

GeoVIEW.WA — an interactive geological resource

INTRODUCTION

Mineral exploration is an important and challenging activity in the state of Western Australia (Fig. 1). The State is in excess of 2.5 million square kilometres in area (one-third of Australia), and had a 2012-13 mineral production of greater than \$AU 101 billion. Effective mineral exploration increasingly relies on the need to integrate large and diverse datasets, and this has led to the development of software applications that can rapidly display and interrogate data. Although a variety of software packages are currently available, to some explorers, either the cost (including the initial purchase price and the cost of ongoing maintenance or upgrades), or type of operating platform restricts their use. Recognising this limitation, the Geological Survey of Western Australia (GSWA) developed the web-based application GeoVIEW.WA, which can be used to view and interrogate a wide range of data in both a textual and spatial context. GeoVIEW.WA can be accessed through the Online Systems tab from the Department of Mines & Petroleum's website at www.dmp.wa.gov.au.

GSWA is the principal supplier of geoscience information to the mineral exploration industry in Western Australia. Exploration companies active in the State range from multinationals, through mid-tier and junior companies, to individual prospectors, and all make use of the geoscience data made available by GSWA. GeoVIEW.WA offers all explorers the capability to integrate, view, interrogate and download large and diverse datasets using a web browser.

Table 1. Operational Layers in GeoVIEW.WA (see Figure 2).

Layer	Description
Minerals	Compilation of mines and mineral deposits (MINEDEX ⁺), mineral exploration reports (WAMEX ⁺), specialized projects (e.g., inventory of abandoned mine sites)
Drillholes	Mineral exploration drillholes (MDHDB [*]); drillholes with spectral mineral data (HYLOGGER); drillholes held by GSWA
Tenements	Mineral exploration tenements (historical, live, pending)
Native title	Native title claim and determined areas, indigenous land use agreement areas
Special category lands	E.g., geoheritage sites, heritage areas, conservation estates
Geochronology	Age determination information and metadata, GSWA and Geoscience Australia data
Geochemistry	Private sector and GSWA geochemistry (includes data from WACHEM⁺ and WAROX⁺)
Geophysics	Company and government airborne surveys and ground surveys, and surveys in progress
Petroleum	E.g., petroleum and geothermal titles and releases, petroleum wells, 3D seismic lines, magnetic surveys
Indexes	Mapsheet indexes at various scales
Administrative boundaries	E.g. local government authorities, mineral fields
Topography and cultural	E.g., Location of towns, road and rail networks
Geology	Lithology and structure at various scales, tectonic units, basin depths
Topographic imagery	1:250 000 topographic map mosaics
Geology imagery	1:250 000 and 1:100 000 map mosaics
Relief imagery	Shuttle radar topography mission (SRTM) imagery
Geophysics imagery	Magnetics, gravity and radiometrics imagery
ASTER imagery	Advanced Spaceborne Thermal Emission and Reflection Radiometer content and composition images

^{*}MDHDB – discussed here

⁺ corporate database



Figure 1. Location of Western Australia.

GEOCHEMISTRY IN GEOVIEW.WA

GeoVIEW.WA integrates 18 fundamental categories of information (listed as Operational Layers in Figure 2 and Table 1), and a total of 110 individual layers sourced not only from within GSWA, but from other parts of the parent organisation (Department of Mines and Petroleum, DMP), other State and Federal government agencies, and, when provided to GSWA, the private sector. An example of the comprehensive coverage is provided by geochemical data. Of the seven datasets available through GeoVIEW.WA

(Fig. 2), five are from the private sector. The datasets include stream sediment chemistry from two regional surveys (1) Pickands-Mather (n = 32 700) and (2) BHP-Billiton (n = 19 600), (3) a soil geochemistry survey (WMC Yamarna area (n = 15 200)), (4) granite-greenstone bedrock chemistry from the Yilgarn Craton (Hallberg; n =

