 | SENE |
| | | | | 21 | NENW |
| | | | | 22 | NWNW |
| | | | | 23 | SWNW |
| | | | | 24 | SENW |
| | | | | 31 | NESW |
| | | | | 32 | NWSW |
| | | | | 33 | SWSW |
| | | | | 34 | SESW |
| | | | | 41 | NESE |
| | | | | 42 | NWSE |
| | | | | 43 | SWSE |
| | | | | 44 | SESE |
| | GLOT | | number (double), 8 | | Two-digit government lot ID, if applicable (unique only within a section) |
| | | | | 0-7 | Government lot number |
| | | | | 99 | Meandered water body (used in combination with FORT = 0 to identify meandered water bodies) |
| Stockpile Material Information Source | | | | | Table that relates each stockpile with one or more information sources for the purpose of tracking how or why certain determinations about a stockpile were made. |
| | SMISID | primary key | number (long), 4 | | Unique identification number for each stockpile material information source record. |
| | InfoSrcID | foreign key (links to 'Information Source') | number (long), 4 | 1-9 | Unique identification number for the nine different information sources. |
| | StkplID | foreign key (links to | number (long), 4 | 113, 114, 302, 305, ... | Unique identification number for each |

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| | | 'Mined/Piled Stockpile Material') | | | stockpile. (Used interchangeably with "Stkp_Uniq") |
| Stockpile Material Property Ownership | | | | | Table contains ownership information for each piece of stockpile as intersected (or "chopped" up) by Public Land Survey (PLS) forty acre parcels or government lots. The PLS features are contained the 'Stockpile Legal Description' table. |
| | SMPOID | primary key | number (long), 4 | | Unique identification number for each stockpile material property ownership record. |
| | LEID | foreign key (links to 'Legal Entity') | number (long), 4 | | Unique identification number for each owner. |
| | SSTMeanOwn | | text, 50 | "Trust Fund", "Acquired", "Exchange", or "Tax Forfeit". (See valid values described in further detail under "STMeanOwn" in the 'Property Ownership' table) | If the State is the owner, the way in which ownership was acquired by the state is noted. This is the same list of values in the 'Means of Ownership' lookup table. |
| | StkPLSID | foreign key (links to 'Geoglot and Stockpile Info') | number (double), 8 | | Unique identification number for each piece of stockpile per forty acre parcel or government lot. |
| | StkOwnTx | | text, 100 | "Owner of stockpile in N1/2 of forty", "Ownership through agreement...", etc. | Comments regarding the stockpile ownership |
| | WithSurIn | | yes/no | yes or no | "Yes" means the stockpile ownership is tied to the underlying surface ownership (generally, stockpiles containing overburden materials are tied to the surface owner of the parcel). "No" means the |

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| | | | | | stockpile ownership is not the same as the surface ownership. |
| | WholeStkIn | | yes/no | yes or no | "Yes" means the entire stockpile has the same ownership, regardless of varied underlying surface ownership across many parcels. "No" means the stockpile ownership may vary across many parcels. |
| | Geoglot | foreign key (links to 'Stockpile Legal Description') | number (double), 8 | | A 14-digit composite identifier that uniquely defines a portion of land to the government lot level. (Consists of fields: COUN, TOWN, RDIR, RANG, SECT, FORT, GLOT, given in this order, from 'Legal Description' table) |
| Stockpile Material Sample Acquisition | | | | | Table relates a single sample to a specific stockpile and an x, y coordinate. |
| | SampleNm | primary key (links to 'Sample') | text, 4 | | Unique identifier that corresponds to samples taken from the stockpiles. |
| | | | | "1" - "82" | Single sample numbers |
| | StkplID | foreign key (links to 'Mined/Piled Stockpile Material') | number (long), 4 | 113, 114, 302, 305, ... | Unique identification number for each stockpile. (Used interchangeably with "Stkp_Uniq") |
| | XYIDNm | foreign key (links to 'X, Y Coordinates') | number (long), 4 | 10, 11, 13, ...308 | Unique identification number for each x, y coordinate. |
| Stockpile Material Type | | | | | Table lists 11 stockpile material types, as defined for this project, that occur in the two study areas. |
| | MatTypID | primary key | number (long), 4 | 1-11 | Unique identification number for each stockpile material type. |
| | MatTyp | | text, 35 | "Glacial Overburden" | This includes unconsolidated sediment deposited by glaciers that was removed to gain |

