NGinsight Dashboard – Draft User Guide

This draft version of the NGinsight Dashboard user guide provides a short description on how to operate the graphical user interface features that are coupled with informative natural gas and electric infrastructure data sources to elevate the operational situational awareness of the interdependent natural gas and electric power infrastructure systems. Originally developed as two independent tools, NGinsight Map displays publically available natural gas pipeline and generating plant layers and relates these features to important near-real-time gas nomination and notice information provided by NGinsight Reports. Now, these display and reporting capabilities are fully integrated into a single user interface designed to communicate relevant operational natural gas information that could potentially impact generating plant fuel adequacy and its operational status—all aimed to improve the resilience situational awareness of the integrated bulk electric and natural gas systems. The development of NGinsight is currently funded by the Department of Energy (DOE) Office of Electricity through its North American Energy Resilience Model program with funding dating back from sponsors within DOE's Infrastructure Security and Energy Restoration Division.

NGinsight provides an intuitive user interface driven directly by a relational database consisting of natural gas and electric data sources. NGinsight also provides access to tabular pipeline informational posting content provided by pipeline companies using either the Electronic Data Interchange (as defined by the NAESB EDI Standard) format, or web scraping, when those companies do not operate an EDI exchange. In addition to electric power plant information, NGinsight couples gas meter point data with those electric assets to provide a comprehensive view of electric and gas usage information. Currently, only 9 out of 103 pipeline, offshore, or storage companies represented currently require web scraping as preparations are completed to move toward EDI when offered by those entities.

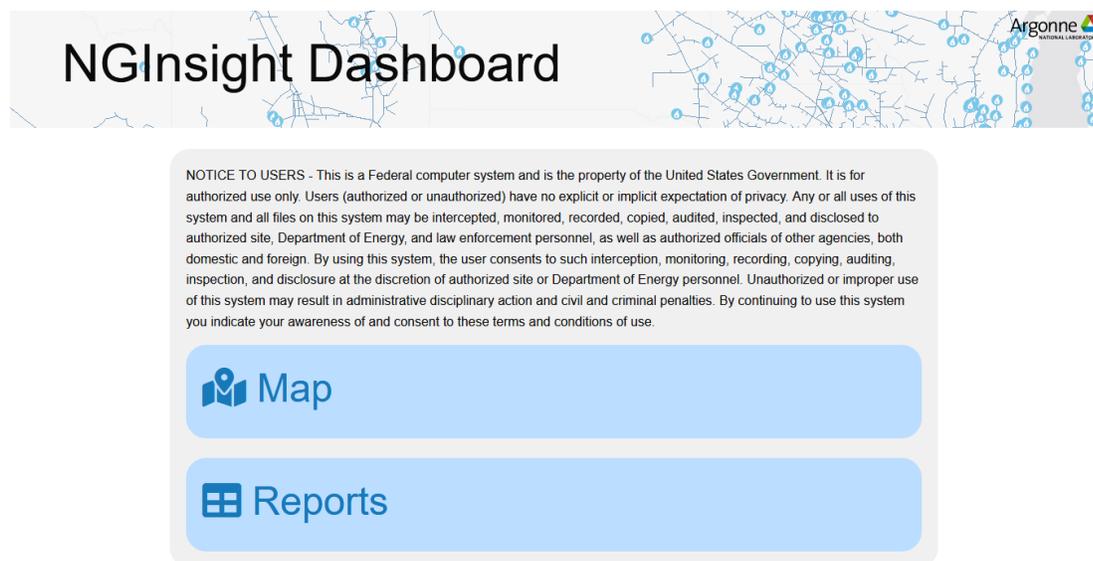Shown in Figure 1, NGinsight is accessed by following the address: https://ngdashboard.gss.anl.gov

Figure 1. Government Disclosure Statement and Access Menu to NGinsight Map and Reports

