oneBRIDGE

Flow Forward™

CIM™

User Guide 3.42

September 18, 2024

1. Introduction

Cognitive Integrity Management ("CIM") is an advanced integrity management end-to-end Software-as-a-Service ("SaaS") application for pipeline operators world-wide. It has comprehensive functionality to optimize and provide assessment planning and tracking, analyses of data integrity for regulatory compliance, dig management, real-time audit-readiness, instant business intelligence, and integration with other enterprise systems.This User Guide is designed to provide information on using CIM 3.40.

1.1   How to Access CIM

Each company will have their own instance of CIM and will be provided with their specific URL. From an internet browser, navigate to your company's specific website for accessing CIM.

1.2   Navigation

While logged in to the application, the main menu bar will be visible at the top of the screen which will allow you to navigate to the different areas as needed (depending on the user privileges). The following are options from the menu bar as shown in the figure below.
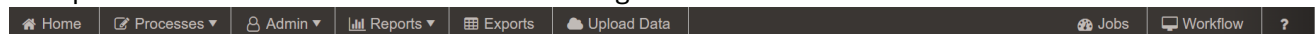
➢   Home
➢   Processes
➢   Assessment Planning
  •   Integrity Compliance
  •   Dig Management
  •   Threat Monitoring
➢   Admin
  •   Condition Management
  •   Data Management
  •   User Management
  •   System Management
➢   Reports
  •   Reports
  •   Growth Analysis
  •   Threat Detection
➢   Exports
➢   Upload Data
➢   Jobs
➢   Workflow
➢   Knowledge Base (? icon)

1.3   CIM Workflow

Once a pipeline system is created within CIM, an assessment can then be created for that pipeline system using the 4 stages located within Processes. There are several ways a *Pipeline System* can be created: through a separate OneBridge portal for uploading multiple pipeline systems (see separate User Guide) or one-by-one using Admin – System Management. Once a *Pipeline System* is created, an assessment can then be managed within CIM using the four Processes. Therefore, the sequence of work within CIM for managing an assessment is:

1. Create a pipeline system: systems can be created in 3 ways:
    a. The GIS sync will automatically create all the systems in CIM that are in a client's GIS (most common and best option).
    b. The user can create systems one-by-one in System Management.
    c. Users can use the Onboarding Tool to bulk load systems with a template.
2. Create an assessment in Assessment Planning
3. Analyze the assessment results in Integrity Compliance
4. Prepare the anomalies for evaluation in Dig Management
5. Provide repair information for those anomalies evaluated in Threat Monitoring

All other pages can be accessed at semi-random times i.e. Reports, Knowledge Base, etc.

1.4   Naming Convention

The first page that opens when clicking on that page is referred to as the home page. For example, the Assessment Planning (home page) is accessed by clicking on Processes – Assessment Planning.
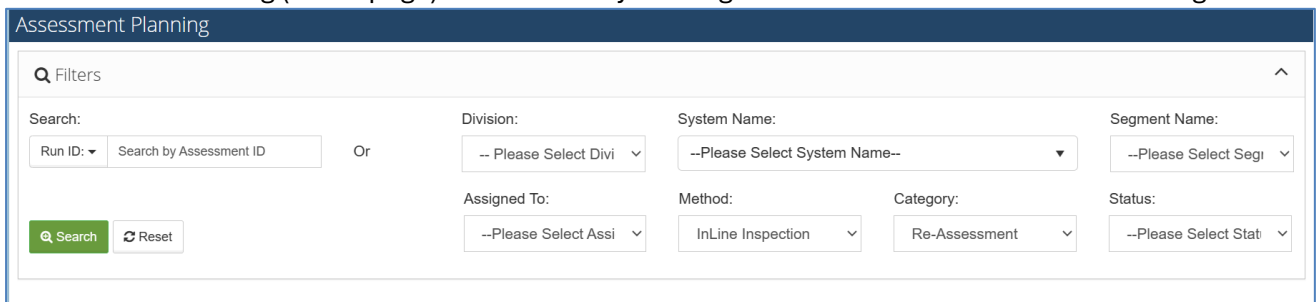
All other pages within Assessment Planning have a different title e.g. Assessment Planning (Create). *Assessment Planning – Filters* is the entire area shown under *Filters* in the above screenshot. *Assessment Planning – Assessments* refers to the grid shown at the bottom of the Assessment Planning (home page) as seen below.