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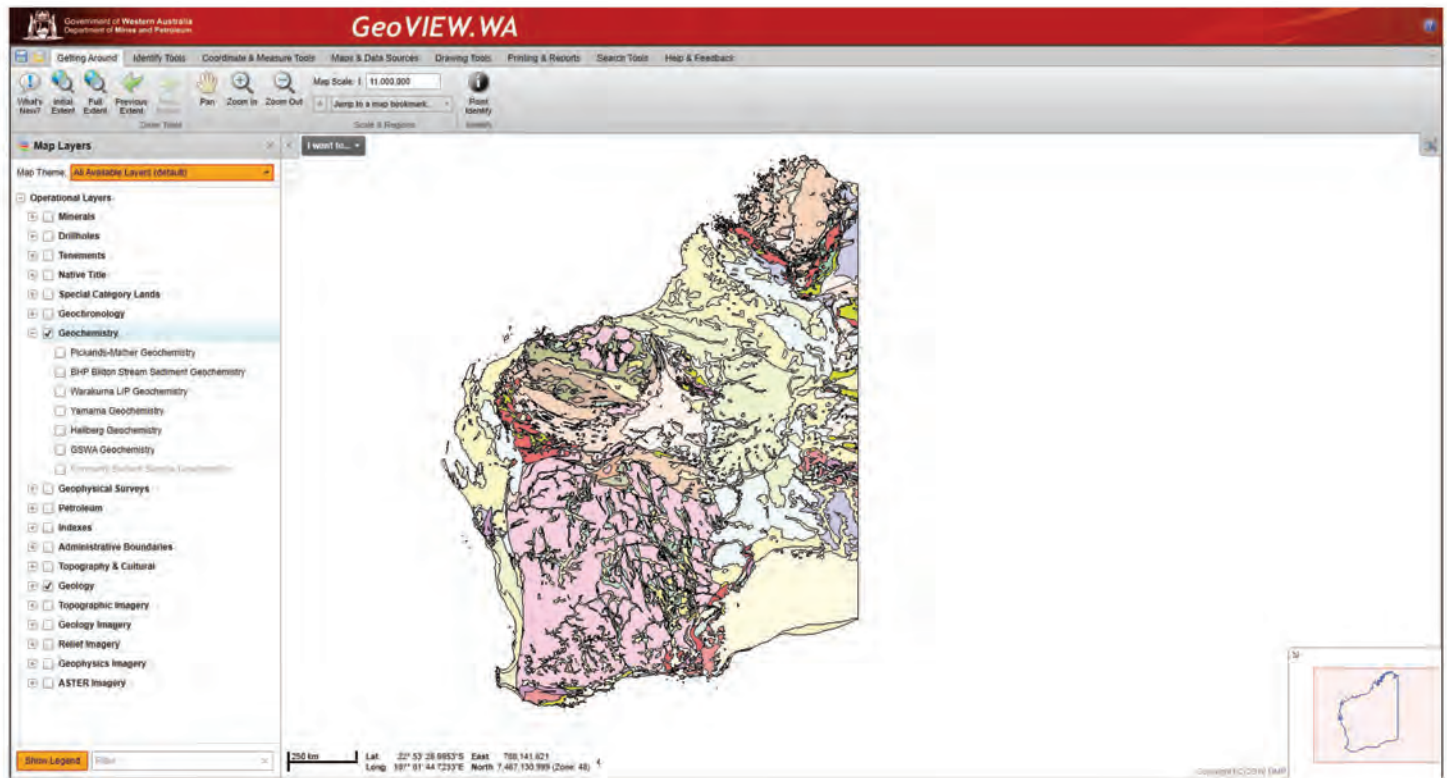


Figure 2. Computer screen snapshot of GeoVIEW.WA interface showing the available Operational Layers. The seven datasets available for geochemistry are shown. Map coverage shown is interpreted bedrock geology at 1:2 500 000. *continued on page 4*

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1 860), and (5) exploration company surface geochemistry captured as part of a Mineral Drillhole and Surface Geochemistry Database (MDHDB) generated by GSWA ($n > 4\,500\,000$ assays). Data from within GSWA (GSWA geochemistry in Figure 2) comprise regolith and rock geochemistry carried out on samples collected by GSWA staff as part of either regional mapping and mineralization programs, or resulting from regional regolith geochemical surveys. The data are stored in the corporate WACHEM database, with associated metadata in the field observations database, WAROX. WACHEM currently holds in excess of 35 000 analyses. GSWA data can be searched using two approaches, textual or spatial. Textual searching allows interrogation according to element and element concentration range, and using metadata from the WAROX database, such as lithology, sample number, or analytical batch. The output can be downloaded in .csv format, from which individual batch details can be also downloaded using a hyperlink to the sample. The batch information contains quality control information (e.g., analyses of sample duplicates, reference materials, blanks), as well as the analytical laboratory (and laboratory-specific acronyms for sample preparation and analysis), and information on how the sample was prepared (e.g. crushing, screening, milling). Spatial searching encompasses selecting analyses according to 1:500 000 scale tectonic units, exploration tenement, a user-defined rectangle, a 1:250 000 or 1:100 000 map sheet, or a user-defined set of coordinates. Similar to textual

interrogation, extracted data are made available as .csv files, with related batch information.

The largest collection of geochemical data available through GeoVIEW.WA is that linked to the Mineral Drillhole and Surface Geochemistry Database (MDHDB). Both drilling and surface geochemical data have been extracted from public company reports, submitted to DMP on an annual basis as a part of a regulatory requirement of holding a mineral exploration licence. These data are released when the exploration licence is relinquished. Drillhole coordinates and associated metadata (e.g., drilling methodology, trend and plunge of drillhole) are available through GeoVIEW.WA, whereas other data (including drill hole geology and survey information, and drillhole assays data) are available as either text files or in .pdf format. Currently, the MDHDB holds in excess of 1 260 000 drill hole collar coordinates and related metadata. Surface geochemistry comprises the locations of individual samples and a link to a text file of results and metadata ($n > 4\,500\,000$ assays).