After selecting the address above using your browser (Firefox or Chrome preferred), Figure 1 shows the option to select either the mapping or reporting options of NGinsight. Select the Map button and a login form (Figure 2) will appear for you to enter your username and password. A similar login form appears if the Reports button is selected; however, the form background will look slightly different.
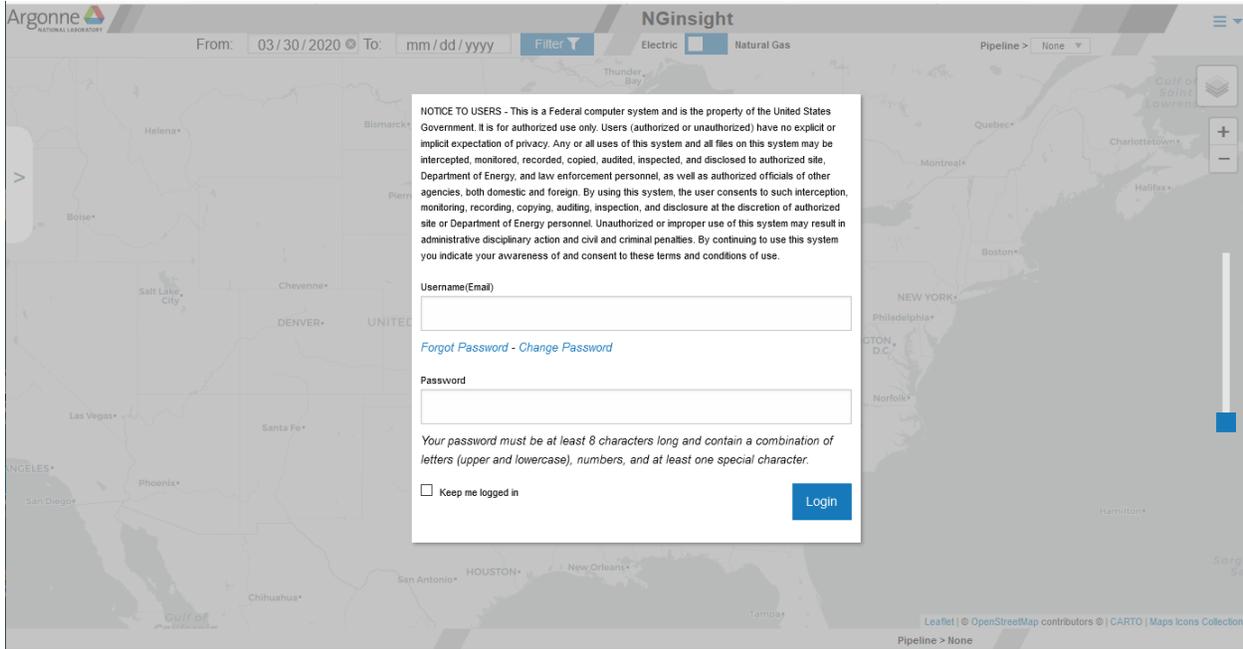

Figure 2. NGinsight Map Login Form

As a first-time user of NGinsight, you will need to do some additional steps to establish your new credentials. To begin this process, click the Forgot Password link as shown in Figure 3.
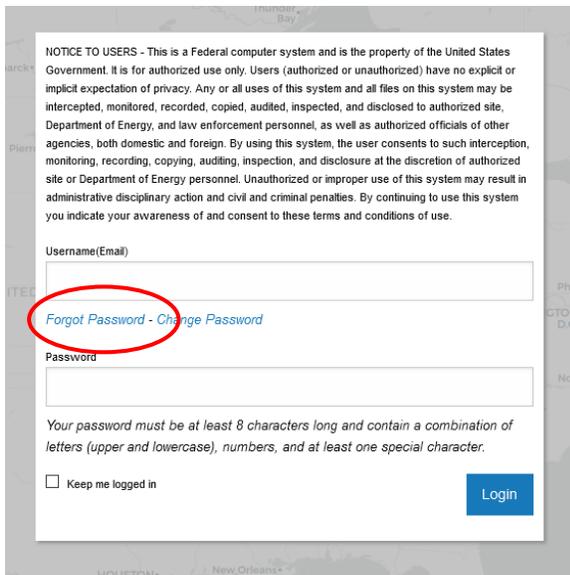

Figure 3. Forgot Password Link on Login Form

On the new form that pops up, enter your email address and click the Reset Password button. An email with a temporary password will be sent to your email account, and the text on the login form will update (Figure 3) to include new red and blue font text.

Figure 3. Updated Login Form with Change Your Password Link Shown in Blue

The email sent to your account states: "A temporary password has been assigned to your account. Please use the following password to change your password: *<temp password>.*" Once you have your temporary password, click the blue text (Figure 3), "change your password," which provides a link that opens another login form where you can enter your temporary password provided in the email and enter and confirm your new password (Figure 4).