1.5   Grid Settings and Features

Grids may contain the following features and settings allowing for customization by the user. These setting options are available by clicking the Grid Settings button at the top right corner of any grid. The following options are available within the menu:

- **Filters**: allows the user to filter individual columns within the table. When checked, a filter icon will be placed in the header of each column allowing the user to filter columns as needed.
- **Grouping**: allows the user to group the assessments by a column header by dragging the column header to the top where it says, "Drag a column header and drop it here to group by that column." For example, you could group all assessments by "Pipeline System." This setting is on by default.
- **Reordering**: allows the user to change the order that the columns appear by simply dragging the column header left or right. This setting is on by default.
- **Resizing**: allows the user to change the width of the columns. This setting is on by default.
- **Sorting**: applies a simple filter where columns are sorted alphabetically or numerically by clicking on the column header. An up or down arrow will be visible on the selected column showing the order that the data is sorted. Clicking the same header again will resort the data in the opposite direction. This is setting is on by default.
- **Hiding**: allows columns to be added or removed from the view. Three vertical dots appear in the column headings, and right clicking on "Columns" allows the User to toggle on or off which columns should be visible.
- **Saved Settings**: allows the user to perform the following tasks for the settings they have customized for the respective grid:
  - *Load*: when selected, loads the user's saved settings.
  - *Save*: when selected, saves the user's selected settings.
  - *Cancel*: when selected, resets the grid to the default settings
- **Pagination Bar**: located at the bottom left of applicable grids can be used per the following:
  - Return to the previous pages one (1) page at a time
  - Return to the first page
  - Verify the current page
  - Advance through available pages one (1) page at a time
  - Advance to the last page
  - Set the number of records desired per page using the drop-down

1.6   GIS Integration

Some fields are auto populated from a user's GIS. This requires a sync agent that transfers data from a GIS platform to CIM. If a field define the source as "GIS" or "GIS Integration," that field will not be populated if user does not have a GIS platform synced with CIM.

2. Definitions

2.1   General

Word(s) and Acronyms	Definition
Cluster	Two or more adjacent metal loss features (pits) in the pipe body or weld that may interact to weaken the pipeline more than either would individually.
Downstream	Refers to the direction of the pipeline in which the product is flowing.
GIS	Geographic Information System: a computer system that analyzes and displays geographically referenced information
ILI Service Provider / ILI Vendor	The company who provides the in-line inspection (ILI) system i.e. ILI tool, analysis and furnishes the report to the pipeline operator, which contains the results/data from the inspection in a written and tabular format.
Pipe joint	A continuous piece of pipe that was constructed as a whole unit in a pipe

	manufacturing facility. A typical pipe joint from the pipe mill will be 40 or 60 feet, with some variation
Pipe tally	Refers to the ILI data that is provided in a tabular format with rows and columns, typically provided in a Microsoft Excel (xlsx) or .csv file format. Used synonymously with ILI report, however ILI report can also refer to the associated document that describes the ILI results in a non-tabular fashion with graphs and charts, typically provided in pdf format. **The pipe tally is uploaded to CIM and read by the machine learning algorithm for data alignment and analysis.** The pdf report can be uploaded for storing in the platform only.
Pitting	Localized corrosion of a metal surface that is confined to small areas and takes the form of cavities called pits
Upstream	Refers to the opposite direction of the pipeline to which the product is flowing.