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| | | | | | <p>access to the iron ore. Material consists of sediments deposited during the Quaternary Period (10,000 to 2 million years ago). The sediments range from till (material deposited directly by glacial ice) to sand and gravel (material deposited from glacial meltwater). Till is an unsorted sediment with grain sizes ranging from clay to +5 foot boulders. Multiple glacial advances deposited several till units in the region. Between some of these till units are discrete lenses of sand and gravel. In several overburden stockpiles, many of these various units are mixed together. The stockpiles tend to be boulder-rich with a sandy, silt matrix. The color ranges from buff to reddish-brown. Rock particles are sub-angular to sub-rounded. A few stockpiles contain primarily outwash sand and gravel. The sand and gravel is moderately sorted, oxidized to a light brown color, contains little silt, and is cobble-rich. The rock particles are sub-rounded.</p> |
| | | | | "Cretaceous Overburden" | <p>This includes unconsolidated sediment in the form of saprolitic clay and rock particles that forms from chemically weathered iron formation. Weathering events occurred during the Cretaceous period (65 to 146 million years ago). This material is dominantly clay with some rock particles.</p> |

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| | | | | | Within a given stockpile, cretaceous overburden may contain glacial till and other "overburden" type sediments. |
| | | | | "Slate" | <p>A local term used to described a fine-grained rock composed mostly of siliceous minerals. Slate is found above and within the iron formation and is approximately 1.9 billion years old.</p> <p>Although the slate is mostly fine grained, some clastic bedding is evident. Fracturing, or splitting, occurs along bedding planes. Within the pile, slate appears to have a dark gray appearance. Rock sizes range from 1/8 of an inch to +3 feet.</p> |
| | | | | "Paint Rock" | <p>A highly decomposed, slate-like rock with a tacky, powdery texture on exposed surfaces. The decomposition of these rocks is attributed to weathering of altered slate and natural ore along fault or joint planes. The descriptor "paint" refers to the red to rust colored, colloidal particles that partially constitute the rock.</p> <p>Within the stockpiles, paint rock can vary from fine sand to +3 foot rocks. Similar to natural ore, paint rock fractures parallel to bedding planes.</p> |
| | | | | "Natural Ore Fine Tailings" | <p>This includes a by-product of the natural iron ore mining processes. Fine tailings have been crushed and usually deposited into a "tailings" basin. This material is very well sorted with a rock size</p> |

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| | | | | | ranging from clay to 3/8 of an inch. Rock fragments are sub-angular. |
| | | | | "Natural Ore Mixed-Sized Rock" | <p>This includes soft, iron ore that has been altered and re-mineralized along faults and fractures. This material was originally deposited as taconite, which was then oxidized to create trough, fissure, or flat-lying natural iron ore bodies. The mineralogy consists of mostly hematite, goethite and limonite with minor amounts of magnetite and manganese oxides. There are a range of textures from compact to rubbly or friable. Bedding and other primary features are often evident. Within a stockpile, this material is unsorted. Rock sizes range from clay to +6 foot boulders, with an estimated average rock size being 3/8 of an inch to 5 inches. The amount of clay in natural ore piles is difficult to quantify; however, the clay seems to be a natural cement that stabilizes the stockpile. Natural ore rocks fracture, or part, parallel to bedding planes. Taconite boulders are frequently observed along the slopes of natural ore stockpiles and may have been placed there for slope and erosion control.</p> |
| | | | | "Natural Ore Coarse Tailings" | <p>This includes a by-product of the natural iron ore mining processes. This by-product contains mostly siliceous rocks with</p> |