Figure 4. Change Password Login Form

After you click the Change Password button, you will be logged into the system using your new credentials. You will also receive an email message indicating that "Your password has been changed!" If you encounter a problem where the login form shown in Figure 3 does not display, simply reenter the NGinsight web address to start a new session, click the Map button, and click Change Password when the main login form (Figure 2) appears. The Change Password login form will display, and allow you to complete the change password process described for Figure 4.

When you complete the login process for NGinsight Map, you will see a display similar to that shown in Figure 5. Several features of NGinsight are highlighted using red ellipses. These features are described below in a clockwise manner.
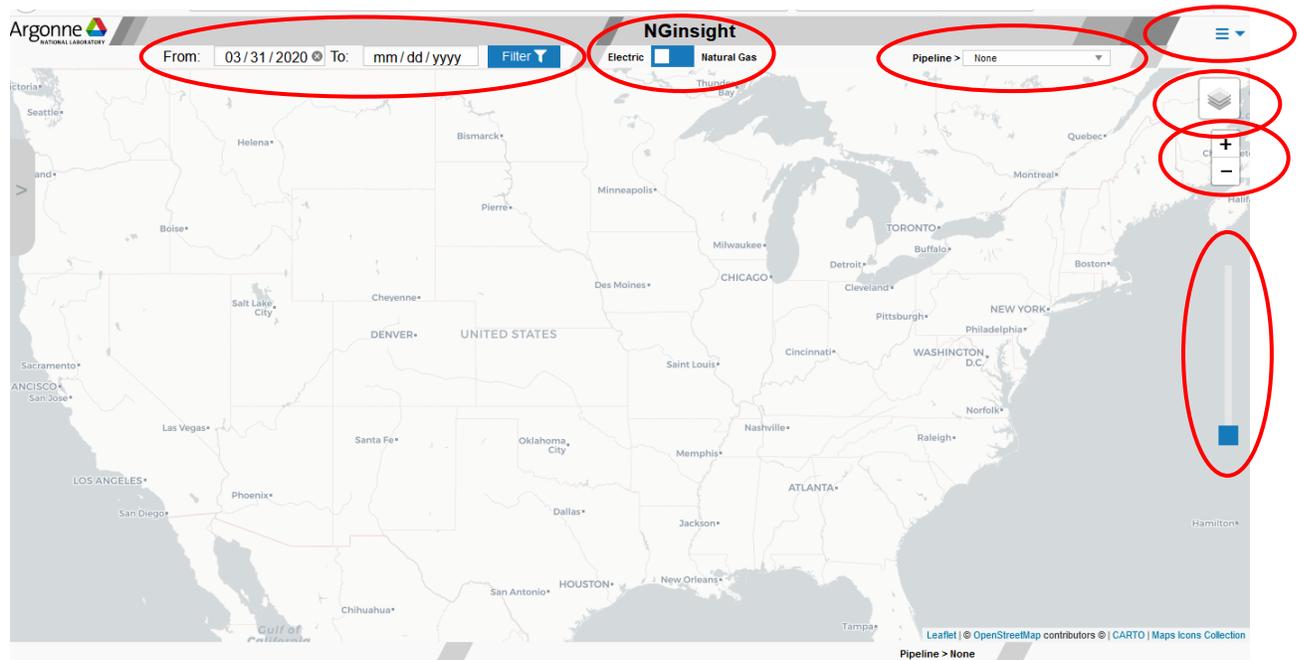
Figure 5. Initial Display after Logging into NGinsight Map

Key features identified in Figure 5 include:
- **Information Filter** – Shown toward the left-upper corner of the display, the information filter consists of a from date, to date, and Filter button to activate the specified date range. By default, a two-day sliding window is used to select the data that drives the NGinsight display. The default value is chosen because NGinsight is primarily intended to communicate the daily situational awareness found in natural gas nominations and pipeline notices. By adjusting the from/to dates and clicking the Filter button, you can also display historical data if you would like to explore system conditions of previous events of interest, for example.
- **Electric/Natural Gas Toggle** – When completed, this toggle switch will allow you to adjust the display to emphasize an electric perspective (i.e., display generating plant point layer) or a natural gas perspective that shows meter points and their corresponding data. Currently, the toggle is set to display electric generating plant information.
- **Pipeline Dropdown** – Select the pipeline of interest applicable to your region. While NGinsight contains pipeline information for more than 100 different entities, your user account is used to

select only pipelines that traverse your region to reduce clutter on the display. You can select "all" pipelines in your region or an individual pipeline to examine it in more detail.