2.2 Module-Specific

Word(s)	Definition	Example or dropdown options, if applicable	Screen that word(s) first appears, in order of Work Flow	Source
Admin – System Management				
Active Indicator	**Active** indicates that the pipeline system or segment is in operation. **Inactive** indicates otherwise and **null** appears if status has not been denoted (only applies to some legacy segments.)	active, inactive, null	Home - Filters	Assigned by CIM - default as active when a new pipeline system is created.
(Pipeline) Division	A category by which pipeline systems are sometimes organized. The hierarchy is typically Division > System > Segment.	Central, East, West	(New System)	User input when a new pipeline system is created.
System Code	A pre-defined code from a user's GIS or an auto-assigned code from CIM	OBS1, OBS86	Home - Filters	If using a GIS sync to create systems, CIM will use a pre-defined System Code from a user 's GIS. If using System Management or Onboarding Tool to create Systems, CIM will auto assign a System Code using the prefix OBS (Ex. OBS1, OBS2). User can modify the System Code in Onboarding tool BUT only before

				any data is loaded.
(Pipeline) System Name	Name of pipeline system. The hierarchy is typically Division > System > Segment.	Betty White Gathering System	(New System)	User input when a new pipeline system is created.
Assessment Planning				
Assessment ID	Number assigned to each assessment	10445	Home - Filters	Assigned by CIM when a new assessment is created
Assessment Name	Name of the integrity assessment	2024 Care to Bear 16in UT-Crack	(Create) – Assessment Details	User input when creating a new assessment
Assigned To	The user who is assigned to manage the assessment within CIM	Betty White	(Edit) – Assessment Details	User input when editing an assessment
Begin Eng'r Station (ft)	Beginning of the inspection, specified in an Engineering Station number, a system of linear measurement commonly used by pipeline operators to denote pipeline locations.	0+00	Home - Assessments grid	GIS integration
(Assessment) Category	Describes whether the assessment is a Baseline[1], Integrity[2] or Reassessment[3]	Baseline, Integrity, Reassessment	(Create) – Assessment Details	User input when creating a new assessment
Checkout By	User who has the assessment in "edit mode."	bettywhite@onebridge-solutions.com	Home – Assessments grid	Auto populated by CIM.
Closure Date (referred to as "Team Closure" in (Edit)	If the assessment has been completed, the date of completion or closure.	11/03/2023	(Edit) – Assessment Dates – Team Closure	User input when editing an assessment.
Customer Assessment ID	An ID that caters to the user's internal specifications regarding assessment naming convention.		Home – Assessments grid	Special import. See Account Manager to use this field.
Deletion Date	The date an assessment is deleted, if applicable.	11/03/2023	Home – Assessments	(Irrelevant field now that assessments are

[1] Typically refers to the first assessment by which all subsequent assessments can be measured against. "Baseline" is used in US regulations when describing the first integrity assessment of a pipeline containing an HCA for both gas and liquid pipelines. The pipeline industry has largely adopted "Baseline Assessment" to describe the first assessment on pipelines.
[2] Any inspection that assesses integrity. Operators may use "Integrity assessment" instead of "Baseline" or "Reassessment" to describe an assessment on a pipeline that is not covered in their Integrity Management Program (IMP).
[3] An assessment that occurs after the baseline assessment to identify new anomalies or growth of previous anomalies.