EXAMPLES OF GEOVIEW.WA USAGE

Point identification

The Point Identify tool can be used to show the attributes of point data. For GSWA geochemical coverage (Fig. 3), selection of a point using this tool produces a fly-out, showing the metadata and the sample composition (Fig. 3). The Results panel on the left of screen provides

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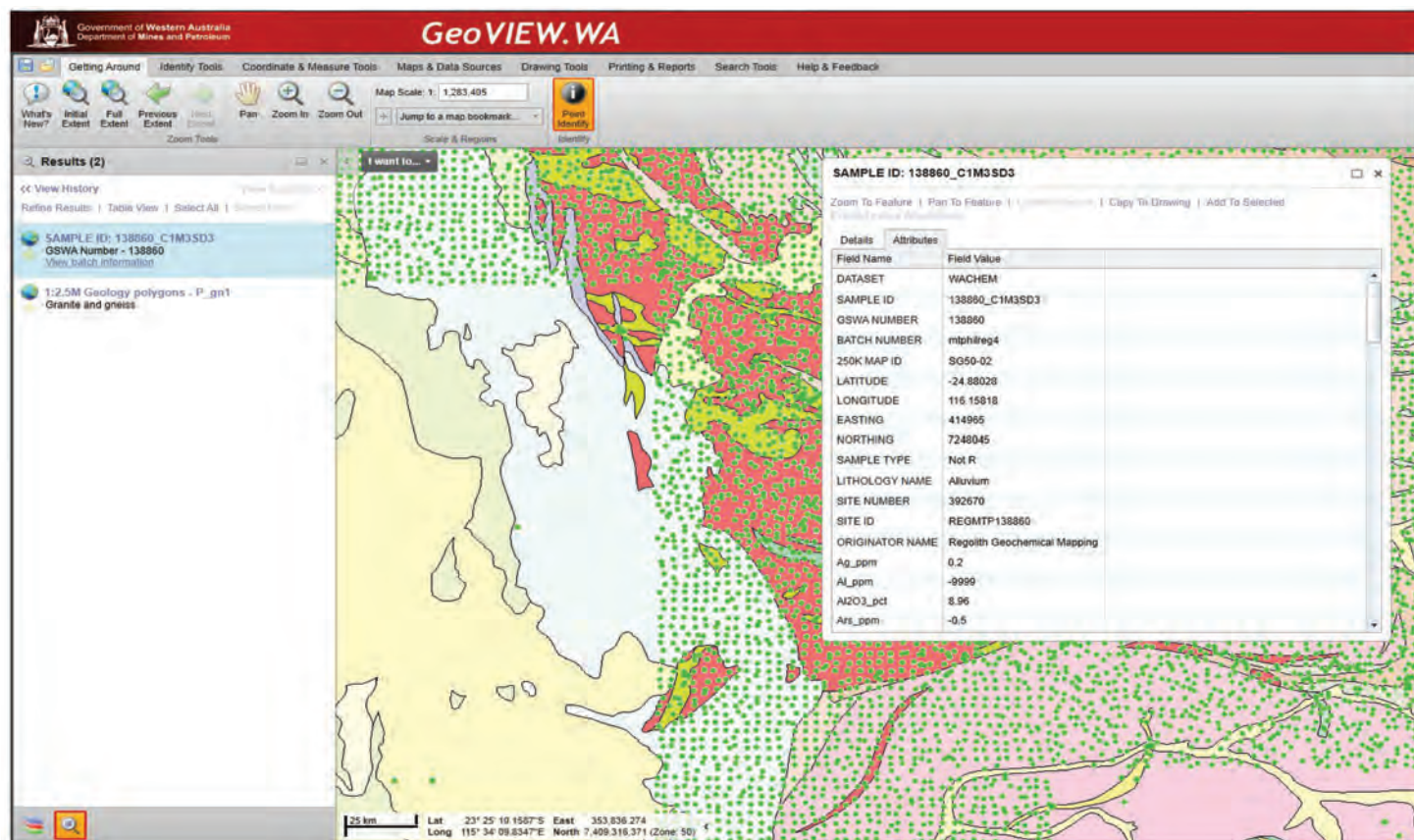


Figure 3. Samples from the GSWA WACHEM database for the Gascoyne area of Western Australia, shown against 1: 2 500 000 scale interpreted bedrock geology. The fly-out table is the result of using the Point Identify tool to examine an individual sample.