- **Menu Dropdown** – The menu dropdown located in the far-right-upper corner allows you to Logout or Change Password.
- **Layers Symbol** – You can choose either a light or dark background layer, as you prefer.
- **Zoom Symbols** – Use "+" or "–" to zoom in or out, as needed. The mouse scroll wheel also facilitates this operation.
- **Slide Bar** – When set to its lowest position, all power plant points associated with the selected pipeline(s) are displayed. When set to its top position, no power plant points are displayed. For positions in between, the display is governed by the megawatt capacity of each power plant.

Figure 6 shows the NGinsight legend.
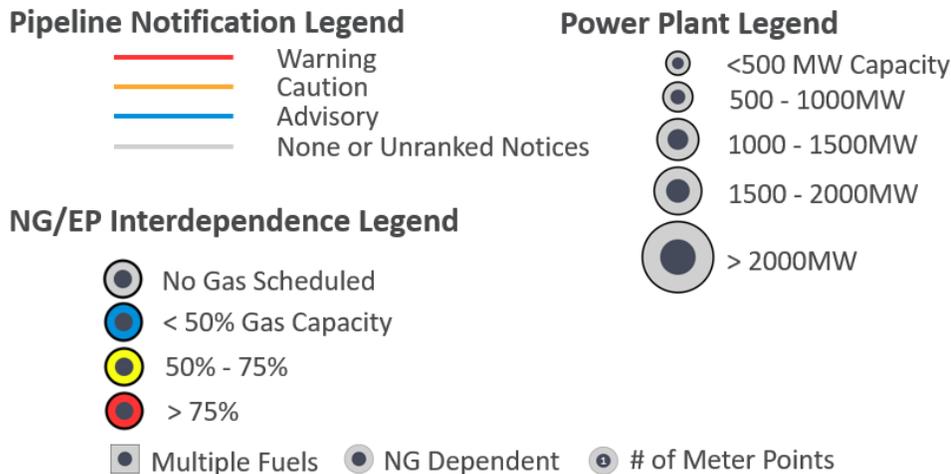
Figure 6. NGinsight Legends

Referring to Figure 6, several important legends are conveyed:

- **Pipeline Notification** – NGinsight actively categorizes real-time pipeline notices using a natural language processing, machine learning algorithm. The algorithm, and supporting process guided by subject matter experts, produces five severity ratings that are binned into four overall categories: severe, warning, advisory, and none. Pipeline notices that are collected hourly are examined and assigned to a group of notices that all share the same severity rating. Assuming that the Information Filter is set to its default two-day current setting, notices for each pipeline within that date range are screened for the highest severity and the appropriate color (i.e., red, orange, blue, or grey) is assigned to the pipeline display to direct your attention to pipelines with higher severity notices (i.e., those that are categorized as severe and shown as red). On the contrary, pipelines with no notices within the Information Filter data range are displayed as grey pipelines to detract your attention. Using NGinsight as a screening tool, the color scheme is designed to alert the user that additional investigation of a notice's content is required to

determine the extent, if any, of potential operational impacts in the region. A follow-up call with gas operations may also be useful in cases when operating within small margins or in the presence of other operational constraints. The pipeline layers used on the display are derived from the Energy Information Administration (EIA), because the information is publically available.