			grid	"hard" deleted.")
Due Date	The date by which an assessment should be completed by, identified by the pipeline operator	11/03/2024	(Create) – Assessment Details	User input when creating an assessment
End Eng'r Station (ft)	The end of the inspection, specified in an Engineering Station number, a system of linear measurement commonly used by pipeline operators to denote pipeline locations.	9735+29.49	Home – Assessments grid	GIS integration
Execution End Date	The date on which the assessment was completed.	08/25/23	(Edit) – Planning tab	User input when editing an assessment
Execution Start Date	The date on which the assessment started.	08/20/23	(Edit) – Planning tab	User input when editing an assessment
HCA Length (mi)	The total linear length of High Consequence Areas that exist on the pipeline in miles.	0.5	Home – Assessments grid	GIS integration
Latest Report Date	The most recent report date – particularly useful when there are multiple reports received from vendor e.g. Rev 1, Rev 2, etc	11/03/23	Home – Assessments grid	Auto-populated by CIM.
Length (mi)	Length of the pipeline in miles.	43.2	Home – Assessments grid	GIS integration
Method	Type of integrity assessment method performed	ILI, hydrotest, CP survey, Direct Assessment	(Create) – Assessment Details	User input when creating an assessment
Pipeline Data	Data about the pipeline segment typically stored in a GIS system, describing location, construction, material, and consequence of the pipeline.	Route ID, station #s, HCA locations, etc.	(Edit) – Pipeline Data tab	GIS integration
Receipt Date	Date that the assessment report was received by the user from the vendor	02/14/24	(Edit) - Vendor Data – Add Vendor Report	User input when uploading a vendor report.
Regulatory Status	Open text field where user can describe the regulatory classification of the pipeline system.	Regulated transmission	Home – Assessments grid	GIS integration
Run ID	An auto-generated unique number assigned to every	150458	(Edit) - Vendor Data	Assigned by CIM.

	uploaded ILI pipe tally.		tab	
Run Length (mi)	Linear inspection length in miles	10.5	(Edit) - Planning tab	User input when editing an assessment.
Scheduled Run Date	The date for which the assessment is scheduled.	12/25/25	(Edit) - Planning tab	User input when editing an assessment.
Segment Name	The name of the assessable segment. For pipelines inspected with ILI, the naming convention is typically trap to launcher. The hierarchy is typically Division > System > Segment.	Teddy to Sunshine 20in	(Create) – Assessment Details	User input when creating an assessment
(Assessment) Status	**Future**: Assessment due date is in the future. **Active**: Assessment due date has passed but assessment is not closed. These are dependent on the "Closure Date" field. **Completed**: User has entered a closure date that is not in the future.	Future, Active, Completed	Home - Filters	Auto-populated by CIM, based on Assessment Date and Closure Date
Tool Technology	The technology type deployed on the in-line inspection tool.	Deformation, MFL, Inertial Mapping (IMU)	(Edit) – Assessment Details	User input when creating a new assessment.
(ILI) Tool Vendor	Name of the ILI service provider	NDT, TDW, Rosen, etc.	(Edit) – Planning tab	User input when editing an assessment.
Transmittal Date	Date that the assessment report is sent to the pipeline operator.		(Edit) – Vendor Data	User input when editing an assessment
(Report) Type	Denotes whether the report is Preliminary or Final.	Preliminary, Final	(Edit) - Vendor Data – Add Vendor Report	User input when uploading a new vendor report
Vendor Report ID	Name or ID of the assessment report that is specific to the vendor		(Edit) - Vendor Data – Add Vendor Report	User input when uploading a new vendor report
Integrity Compliance				
Analysis ID	An auto-generated unique number assigned to each analysis.	100000269	Home – Filters	Assigned by CIM
Analysis Method	Type of analysis to conduct in Integrity Compliance	ILI analysis, API 1163	Home – Filters	User selection when creating a new analysis
(Analysis) Status	**Waiting to Process**: After a new analysis has been created but before Process Analysis has	Waiting to Process Analysis, Processing	Home – Filters	Auto populated by CIM.

	been clicked. **Processing Analysis**: after Process Analysis has been clicked but before it has processed (usually < 15 mins). **Waiting for Approval Submission**: after an analysis has been processed but not submitted for approval. **Waiting for Approval(s)**: after an analysis has been submitted for approval but not approved. **Approved**: after an analysis has been approved.	Analysis, Waiting for Approval Submission, Waiting for Approval(s), Approved		
Discovery Date	The date that sufficient information is known about the anomaly to take action. See 49 CFR 195.452(h)(2) and 49 CFR 192.933(b) for reference	05/10/24	Home – Analysis grid	Auto-populated by CIM as the date the analysis was created
Tool Tolerance	Per API 1163, the tolerance describes the sizing accuracy of an ILI tool and characterizes how close the reported size (in terms of length, width and depth) of an anomaly will agree with actual depth. The sizing accuracy is reported with a tolerance (+/-10%t) and a certainty (80%).	+/- 10% t where t = wall thickness (although typically denoted as the percentage (10%) in CIM, it's assumed this is multiplied by the wall thickness.)	(Create) – General tab	User input when creating an analysis.

