# Halliburton GeoGraphix CDF Reader/Writer

The Halliburton GeoGraphix CDF format Reader and Writer modules provide the FME with the ability to read and write WhiteStar files. This format is also known as the Cartographic Data Format (CDF) Version 1.0 used by the GeoGraphix® Exploration System (GES) mapping package. The WhiteStar Corporation in the U.S. sells a variety of digital map data in this format, much of it targeted at the oil and gas, pipeline, natural resource, and engineering industries.

## Overview

The WhiteStar format is a two dimensional format that employs a major/minor code scheme similar to that used by the USGS DLG format. It does not support user-defined attributes. The format does carry coordinate system information and supports several different projections, though normally it carries coordinates in decimal lat/long format. In some circumstances, the coordinates may be in degree, minute, second format.

The format can hold linear features, which may be closed into simple polygons. No polygons with holes can be stored directly. Point label features are also accommodated to carry annotation.

The FME considers a WhiteStar dataset to be a single file. Normally, WhiteStar files have a `.cdf` extension.

## GeoGraphix CDF (WHITESTAR) Quick Facts

| | |
|---|---|
| Format Type Identifier | WHITESTAR |
| Reader/Writer | Both |
| Licensing Level | Base |
| Dependencies | None |
| Dataset Type | File |
| Feature Type | Geometry based name |
| Typical File Extensions | .cdf |
| Automated Translation Support | Yes |
| User-Defined Attributes | No |
| Coordinate System Support | No |
| Generic Color Support | No |
| Spatial Index | Never |
| Schema Required | No |
| Transaction Support | No |
| Geometry Type | wht_type |

| Geometry Support | | | | |
|---|---|---|---|---|
| **Geometry** | **Supported?** | | **Geometry** | **Supported?** |
| aggregate | no | | point | yes |
| circles | no | | polygon | yes |
| circular arc | no | | raster | no |
| donut polygon | yes | | solid | no |
| elliptical arc | no | | surface | no |
| ellipses | no | | text | yes |
| line | yes | | z values | no |
| none | no | | | |

# Reader Overview

WhiteStar datasets store entities as a header (type "B" record) followed by zero or more coordinates (type "C" records) and then by zero or more labels (type "D" records). The WhiteStar reader emits a single feature representing all of the coordinate information for an entity, as well as a feature for each label record in the entity.

**Note:** If an entity contains multiple line segments or polygons, a mapping file generated by FME to read WhiteStar data will emit a feature for each line segment or polygon in the entity, rather than a single feature with all lines and/or polygons).

Any coordinates to be drawn with the pen in the "up" position are discarded by the WhiteStar reader. The reader interprets the lifting of the pen only as a means to end a polyline or polygon.

## Reader Directives

The directives processed by the WhiteStar reader are listed below. The suffixes shown are prefixed by the current `<ReaderKeyword>` in a mapping file. By default, the `<ReaderKeyword>` for the WhiteStar reader is `WHITESTAR`.

### DATASET

**Required/Optional:** *Required*

The value for this directive is the WhiteStar file to be read. A typical mapping file fragment specifying an input `WHITESTAR` dataset looks like:

```
WHITESTAR_DATASET /usr/data/92i080.cdf
```

**Workbench Parameter:** *<WorkbenchParameter>*

# Writer Overview

The WhiteStar writer writes all features to a single WhiteStar file, specified by the `DATASET` directive. Each feature will be written as a single entity in the output file, so no entities in the output file will contain both coordinate and label information.

## Writer Directives

The directives that are processed by the WhiteStar writer are listed below. The suffixes shown are prefixed by the current <WriterKeyword>_ in a mapping file. By default, the <WriterKeyword> for the WhiteStar writer is WHITESTAR.

### DATASET

**Required/Optional:** *Required*

The value for this directive is the name of the created WhiteStar file. If a file of this name exists, it is replaced by the new file. A typical mapping file fragment specifying an output WHITESTAR dataset looks like:

```
WHITESTAR_DATASET /home/goober/hydro.cdf
```

**Workbench Parameter:** *<WorkbenchParameter>*

# Feature Representation

In addition to the generic FME feature attributes that FME Workbench adds to all features (see *About Feature Attributes* on page 7), this format adds the format-specific attributes described in this section.