- **Power Plant** – Power plant icon size reflects the nameplate generator capacity. The power plant layer used on the display is derived from the EIA, because the information is publically available. Clicking on the power plant icon displays additional power plant data.
- **EP/NG Interdependencies** – This legend reflects information derived from electric power and natural gas data to characterize and inform the interdependency between the two systems. Each power plant is carefully mapped to a corresponding gas meter point, which is directly mapped to gas nomination data contained in collected Electronic Bulletin Board (EBB) EDI data.
  - **Icon Color** – The ratio of meter point nominated gas over its design capacity defines a value as a percentage to indicate the potential availability (or unavailability) of gas needed by its generator to ramp up, for example, to meet a new desired operating point. A generator coupled to a meter point that is very close to its design capacity is colored red, indicating that there may be insufficient gas to support additional generation at that power plant. Using NGinsight as a screening tool, the color scheme is designed to alert the user that additional investigation of a meter point's nomination data is required to determine the extent, if any, of potential operational impacts in the region. A follow-up call with gas operations may be warranted to gather additional information when operating margins are tight or when other constraints may limit operations.
  - **Icon Shape** – Two distinct shapes are assigned to generator icons based on a power plant units' fuel mix: square and circle. A circular shape indicates that all of the units at that specific power plant depend on natural gas, in one way or another, to operate. Those units may be dual fueled, but according to EIA data, natural gas is at least one of the fuels that supports the operation of that unit. A square icon, however, indicates that at least one of the units belonging to the power plant operates without natural gas. For example, a power plant with a unit that operates using only distillate fuel oil (perhaps diesel), would have a square icon shape to alert the user that there may be capacity independent of natural gas at that power plant. Again, NGinsight informs the user of possible units that could mitigate generation dispatch during a gas or electric operational constraining event.
  - **Number in Icon** – The number inside of the generating plant icon describes the number of meter points associated with that power plant. There may be a single or multiple meter points that supply gas to a power plant. Furthermore, NGinsight provides the pipeline owner of each meter point, thereby identifying power plants that may be connected to multiple pipelines. These various levels of information assist the user when reacting to pipeline supply curtailments and may initiate more detailed calls with gas operations.

This NGinsight Map overview should provide you with some basic operational background and allow you to explore the tool, until the document can be expanded with more specific use cases.

If you now logout of NGinsight Map, you can start a new session using the web address (https://ngdashboard.gss.anl.gov) to explore NGinsight Reports. After selecting the Reports button (Figure 1), a new login form (Figure 2) allows you to access the tabular reports information. The tabular information in NGinsight Reports can be viewed or exported to support integration into other tools.

After completing the login process, NGinsight provides a window containing a list of available pipelines and their transport service provider ID within your ISO. Although the tool provides access to more than 100 entities covering the interstate, intrastate, storage, and offshore segments of the natural gas industry, the pipeline list for ISO-NE is illustrated below in Figures 7 and 8.

Figure 7. Overview of NGinsight Pipeline Selection Form

Name	TSP ID
ALGONQUIN	006951446
ColumbiaGas	054748041
Dominion	116025180
GULFSTREAM	017738746
Iroquois	603955949
MARITIMES	081787256
PNGTS	159747872
TETCO	007932908
Texas Gas	115972101PROD
TGP	001939164
TRANSCO	007933021

Figure 8. Available Pipelines in ISO-NE Region

Also note the following symbols (Figure 9) that allow filtering and sorting of the content displayed on the form. These symbols denote the functionality, as applicable, to various form columns within NGinsight.
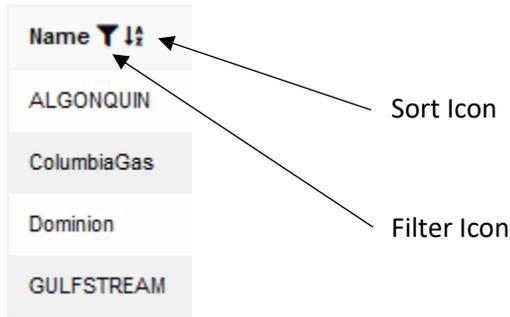
Figure 9. Available Filtering and Sorting Icons

In addition, the menu dropdown on the right supports the following user functions pertinent to your user account (Figure 10).
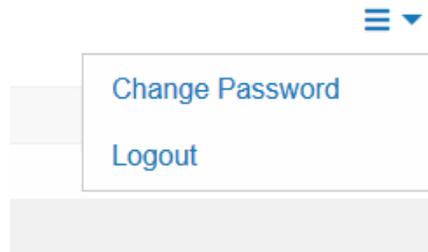
Figure 10. Available User Account Functions

Next, select a pipeline of interest to examine its corresponding data. For example, the following window (Figure 11) is displayed when Algonquin is selected from the pipeline list shown in Figure 7 or Figure 8.