3. Admin

3.1   System Management

System Management is accessed under Admin and allows the user to search for assessable pipeline segments by using the following filters:

- **System Name** (open text)
- **System Code** (open text)
- **Division** (dropdown)
- **Active Indicator** (dropdown)

➢   Click +New at the middle right of the screen and filling in the 3 required fields shown below:

Once a pipeline system has been created, it's deemed active. The pipeline system itself can then be edited by clicking on the Edit button (pencil on paper icon) or deleted by clicking on the Delete button (trashcan icon.)

3.1.1   System Management (Edit System)

➢   Click Edit next to a pipeline system to toggle on and off the **Active** status of the pipeline to the right of the **System Name**.

The System Management (Edit System) page will also show when the pipeline system was created and by whom.

➢   Click +New on an individual pipeline segment to create a new pipeline segment within the pipeline system. This will open a new page - System Management (Segment Management).

3.1.2   System Management (Segment Management)

➢   Fill out the following required fields:

- **Name** (open text)
- **Type** (dropdown): piggable, unknown, hydro

➢ Click Save Segment at the bottom right.

System Management (Segment Management)

✚ Segment Details ⌃

Name: *

Code:

Type: *
-- Please Select Segment Type--

Active: ☑

Begin Latitude:

End Latitude:

Begin Girth Weld:

End Girth Weld:

Begin Longitude:

End Longitude:

Begin Elevation:

End Elevation:

| ▦ **Features** | ▦ GIS Routes | ▦ Master Joint |

Features **0**

✚ New ⚙

Drag a column header and drop it here to group by that column

Action	Type	Value	Route ID	Begin Measure (ft)	End Measure (ft)	Comment

---

3.2 Jobs

You can view the status of an upload or download of data on the Jobs page or in the notification center (bell icon).

To search the status of a job:
➢ Click on Jobs at the top right of the main menu bar.
➢ Filter by **Submitted By**, **Status** or **Process** to find the job.

Each job will have one of the following statuses:
- **In Progress**: the job is still processing.
- **Completed**: everything is complete.
- **Failed Job**: there's a problem that needs to be investigated.
- **Validation Error**: an error has occurred.

3.2.1 Jobs – Export / Download Files

If waiting to download a template or report, filter for *All* under your name for **Submitted By**. If the job is complete, click the Information button ("i" icon). Then in the top left under Job Processing Details and Summary, click File(s) to download the file.

Job Processing Details

Summary

File(s)

General Information

Job:	**Process:**
Dig Plan Package Export	Dig Report Zip Load

Submitted By:	**Submitted On:**	**Module:**
sbaucom@onebridgesolutions.com	06/11/2024 12:34:22 PM	PT-FDSE
Status:		
Completed		

✖ Close

Job Processing Details

Summary

File(s)

File(s) 1

File
sbaucom@onebridgesolutions.com/OBS3_Newport to Laguna Dig Plan_35.zip

|◀ ◀ | 1 ▾ | ▶ ▶| |

✖ Close

4. Home

CIM automatically opens on Dashboard – Vendor Performance. This is referred to as the CIM home page. There are two tabs available on the CIM home page,

4.1   Dashboard - Vendor Performance

The Dashboard – Vendor Performance page provides tables and graphs which show:

- Completed assessments and total # of features identified.
- Assessments by vendor type
- Assessments by technology
- Assessments by status of acceptance
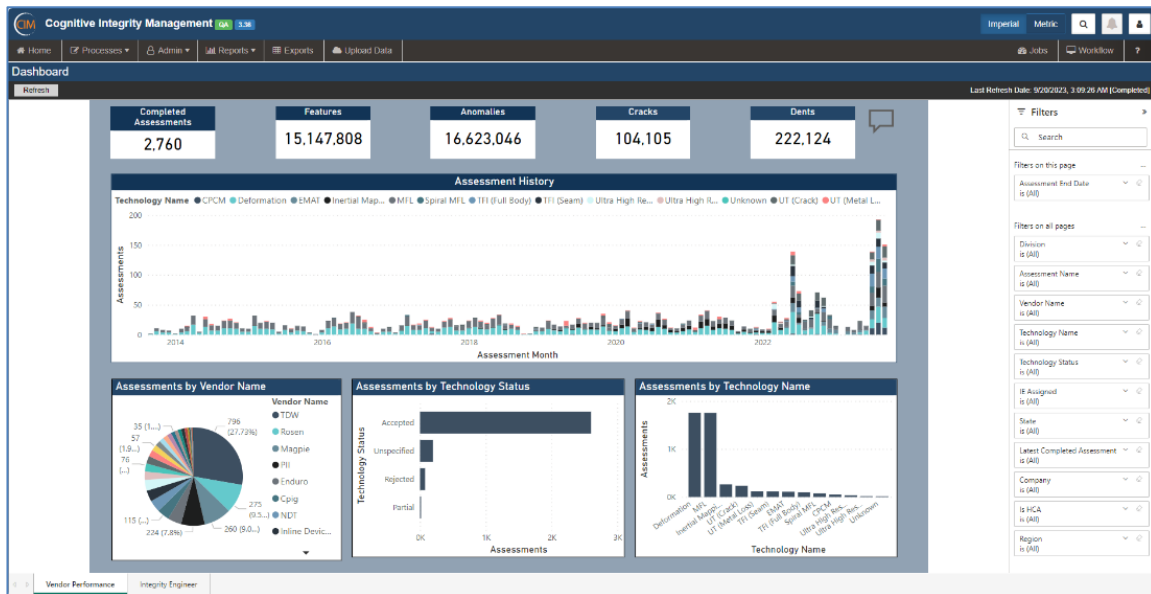
4.2   Q&A Functionality

The Q&A Functionality is accessed by clicking the call-out ballon at the top right side of the Vendor Performance tab, which allows users to query the database. The following figure shows an outcome of running a query for "which states have the most topside dents as a map."
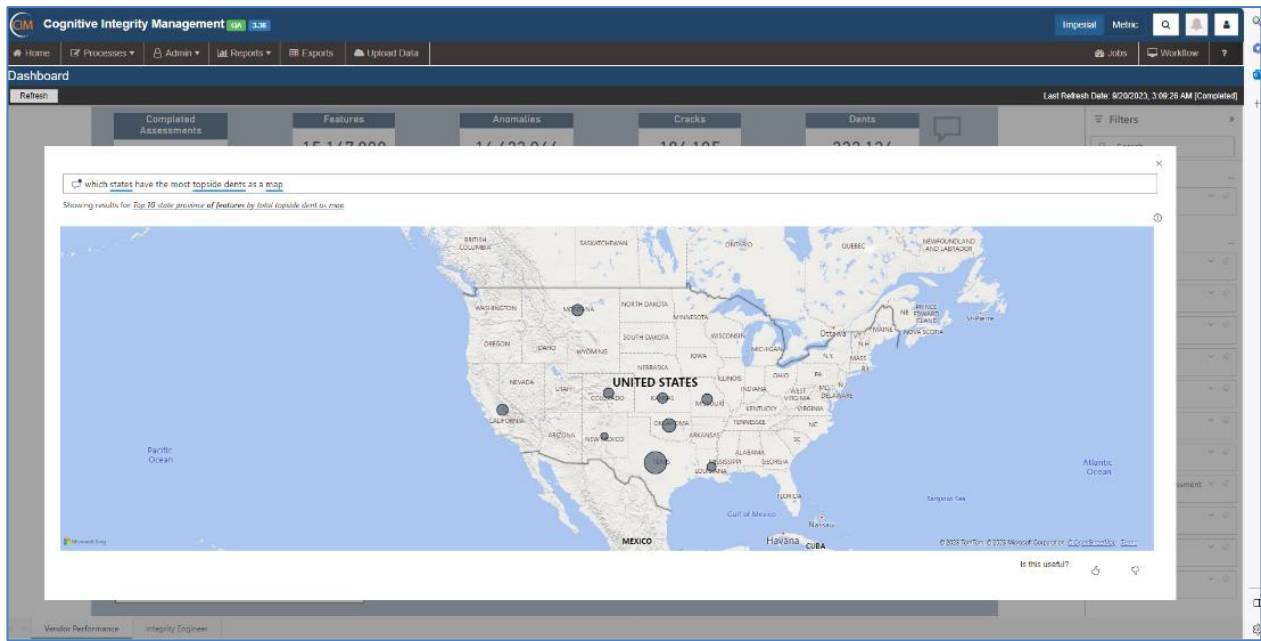
4.3 Dashboard – Integrity Engineer