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the option to view the selected data in the Table View, enabling downloading of data as a csv file. This panel also shows other attributes, in this case, the lithology at the sample site (granite and gneiss), derived from the background bedrock geology coverage. There is also the option to view the analytical batch details for the selected sample, which contains information on the laboratory and the analytical methodology.

Filtering

The Advanced Filter Builder allows user-defined searching. The GSWA geochemistry coverage for part of the State (Fig. 4a) is shown against 1:2 500 000 scale geology. Using a combination of Field Names, Operators and Values (shown in the Advanced Filter Builder panel), the selected data can be filtered. In the example shown, the selected data shown in Figure 4a have been filtered according to Au concentration > 0.001 ppm and Pt <>

1 ppb (Fig. 4b). Using the 'I want to' drop down menu, the selected data can be exported as an ArcGIS shapefile.

Exploration company surface geochemistry – spatial search

These data are shown in GeoVIEW.WA as a series of sample sites (Fig. 5a). Each sample has associated metadata which can be examined in GeoVIEW.WA. Geochemical data are held in the WAMEX database as a series of text files. Individual samples shown in GeoVIEW.WA are linked to the geochemical data via a unique company exploration report number. An example of the Company Surface Sample Geochemistry coverage (Fig. 5a) shows the high density of samples in some areas. Using the Geochemistry Search option, an area of samples can be selected using a variety of tools, including user-specified coordinates or a polygon tool (Fig. 5b). The results of this search (Fig. 5c) are presented in a table which lists Sample Id and related metadata, including the report number (A-number) – i.e., the link to the geochemical data held in

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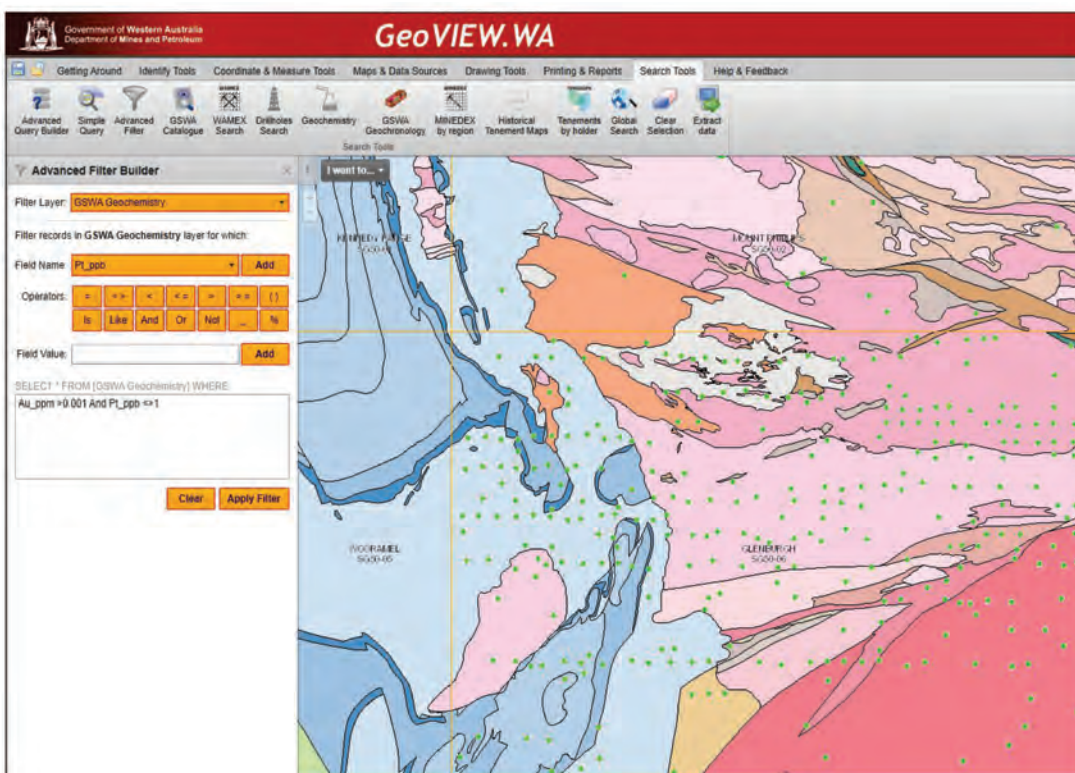
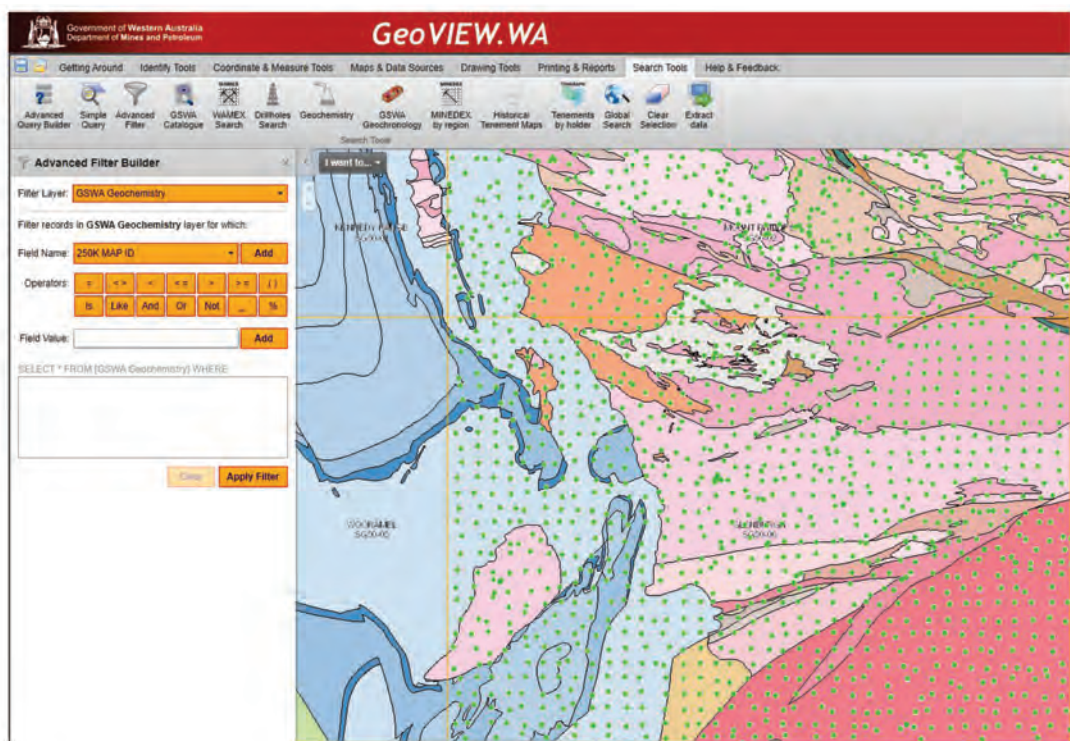