Figure 11. Available Button Options to Display Pipeline Information

As shown in Figure 11, a secondary navigation mechanism is provided to assist the user with page navigation. In addition, the figure shows a set of blue buttons that provide access to the following capabilities and types of information extracted from the pipeline company's EBB via EDI exchange:

- **Back**

  Move back to previous page.

- **Locations**

  Provides a list of meter point locations served by the pipeline that includes the meter point name and meter point.

- **History**

  Provides a sliding 8-day (by default) history of meter point operational capacity information with the most recent data at the top of the list. This date range can be adjusted, as needed, to display the desired range of data. Be cautious of delays that could occur as the data is queried from the database.

- **Posting**

  Provides most-recent-posted meter point operational capacity information for all meter points.

- **Notices**

  Provides a sliding 8-day history of notices (e.g., critical and non-critical) for each pipeline. By default, current day notices are displayed at the top of the list.

Figure 12 shows a portion of the meter point operational capacity information sorted by meterpointID.

| Pipeline	Meterpoint	Entity	Effective Date	Posting Period	Cycle	Design Capacity	Operationally Available Capacity	Operating Capacity	Total Scheduled Quantity	Delivery Type	Quantity Type	All Data Available	Interruptible	Authorized Overun	Capacity Exceeded
ALGONQUIN	00001	MQ	2020-04-02 09:00:00	2020-04-02 10:15:00	TIM	18022	12022	18022	6000	D	DPQ	Y	null	null	null
ALGONQUIN	00002	MQ	2020-04-02 09:00:00	2020-04-02 10:15:00	TIM	235284	213634	235284	21650	D	DPQ	Y	null	null	null
ALGONQUIN	00003	MQ	2020-04-02 09:00:00	2020-04-02 10:15:00	TIM	342081	283182	342081	58899	D	DPQ	Y	null	null	null
ALGONQUIN	00004	MQ	2020-04-02 09:00:00	2020-04-02 10:15:00	TIM	157437	115366	157437	42071	D	DPQ	Y	null	null	null

Figure 12. Portion of Informational Posting Display for Algonquin Pipeline

Considering our focus on pipeline notices, once selected, a series of attributes are displayed for all recent notices given a default 8-day sliding history (Figure 13).

Figure 13. Notices Display for Algonquin Pipeline

By default, the most recent notices are displayed at the top of the list. This timeframe can be adjusted by using the from/to dates associated with the Filter button. Also note that for the "Subject" column (see Figure 14), there is an added capability to expand or collapse the details of the Subject by using the "+" and "-" symbols – either for the entire list of notices or for each individual notice.

Figure 14. Expand or Collapse Feature of Subject Content

The last column is provided to enter your User Rating for each notice. As the name implies, ratings determined by you are tagged to your user account. Others within your organization having an established account will be able to access all ISO-NE pipelines, for example, and select ratings that are tagged to their user name. Once assigned, User Ratings can be sorted by importance.

As you assign ratings, we are indicating notices with lesser importance as "1", ranging to notices with greatest importance as "5" (Figure 15). Adhering to this convention will greatly assist our automated methods now under development.

Figure 15. Available User Ratings

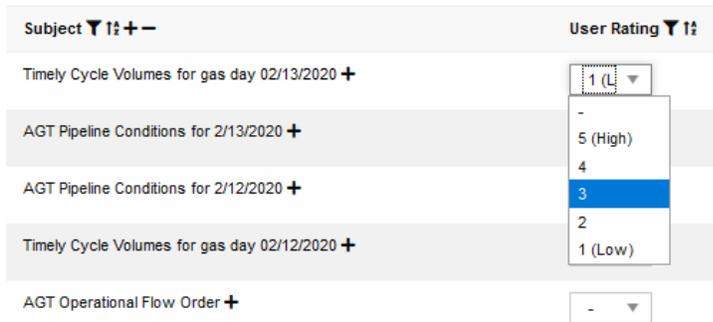The tool also provides the capability to download data in two forms: as a comma-delimited csv file or as a json file. These two options are provided to facilitate potential integration with other applications that may already be available to you.

The csv option exports a simple list of all rows as seen on the page. Expanded content is not displayed in the csv format. In contrast, a json file export provides a detailed dump of information displayed on the page and is described in more detail below.