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| | | | | | <p>some hematite banding. The stockpiles are moderately-well sorted, ranging in size from 3/8 to 4 inches in diameter, and has an angular particle shape. In the processing of coarse tailings, the material was washed; therefore, there is little to no silt within the pile.</p> |
| | | | | "Taconite rock (boulders)" | <p>This includes magnetic and some non-magnetic iron-bearing boulders. Characterized by alternating bands of iron oxides (magnetite and/or hematite) with bands of silicates and carbonates. Bedding and other primary structures are evident. Most taconite stockpiles consists of boulder-sized rocks ranging from 2 feet to +9 feet in diameter with an estimated average of three feet. The boulders tend to have a blocky shape. Some glacial boulders may be incorporated into the pile.</p> |
| | | | | "Cretaceous Ore" | <p>Semi-lithified conglomerate deposited during the Cretaceous period. The conglomerate contains sub-angular to rounded hematite cobbles and sands within an iron-rich, glauconitic, carbonate matrix. Cretaceous ore piles have moderately poor sorting and range in grain size from clay to +3 foot boulders. The boulders are highly cemented blocks of smaller rock particles.</p> |
| | | | | "Taconite Mixed Sized Rock" | <p>Magnetic and non-magnetic iron ore, some of which may have been</p> |

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| | | | | | processed. The rock characterization is described in Taconite Rock Boulders above. This stockpile type is difficult to discern from "Natural ore mixed-sized rock" in the field and may contain other material within the stockpile; classification is based upon company records pertaining to individual stockpiles. These piles are poorly sorted with a rock size from 2mm to +6 feet. Taconite boulders frequently occur along the slope and edges of these piles. |
| | | | | “Lean Taconite” | Stockpiled rock associated with taconite mining. This rock has between 10 and 19% magnetic iron by weight. Generally more massive than waste rock, generally gray with subtle banding that weathers brown. |
| | | | | “Waste Rock (Iron Formation)” | Stockpiled rock associated with taconite mining. This rock has less than 10% magnetic iron by weight. Variable colors and competency. |
| Stockpile Mine of Origin | | | | | Table relates a specific stockpile to one or many mines of origin. Determinations are based on records kept by stockpile owners and/or mining companies. |
| | STMOID | primary key | number (long), 4 | | Unique identification number for each stockpile mine of origin record. |
| | StkpIID | foreign key (links to 'Mined/Piled Stockpile Material') | number (long), 4 | | Unique identification number for each stockpile. (Used interchangeably with "Stkp_Uniq") |

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| | MineID | foreign key (links to 'Natural Ore Mine') | number (long), 4 | 1 - 62 | Unique identification number for each mine/property name. |
| Stockpile Photo Location | | | | | Table relates a photo, and the comments about that photo, to a specific stockpile and an x, y coordinate. |
| | SPLID | primary key | number (long), 4 | 1 - 197 | Unique identification number for each stockpile photo location record. |
| | PhotoNm | foreign key (links to 'Photo') | number (long), 4 | Ex: 19, 20, 21, ...347 | Unique identifier that corresponds to photographs taken of the stockpiles. These photographs (in .jpg format) are included as part of the data from this project. |
| | StkplID | foreign key (links to 'Mined/Piled Stockpile Material') | number (long), 4 | | Unique identification number for each stockpile. (Used interchangeably with "Stkp_Uniq") |
| | PhotoTx | | text, 100 | Ex: "Close up of material, pen for scale" | Comments about individual photographs. Comments may include if the picture is a close up or taken at a distance, the scale used, and other comments. |
| | XYIDNm | foreign key (links to 'X, Y Coordinates') | number (long), 4 | Ex: 10, 11, 13, ...308 | Unique identification number for each x, y coordinate. Same as photo Wpt. |
| Test Name and Sample Number | | | | | Table contains a list of all samples, the name of the test performed on the sample and the sample type, single or composite. |
| | TestName | (may be linked to 'Test Type') | text, 50 | | The name of tests performed on samples. (See 'Test Type' table for further definition) |
| | SampleNm | foreign key (links to 'Sample') | text, 4 | | Unique identifier that corresponds to samples taken from the stockpiles. |