WhiteStar entities define polylines, polygons, and labels (text). Each FME feature can represent an aggregate of polylines, an aggregate of polygons, or a single label. The feature type of a WHITESTAR feature will be one of the values LINE, POLYGON, or TEXT, to specify which type of geometry is being represented.

All WhiteStar features have the following attributes defined:

| Attribute Name | Value |
|---|---|
| wht_type | Specifies what type of data the feature is representing. Established values are: wht_polyline, wht_polygon, and wht_label. |
| wht_entity_type | This attribute holds the string that is placed on the entity header. By default this is POLYLINE or TEXT, but the writer will output this attribute's value if it is specified. |
| wht_major_code | Major attribute code from entity header corresponding to the feature.<br>**Range:** 0..999 |
| wht_minor_code | Minor attribute code from entity header corresponding to the feature.<br>**Range:** 0..9999 |

When writing WhiteStar data, default values are supplied for wht_major_code and wht_minor_code when needed. The value for wht_major_code defaults to "200" ("manmade"), and wht_minor_code defaults to a value of "0300", "0100", or "0200", depending on the geometry type (point, area, and line, respectively).

In addition to the above, label features have additional attributes. The following subsections describe the structure of each type of WhiteStar feature.

## Lines

**wht_type:** wht_polyline

WhiteStar polyline features contain either a single line or an aggregate of lines. When reading a WhiteStar entity, the reader will aggregate all linear elements for a single entity into one LINE feature. Similarly, the writer will put all lines contained in a single LINE feature into one entity in the output WhiteStar file.

The "implied closure" flag of the entity header will always be reflected in the feature type of the feature representing the entity. If the flag is set to "0" in an input WhiteStar file, LINE features will be generated. Conversely, LINE entities are written with the "implied closure" flag in the entity header set to a value of "0".

## Polygons

**wht_type:** wht_polygon

WhiteStar polygon features contain either a single polygon or an aggregate of polygons. When reading a WhiteStar entity, the reader will aggregate all linear elements for a single entity into one POLYGON feature. Similarly, the writer will put all lines contained in a single POLYGON feature into one entity in the output WhiteStar file.

The "implied closure" flag of the entity header will always be reflected in the feature type of the feature representing the entity. If the flag is set to "1" in an input WhiteStar file, LINE features will be generated. Conversely, POLYGON entities are written with the "implied closure" flag in the entity header set to a value of "1".

## Labels

**wht_type:** wht_label

WhiteStar TEXT features contain a single text label. When reading a WhiteStar entity, the reader will create a separate TEXT feature for each label in the entity. Similarly, the writer will create a single entity for each TEXT feature written.

The TEXT feature geometry consists of a single point to specify the location of the text. The following attributes are also present on TEXT features.

| Attribute Name | Value | Required/ Optional |
|---|---|---|
| wht_label_string | Text of label entity. This is an alphanumeric character string of up to 212 characters.<br>**Default:** "" | Optional |
| wht_label_length | Length of label text, in characters.<br>**Default:** length of wht_label_string's value. | Optional |
| wht_label_height | Height of the label text. This is an integer, and is interpreted according to the value of wht_label_units.<br>**Range:** 0-99999<br>**Default:** 10 | Optional |

| Attribute Name | Value | Required/ Optional |
|---|---|---|
| wht_label_units | Units by which to interpret the value of wht_label_height. Valid values are "L" for lat/long, "M" for metres, "F" for feet, "R" for relative, or "O" for other projection code.<br>**Default:** 10 | Optional |
| wht_label_angle | Angle by which text is rotated about its point. This is measured in degrees counterclockwise.<br>**Range:** 0-360<br>**Default:** 01G/ | Optional |
| wht_label_orientation | Flag to indicate whether the text is more vertical (value of "V") or horizontal (value of "Z"). This is always computed at the time of writing. | Computed |
| wht_label_horijust | Horizontal justification of the string. Valid values are "L" for left-justified, "C" for centre-justified, or "R" for right-justified.<br>**Default:** "C" | Optional |
| wht_label_vertjust | Vertical justification of the string. Valid values are "T" for top-justified, "C" for centre-justified, or "B" for bottom-justified.<br>**Default:** "C" | Optional |

Note that the attribute wht_label_angle specifies the rotation as a counterclockwise number, contrary to the value which is actually placed in the WhiteStar label record.