In its simplest form, the following data is displayed for each notice in json format:

```
{
  "id": 441154,
  "Pipeline": "ALGONQUIN",
  "Notification ID": "93314",
  "Subject": "AGT Operational Flow Order",
  "User Rating": null,
  "Severity": 2,
  "Posting Period": "2020-02-06 07:23:00",
  "Is Critical": "Y",
  "_id": 441154
},
```

By examining a portion of the information above, one can see that Algonquin posted a critical AGT Operational Flow Order (Notification 93314) on February 6, 2020 at 07:23:00. Other attributes are also provided to support other functions.

It is important to note that the json option operates on all cached data ever displayed during the lifetime of the page. Consider the following discussion describing how this impacts the contents of an exported json file.

For a given pipeline, select Notices to display all notices within the 8-day sliding window. The information displayed on the page initializes the page cache. Now suppose you expand the subject of a single notice (using the individual expand option described in Figure 14), review the content, and later collapse that content. After displaying that data, the expanded information is added to the page cache even though it is not currently visible on the page. If you do a json export, you will see all notices listed in their simple form, as shown above, with the exception that the previously expanded notice now also contains all detailed notice information including all subject text.

```
{
  "id": 441139,
  "noticeid": 441154,
  "type": "OFO",
  "status": "1",
  "subject": "AGT Operational Flow Order",
  "text": "In order to maintain the operational integrity of the
system, Algonquin Gas Tra\nnsmission, LLC (AGT) is issuing an Operational
Flow Order (OFO) pursuant to Se\nction 26 of the General Terms and Conditions
of AGT's FERC Gas Tariff effectiv\ne 9:00 AM CCT, February 8, 2020, to all
parties, with the exception of those O\nperational Balancing Agreements
required by FERC regulations, on the AGT syste\nm.\n.\nThis OFO does not
affect the ability of AGT to receive or deliver quantities\nof gas for
scheduled nominations to any customer or pipeline.\n.\nDuring the
effectiveness of this OFO, all parties must be balanced such that\nactual
deliveries of gas out of the system must be equal to or less than sched\nuled
deliveries.  The penalty shall apply to each dekatherm of actual
delivery\nquantities that exceeds the greater of 4,000 Dth or 104% of
scheduled deliver\ny quantities.  The penalty will be equal to three times
the daily Platts Gas D\naily \"Daily Price Survey\" posting for the High
Common price for \"Algonquin, ci\nty-gates\" for the day on which such
violation occurred as indicated in AGT's G\neneral Terms and Conditions
Section 26.8.  In addition, AGT will not permit re\ntroactive nominations to
avoid an OFO penalty (except for primary firm no-noti\nce
nominations).\n.\nAGT may be required to issue an hourly OFO pursuant to
General Terms and Cond\nitions Section 26.7(d) to impose further restrictions
in order to maintain the\noperational integrity of the system.\n.\nAs
previously posted AGT, requests that customers/point operators on AGT be
a\nware of the impact non-ratable hourly takes from the system may have in
causin\ng delivery pressures reaching lower than desired levels.  As a
reminder, AGT's\nsystem is not designed to sustain delivery pressures above
contract levels wh\nile making non-ratable/accelerated deliveries above
scheduled quantities for m\nore than 6 consecutive hours, to be followed by
flows below scheduled quantity\nfor the balance of any 24 hour
period.\n.\nFurthermore, if customers/point operators don't manage hourly
takes from the\nsystem, 1) delivery pressures will be impacted and /or 2) AGT
may be required\nto impose further restrictions or courses of action in order
to maintain the o\nperational integrity of the system.\n.\nAGT may be
required to issue system specific and/or hourly OFO's pursuant to\nGeneral
Terms and Conditions Section 26.7(d) to impose further restrictions in\norder
to maintain the operational integrity of the system.\n.\nThis OFO will remain
in effect until further notice.\n.\nPlease contact your Operations Account
Representative should you have any que\nstions.\n."
}
```

Suppose you would like to create a json file that includes all subject content for all notices. To perform this operation, simply do an expand all, using the + symbol in the Subject column (Figure 14), and export the information. The resulting file will contain all content for all displayed notices without having to individually expand each notice record.

You can further specify the range of dates for displayed notices by using the from/to date filter provided.

For additional information using NGinsight please feel free to contact Jim Kavicky (kavicky@anl.gov) and Brian Craig (bcraig@anl.gov) via email. We will coordinate a response to address your needs.