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| | SampType | | text, 10 | "single" or "composite" | See descriptions above for "SampleNm" field in 'Sample' table |
| Test Results-Abrasion | | | | | This test measures the breakdown of material by weight percent. This test was performed on glacial overburden, natural ore coarse tailings, natural ore fine tailings, natural ore and taconite mixed-sized rock, and cretaceous ore samples. |
| | TestTypeID | primary key (composite) foreign key (links to 'Test Type') | text, 20 | "C131/C535" | These are the official call letters for the American Society Testing and Materials (ASTM) test for Los Angeles Abrasion. |
| | TR3ID | primary key (composite) | number (long), 4 | | Unique identification number for each 'test results...' record in this table. |
| | SampleNM | foreign key (links to 'Sample') | text, 4 | "ZZ1", "ZZ2", "ZZ3", "ZZ4", "ZZ5", and "ZZ6" | Unique identifier that corresponds to samples taken from the stockpiles. In this case, composites of composite samples. |
| | AbrasVal | | number (double), 8 | Ex: 45.30 | The test results for abrasions measured in weight percent. |
| Test Results-Chem Assays | | | | | This test measures major chemical oxides within a sample. The results are the percentage of the sample. Chemical assays were performed only on single samples that contain iron ore . |
| | TestTypeID | primary key (composite) | text, 20 | "IRON" | Call letters for this test. |

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| | | foreign key (links to 'Test Type') | | | |
| | TR10ID | primary key (composite) | number (long), 4 | Ex: 1, 2, 3, 4, ...51 | Unique identification number for each 'test results...' record in this table. |
| | SampleNM | foreign key (links to 'Sample') | text, 4 | Ex: "14", "15", "16", ..."82" | Unique identifier that corresponds to samples taken from the stockpiles. In this case, single samples taken from iron ore stockpiles. |
| | Fe | | number (double), 8 | Ex: 41.91 | Percent total iron in a sample by weight. |
| | Hematite | | number (double), 8 | Ex: 59.38 | Percent of hematite in the sample. This calculation was derived by: $(\text{Fe} - \text{Fe}^{++}) \times 1.4297$ |
| | Fe ⁺⁺ | | number (double), 8 | Ex: 0.90 | Percent ferrous iron in a sample by weight. |
| | FeO | | number (double), 8 | Ex: 1.16 | Percent iron oxide in a sample by weight. |
| | SiO ₂ | | number (double), 8 | Ex: 22.16 | Percent of silica in a sample by weight. |
| | Al ₂ O ₃ | | number (double), 8 | Ex: 2.685 | Percent of aluminum oxide in a sample by weight. |
| | CaO | | number (double), 8 | Ex: 1.010 | Percent of calcium oxide in a sample by weight. |
| | MgO | | number (double), 8 | Ex: 0.345 | Percent of magnesium oxide in a sample by weight. |
| | Na ₂ O | | number (double), 8 | Ex: 0.013 | Percent of sodium oxide in a sample by weight. |
| | K ₂ O | | number (double), 8 | Ex: 0.181 | Percent of potassium oxide in a sample by weight. |

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| | MnO | | number (double), 8 | Ex: 0.218 | Percent of manganese in a sample by weight. |
| | FreeSiO2 | | number (double), 8 | Ex: 17.26 | Percent of free silica in a sample by weight. |
| | CO2 | | number (double), 8 | Ex: 0.44 | Percent of carbon dioxide in a sample by weight. |
| Test Results-Clay Lumps | | | | | A test to measure the amount of clay lumps and friable particles in a sample by weight percent. Tests were performed on glacial overburden, natural ore coarse tailings, Cretaceous ore, natural ore and taconite mixed-sized rock samples. |
| | TestTypeID | primary key (composite) foreign key (links to 'Test Type') | text, 20 | "C142" | These are the official call letters for the American Society Testing and Materials (ASTM) test for clay lumps. |
| | TRIID | primary key (composite) | number (long), 4 | | Unique identification number for each 'test results...' record in this table. |
| | SampleNM | foreign key (links to 'Sample') | text, 4 | Ex: "A1", "B9" | Unique identifier that corresponds to samples taken from the stockpiles. In this case, composite samples of single samples. |
| | ClyLmpVal | | number (double), 8 | Ex: 0.62 | Amount of clay lumps in a sample by the percent weight. |
| Test Results-Fine Agg | | | | | This test measures the angularity of the fine particles within a sample by weight percent. This test was only performed on natural ore fine tailing samples because of their small grain size. |