The Dashboard – Integrity Engineer page provides various tables which summarize:

- Assessments scheduled and overdue by selected year
- Summary of assessments due and what month in the year
- Shortcut to "My Favorite Reports"
- A query for upcoming assessments
- Listing of scheduled assessments

5. Processes

In the top left corner of CIM is the <u>Processes</u> mega menu which reveals 4 dropdowns that take you through the integrity assessment lifecycle.
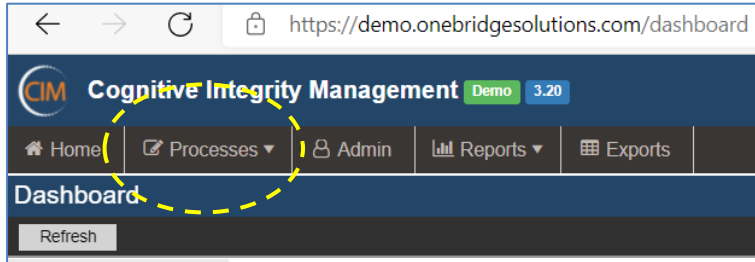
5.1   Assessment Planning

Manage the integrity assessment lifecycle on a given pipeline system. Although CIM is currently focused on inline inspections (ILI), pressure tests, direct assessments, and cathodic protection (CP) surveys can also be managed here.

5.2   Integrity Compliance

Review and analyze integrity assessment results that were uploaded in <u>Assessment Planning</u>. Here the user can select anomalies for further action i.e. repaired or monitored. These anomalies are referred to as "actionable anomalies."

5.3   Dig Management

Manage anomalies that were selected for repair in <u>Integrity Compliance</u> by organizing them into digs, either manually or using a smart dig function. Here documents to be used internally or externally for mitigating said anomalies can be generated e.g. dig sheets. Additionally, data from the inspection and/or repair of said anomalies can be uploaded to help quantify the performance of the ILI system.

5.4   Threat Monitoring

Closes the integrity assessment cycle by tracking actionable anomalies. Repair data can also be uploaded to individual anomalies here.

6. Assessment Planning

6.1 Workflow

Users can create a new assessment or view/edit an existing assessment. Typically, a user will create a new assessment by working in Assessment Planning (Create) and once the minimum information is populated, it is saved and created. Once this happens, the user will be automatically taken to Assessment Planning (Edit).