Figure 4a) GSWA samples with geochemistry from the Gascoyne area of Western Australia; b) Coverage in Figure 4a filtered according to user-defined Au and Pt concentrations using GeoVIEW.WA's Advanced Filter Builder.

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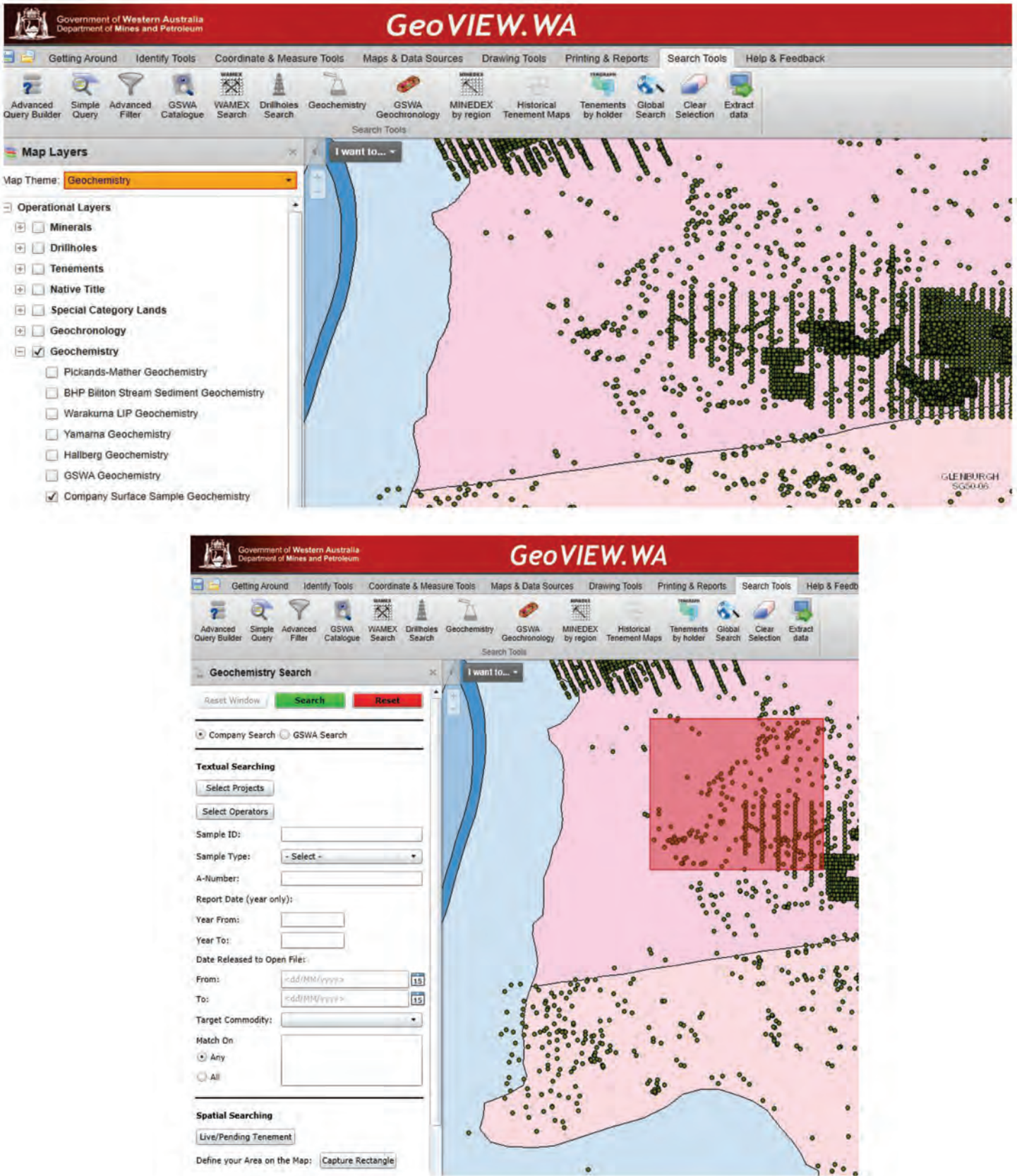