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| | TestTypeID | primary key (composite) foreign key (links to 'Test Type') | text, 20 | "T304" | These are the official call letters for the American Society Testing and Materials (ASTM) test for fine aggregate particle shape. |
| | TR5ID | primary key (composite) | number (long), 4 | | Unique identification number for each 'test results...' record in this table. |
| | SampleNm | foreign key (links to 'Sample') | text, 4 | Ex: "ZZ4", "ZZ5", "ZZ6" | Unique identifier that corresponds to samples taken from the stockpiles. In this case, composites of composite samples. |
| | FineAggVal | | number (double), 8 | | Amount of fine aggregate angularity by percent weight. |
| Test Results-FlatElong | | | | | This test measures the weight percent of flat and elongated particles within a sample. This test was performed on glacial overburden samples. |
| | TestTypeID | primary key (composite) foreign key (links to 'Test Type') | text, 20 | "D4791" | These are the official call letters for the American Society Testing and Materials (ASTM) test for flatness and elongation. |
| | TR2ID | primary key (composite) | number (long), 4 | 1, 2, 3, ...21 | Unique identification number for each 'test results...' record in this table. |
| | SampleNM | foreign key (links to 'Sample') | text, 4 | Ex: "A1", "B9" | Unique identifier that corresponds to samples taken from the stockpiles. In this case, composite samples of single samples. |
| | FlatElgVal | | number | Ex: 1.90 | Amount of flat and |

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| | | | (double), 8 | | elongated particles in a sample by weight percent. |
| Test Results-LtWt Particles | | | | | This tests measures the amount of deleterious material that is lightweight. This was performed only on glacial overburden samples. |
| | TestTypeID | primary key (composite) foreign key (links to 'Test Type') | text, 20 | "C123" | Official call letters for the American Society Testing and Materials (ASTM) |
| | TR4ID | primary key (composite) | number (long), 4 | 1, 2, 3, ...21 | Unique identification number for each 'test results...' record in this table. |
| | SampleNM | foreign key (links to 'Sample') | text, 4 | Ex: "D20", "D21", ..."D29" | Unique identifier that corresponds to samples taken from the stockpiles. In this case, composite samples of single samples. |
| | LtWtVal | | number (double), 8 | Ex: 1.90 | Amount of lightweight particles in a sample by weight percent. |
| Test Results-SGA-Coarse | | | | | This test measures the specific gravity (weight/volume) and water absorption for aggregate particles larger than the number 4 sieve. This was performed on all samples except natural ore fine tailings. Fine tailings were not tested because they do not contain any coarse aggregate. |
| | TestTypeID | primary key (composite) | text, 20 | "C127" | These are the official call letters for the American Society Testing and Materials (ASTM) test for specific gravity and absorption in coarse |

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| | | foreign key (links to 'Test Type') | | | materials. |
| | TR6ID | primary key (composite) | number (long), 4 | 1, 2, 3, ...32 | Unique identification number for each 'test results...' record in this table. |
| | SampleNM | foreign key (links to 'Sample') | text, 4 | Ex: "A1", "B9" | Unique identifier that corresponds to samples taken from the stockpiles. In this case, composite samples of single samples. |
| | CBulkOvDry | | number (double), 8, | Ex: 2.574 | Specific gravity when sample is oven dry and the weight is divided by the bulk volume. |
| | CBulkSSDry | | number (double), 8, | Ex: 2.732 | Specific gravity when sample has a saturated surface where the weight of the dry aggregate plus the weight of the water in pores are divided by the bulk volume. |
| | CApOvDry | | number (double), 8 | Ex: 3.057 | Specific gravity when the sample is dry and the sample weight is divided by the volume of the solid aggregate. |
| | CAbsorpPc | | number (double), 8 | Ex: 6.130 | Weight percent of the water absorbed in the pore space of the sample. |
| Test Results- SGA-Fine | | | | | This test measures the specific gravity (weight/volume) and water absorption for aggregate particles smaller than the number 4 sieve. This was performed on all samples. |
| | TestTypeID | primary key (composite) foreign key | text, 20 | "C128" | These are the official call letters for the American Society Testing and Materials (ASTM) test for specific gravity and absorption in fine materials. |

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| | | (links to 'Test Type') | | | |
| | TR7ID | primary key (composite) | number (long), 4 | 1, 2, 3, ...32 | Unique identification number for each 'test results...' record in this table. |
| | SampleNM | foreign key (links to 'Sample') | text, 4 | Ex: "A1", "B9" | Unique identifier that corresponds to samples taken from the stockpiles. In this case, composite samples of single samples. |
| | FBulkOvDry | | number (double), 8, | Ex: 2.574 | Specific gravity when sample is oven dry and the weight is divided by the bulk volume. |
| | FBulkSSDry | | number (double), 8, | Ex: 2.732 | Specific gravity when sample has a saturated surface where the weight of the dry aggregate plus the weight of the water in pores are divided by the bulk volume. |
| | FApOvDry | | number (double), 8 | Ex: 3.057 | Specific gravity when the sample is dry and the sample weight is divided by the volume of the solid aggregate. |
| | FAbsorpPc | | number (double), 8 | Ex: 6.130 | Weight percent of the water absorbed in the pore space of the sample. |
| Test Results-Sieve | | | | | This test measures the various sized particles of a sample by percent passing each sieve by weight. This test was conducted on all samples except for 45 and 46 (too fine to dry sieve). |
| | TestTypeID | primary key (composite) foreign key (links to 'Test Type') | text, 20 | "MNDNR" | Call letters for this test. (In this case, it specifies the laboratory where the analysis was conducted) |
| | TR8ID | primary key | number (long), 4 | 1, 2, 3, ...80 | Unique identification number for each 'test |

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| | | (composite) | | | results...' record in this table. |
| | SampleNM | foreign key (links to 'Sample') | text, 4 | Ex: "1", "2", "3", "4", ... | Unique identifier that corresponds to samples taken from the stockpiles. In this case, single samples taken from stockpiles. All samples were sieve except samples 44 and 45. |
| | 4in | | number (double), 8 | Ex: 100 | Weight percent passing on the 4 inch sieve. |
| | 3in | | number (double), 8 | Ex: 100 | Weight percent passing on the 3 inch sieve. |
| | 2,5in | | number (double), 8 | Ex:: 97 | Weight percent passing on the 2.5 inch sieve. |
| | 2in | | number (double), 8 | Ex:: 92 | Weight percent passing on the 2 inch sieve. |
| | 1,5in | | number (double), 8 | Ex: 88 | Weight percent passing on the 1.5 inch sieve. |
| | 1,25in | | number (double), 8 | Ex: 85 | Weight percent passing on the 1.25 inch sieve. |
| | 1in | | number (double), 8 | Ex: 75 | Weight percent passing on the 1 inch sieve. |
| | 3/4in | | number (double), 8 | Ex: 71 | Weight percent passing on the 3/4 inch sieve. |
| | 5/8in | | number (double), 8 | Ex: 69 | Weight percent passing on the 5/8 inch sieve. |
| | num4 | | number (double), 8 | Ex: 51 | Weight percent passing on the Number 4 Sieve. |
| | num8 | | number (double), 8 | Ex: 45 | Weight percent passing on the Number 8 Sieve. |
| | num10 | | number (double), 8 | Ex: 40 | Weight percent passing on the Number 10 Sieve. |
| | num16 | | number (double), 8 | Ex: 39 | Weight percent passing on the Number 16 Sieve. |