Figure 5a) Distribution of surface geochemistry samples from the Mineral Drillhole and Surface Geochemistry Database in the Gascoyne area of Western Australia; b) Polygon search area (red box) for data shown in Figure 5a; c) Results of polygon search. Table lists the report number (A-number) which links the sample metadata shown in the table to the text files of geochemical data held in the WAMEX database.

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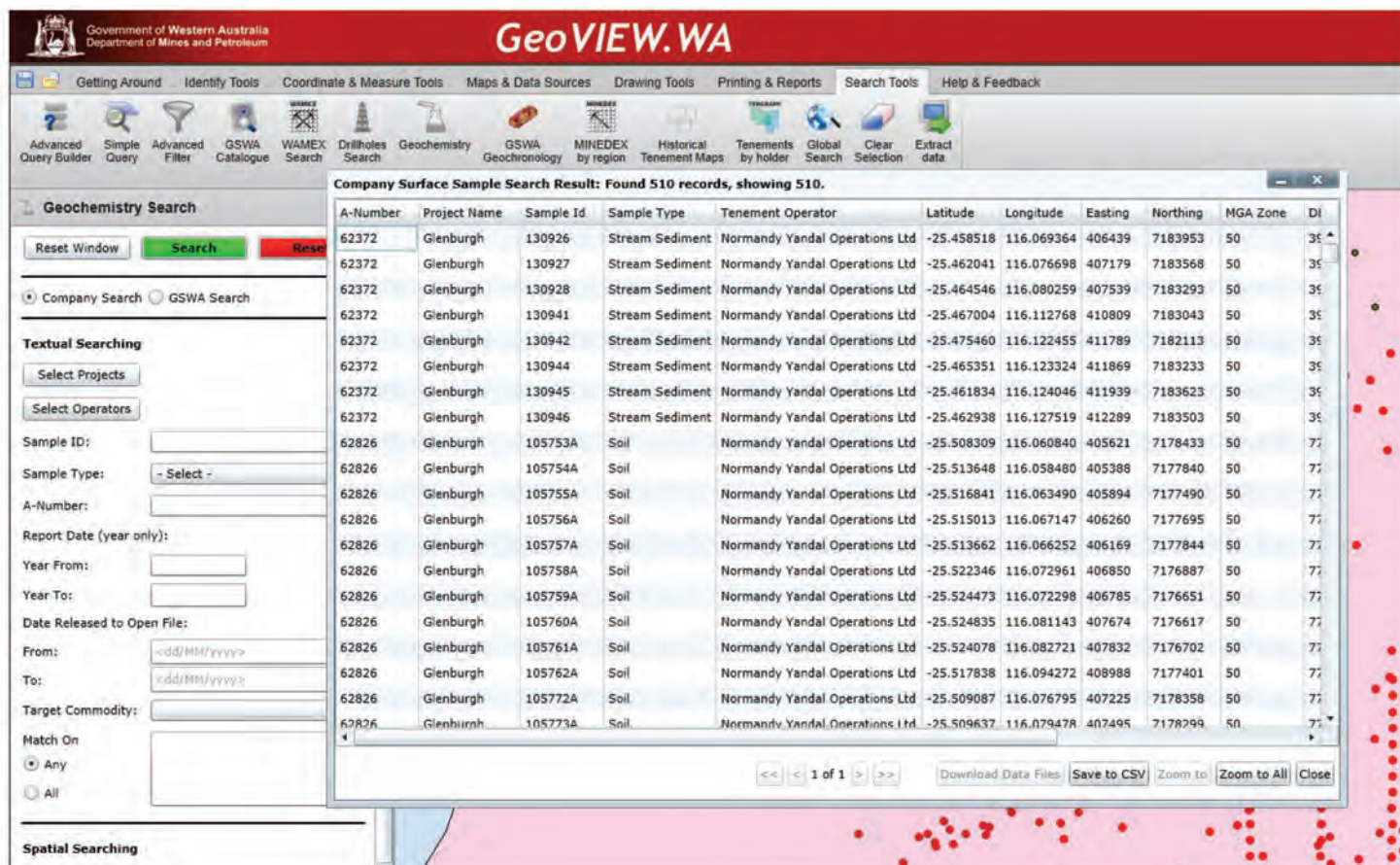


Figure 5c.

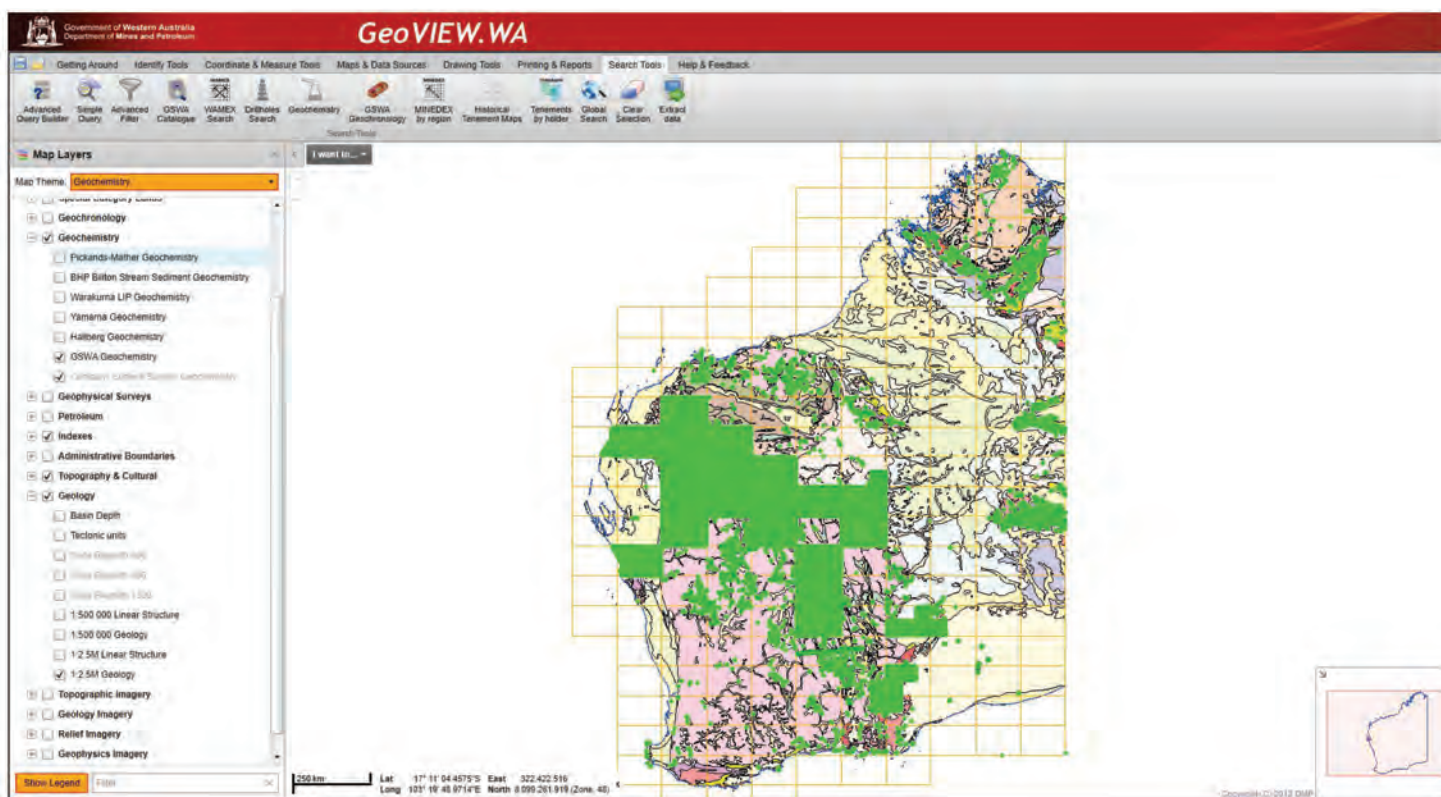


Figure 6a

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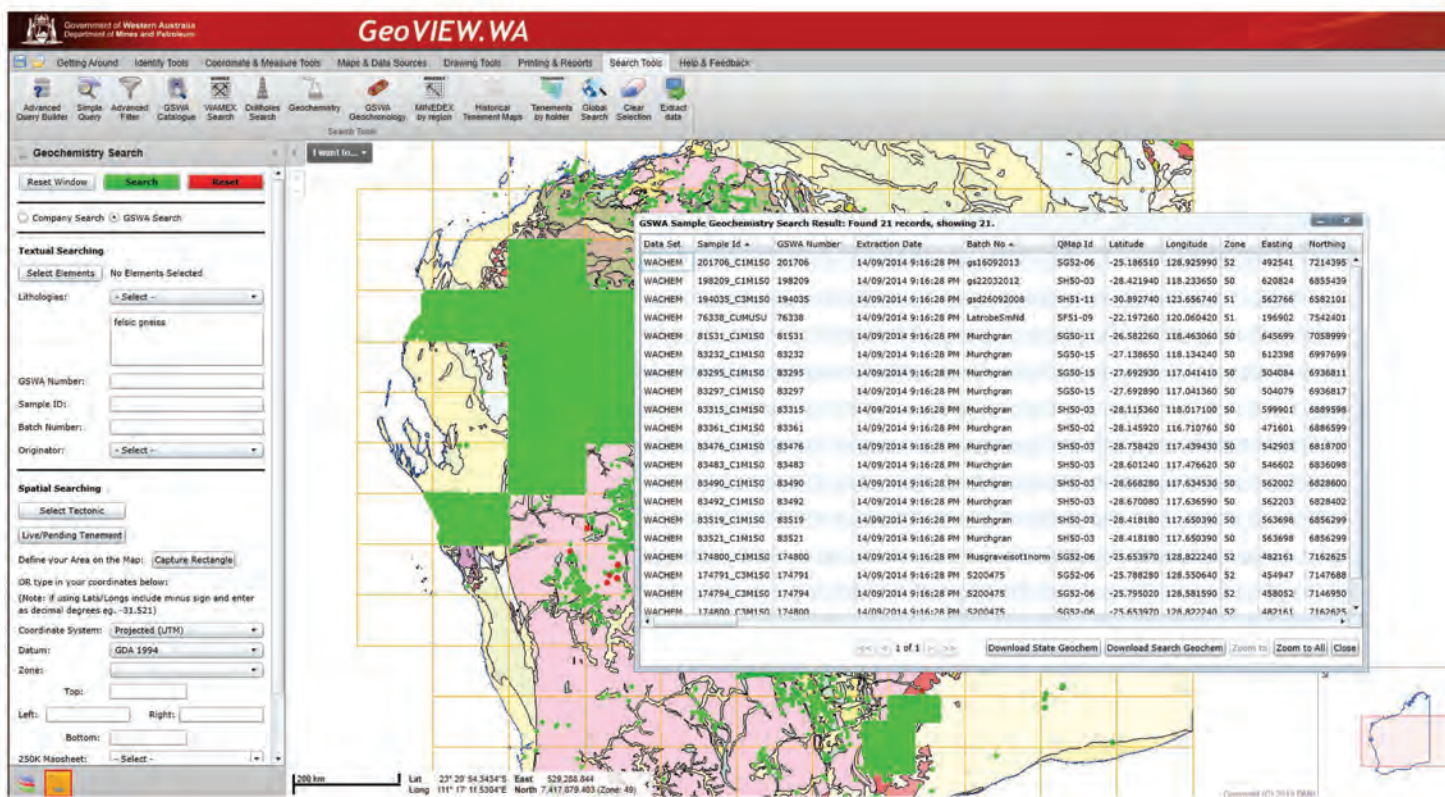


Figure 6a) State-wide coverage of geochemical data from GSWA's WACHEM database (page 8); b) Result of a textual search of WACHEM data (Fig 6a) according to lithology (felsic gneiss), resulting in 21 samples. These data can be downloaded as a .csv file.

the WAMEX database. The sample search results can be downloaded as a csv file.

Geochemistry according to lithology – textual searching

GeoVIEW.WA also allows textual searching of geochemical data, such as samples collected over certain bedrock lithologies. The state-wide coverage of GSWA geochemistry (Fig. 6a) can be refined according to lithology using a textual search (Fig. 6b). Here, the textual search option has been used to identify samples located in areas of felsic gneiss. Similar to other searches of GSWA geochemistry, the results of the search (21 records shown in Figure 6b) can be downloaded as digital data files.

The textual search option also allows further refinements (e.g. searching according to Sample ID, sample collector (Originator) etc.).

CONCLUSION

GeoVIEW.WA is a free, web-based software application that provides access to multiple data layers using a variety of textual and spatial search options, most of which are user-defined. Data can be downloaded as a series of reports, digital data files and maps. All datasets available through GeoVIEW.WA are dynamic, and refreshed daily.

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