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| | num30 | | number (double), 8 | Ex: 20 | Weight percent passing on the Number 30 Sieve. |
| | num40 | | number (double), 8 | Ex: 17 | Weight percent passing on the Number 40 Sieve. |
| | num50 | | number (double), 8 | Ex: 15 | Weight percent passing on the Number 50 Sieve. |
| | num100 | | number (double), 8 | Ex: 10 | Weight percent passing on the Number 100 Sieve. |
| | num200 | | number (double), 8 | Ex: 4 | Weight percent passing on the Number 200 Sieve. |
| Test Results-Soundness | | | | | This test measures the ability of a material to withstand freeze/thaw cycles and is measured in weight percent. This test was performed on all sampled material types except for natural ore fine tailings. |
| | TestTypeID | primary key (composite) foreign key (links to 'Test Type') | text, 20 | "C88" | These are the official call letters for the American Society Testing and Materials (ASTM) test for determining the results of magnesium sulfate or soundness tests. |
| | TR9ID | primary key (composite) | number (long), 4 | 1 - 7 | Unique identification number for each 'test results...' record in this table. |
| | SampleNm | foreign key (links to 'Sample') | text, 4 | Ex: "ZZ1", "ZZ7", "ZZ10" | Unique identifier that corresponds to samples taken from the stockpiles. In this case, composites of composite samples. |
| | 11/2to1in | | number (double), 8 | Ex: 12.7 | Percent by weight breakdown of material that is 11/2 to 1 inch in diameter. |
| | 1to3/4in | | number (double). | Ex: 20.6 | Percent by weight breakdown of material |

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| | | | 8 | | that is 1 to 3/4 inch in diameter. |
| | 3/4to1/2in | | number (double), 8 | Ex: 28.9 | Percent by weight breakdown of material that is 3/4 to 1/2 inch in diameter. |
| | 1/2to3/8in | | number (double), 8 | Ex: 41.0 | Percent by weight breakdown of material that is 1/2 to 3/8 inch in diameter. |
| | 3/8toNum4 | | number (double), 8 | Ex: 41.5 | Percent by weight breakdown of material that is 3/8 inch to number 4 mesh diameter. |
| | CompLoss | | number (double), 8 | Ex: 33.8 | Composite percent by weight breakdown of material. |
| Test Type | | | | | Table lists all test types performed on samples. |
| | TestName | | text, 50 | | Name of test performed on samples. |
| | | | | "Lightweight Particles" | This tests measures the amount of deleterious material that are lightweight. This was performed only on glacial overburden samples. |
| | | | | "Specific Gravity and Absorption-Coarse" | This test measures the specific gravity (weight/volume) and water absorption for aggregate particles larger than the number 4 sieve. This was performed on all samples except natural ore fine tailings. |
| | | | | "Specific Gravity and Absorption-Fine" | This test measures the specific gravity (weight/volume) and water absorption for aggregate particles smaller than the number 4 sieve. This was performed on all samples. |
| | | | | "Los Angeles Abrasion" | This test measures the breakdown of material by weight percent. This test was performed on glacial overburden. |

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| | | | | | natural ore coarse tailings, natural ore fine tailings, natural ore and taconite mixed-sized rock, and cretaceous ore samples. |
| | | | | "Clay Lumps and Friable Particles" | A test to measure the amount of clay lumps and friable particles in a sample by weight percent. Tests were performed on glacial overburden, natural ore coarse tailings, Cretaceous ore, natural ore and taconite mixed-sized rock samples. |
| | | | | "Magnesium Sulfate Soundness" | This test measures the ability of a material to withstand freeze/thaw cycles and is measured in weight percent. This test was performed on all sampled material types except for natural ore fine tailings. |
| | | | | "Flatness and Elongation" | This test measures the weight percent of flat and elongated particles within a sample. This test was performed on glacial overburden samples. |
| | | | | "Chemical Assays" | This test measures major chemical oxides within a sample. The results are the percentage of the sample. Chemical assays were performed on only samples that contain iron ore. |
| | | | | "Sieve Analysis (Gradations)" | This test measures the various sized particles of a sample by percent passing each sieve by weight. This test was conducted on all samples except for 45 and 46 (too fine to dry sieve). |
| | | | | "Spall" | Spall is any deleterious material within a sample (i.e. shale, iron oxide, soft particles). This test measures the total spall |

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| | | | | | within a sample by weight percent. This test was performed on glacial overburden samples. |
| | | | | "Fine Aggregate Angularity" | This test measures the angularity of the fine particles within a sample by weight percent. This test was performed on natural ore fine tailing samples. |
| | TestTypeID | primary key | text, 20 | | These are the corresponding ASTM and other call letters for each test. |
| | | | | "C123" | Lightweight Particles |
| | | | | "C127" | Specific Gravity and Absorption-Coarse |
| | | | | "C128" | Specific Gravity and Absorption-Fine |
| | | | | "C131/C535" | Los Angeles Abrasion |
| | | | | "C142" | Clay Lumps and Friable Particles |
| | | | | "C88" | Magnesium Sulfate Soundness |
| | | | | "D4791" | Flatness and Elongation |
| | | | | "IRON" | Chemical Assays |
| | | | | "MNDNR" | Sieve Analysis (Gradations)- performed by MNDNR |
| | | | | "MNDOT" | Spall |
| | | | | "T304" | Fine Aggregate Angularity |
| | TestAbbr | | text, 20 | | This are the abbreviations used in the data base for each test. |
| | | | | "LtWt Particles" | Lightweight Particles |
| | | | | "SGA-Coarse" | Specific Gravity and Absorption-Coarse |
| | | | | "SGA-Fine" | Specific Gravity and Absorption-Fine |
| | | | | "Abrasion" | Los Angeles Abrasion |
| | | | | "Clay Lumps" | Clay Lumps and Friable Particles |

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| | | | | "Soundness" | Magnesium Sulfate Soundness |
| | | | | "FlatElong" | Flatness and Elongation |
| | | | | "Chem Assays" | Chemical Assays |
| | | | | "Sieve" | Sieve Analysis (Gradations)- performed by MNDNR |
| | | | | "Spall" | Spall |
| | | | | "Fine Agg" | Fine Aggregate Angularity |
| Test Type Determination | | | | | This table notes which tests are performed on which material types. For further explanation, refer to 'Test Type' table. |
| | TTDID | primary key | number (long), 4 | | Unique identification number for each test type determination record. |
| | TestTypeID | foreign key (links to 'Test Type') | text, 20 | "C123", "C88", "C4791", "IRON", ... | This are the corresponding ASTM and other call letters for each test. |
| | MatTypeID | foreign key (links to 'Stockpile Material Type') | number (long), 4 | 1-11 | Unique identification number for each stockpile material type. (See 'Stockpile Material Type' table for definitions) |
| X, Y Coordinate | | | | | Table contains all possible point locations where observations, samples and photos were taken. |
| | XYID | primary key | number (long), 4 | 10, 11, 13, ...308 | Unique identification number for each x, y coordinate. Corresponds to Waypoint and Sample Site #. |
| | Feature | | text, 30 | "rock stockpile", "overburden", "sand", "gravel", "bouldery till", "till" | Type of material examined at a given sample site. |
| | Description | | text, 40 | "01-AUG-00 14:10" | Date and time that point was collected using GPS receiver. Coordinates not |

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| | | | | | collected with a GPS receiver have a null value in this field. |
| | X_Coord | | number (double), 8 | | UTM X coordinate in zone 15, meters |
| | Y_Coord | | number (double), 8 | | UTM Y coordinate in zone 15, meters |
| | Method | | text, 20 | | How the coordinate was obtained |
| | | | | "GPS" | Garmin GPS receiver |
| | | | | "Screen digitized" | Digitized on screen using ArcView |