The minimum steps for creating and editing an assessment are:

➢ Navigate to Processes
➢ Click Assessment Planning
➢ Click +New in the Assessments grid; this will take you to Assessment Planning (Create)
➢ Enter the required data: **System Name**, **Segment, Name, Method, Category**: Baseline, Integrity, or Reassessment, **Due Date, Begin Eng'r Station, Tool Technology** (required for inline inspections).
➢ Click Save; this will take you to Assessment Planning (Edit)
➢ Go to Assessment Planning (Edit) - Planning tab.
➢ Enter the required data: End Execution Date
➢ Click Save
➢ Go to Assessment Planning (Edit) - Execution tab.
➢ Select *Accepted* for Results Status
➢ Go to the Assessment Planning (Edit) - Vendor Data tab.
➢ Click +New
➢ Enter the required data: (report) **type, tool technology**, (report) **name, receipt date** and **system of measure**.
➢ In the *Vendor Report* grid, select the Upload Vendor Report button and upload the assessment report in spreadsheet format.

Once the report has been ingested, an analysis can be created (provided there are no validation errors.) The following sections will explain the process for creating and editing an assessment in more detail.

6.2 Assessment Planning (Home)

The Assessment Planning page lists all assessments either scheduled or performed in the operator's pipeline system.

6.2.1 Assessment Planning (Home) - Filters

Users can find a pre-existing assessment by filtering on the following categories:

- **Assessment ID or Run ID** (open text)
- **Division** (dropdown)
- **System Name** (dropdown)
- **Segment Name** (dropdown)
- **Assigned To** (dropdown)
- **Method** (dropdown)
- **Category** (dropdown)
- **Status** (dropdown)

6.2.2 Assessment Planning (Home) - Assessments

The *Assessments* grid lists each assessment that has been created in CIM with each row denoting a different assessment. The following columns are available for each of the assessments. (Columns are listed alphabetically here and may appear in a different order depending on your settings.)

Action: allows the user take the following actions with each assessment, depending on their status.
- View button (eye icon) opens Assessment Planning (View) provides a read-only view of the assessment.
- Checkout button (page icon): makes the assessment available for editing. This is to ensure that only one user is working on an assessment at a time. If this icon is not available, the user may not have permission to edit the assessment, or it may be checked out to another user.
- Edit button (pencil on paper icon): opens Assessment Planning (Edit) and allows the user to edit the assessment. This button will become available once the Checkout button is clicked.
- Check in or Undo Checkout button (circle arrow icon): this allows other users to edit the assessment, if needed. (An administrator can check in any assessment.)
- Create Follow-up button (two pages icon): allows the user to make a copy of the assessment. This function is typically used for reassessments.

The Settings button (gear icon) on the top right side of the table allows the users to customize the layout of the table. See Grid Settings and Features.

See Definitions for a description of the following column headers.
- Assessment ID
- Assessment Name
- Assigned To
- Begin Eng'r Station
- Category
- Checkout By
- Closure Date
- Customer Assessment ID

- Deletion Date
- Due Date
- End Eng'r Station
- Execution End Date
- HCA Length
- Latest Report Date
- Length
- Method
- Regulatory Status
- Reports Loaded
- System Code
- System Name
- Segment Name
- Status
- Tool Technology
- Tool Vendor

6.3   Assessment Planning (Create)

➢ Click +New to add a new assessment at the top right of the *Assessments* grid. This will open a new page called Assessment Planning (Create)

6.3.1   Assessment Planning (Create) – Assessment Details

All fields in this box are required:

- **System Name** (dropdown)
- **Segment Name** (dropdown)
- **Name of Assessment** (open text)
- **Method** (dropdown)
- **Category** (dropdown)
- **Due Date**: (open text or calendar) – When entering historical assessments where the due date is in the past, a pop-up will appear to ensure the user has entered the correct date. This is not a validation error, and the user will be able to save the assessment.

6.3.2   Assessment Planning (Create) – Assessment Summary

The Begin and End Engineering Station numbers can only be edited if pipeline data from the user's GIS has been integrated into CIM. Once the engineering station numbers are entered, the length, HCA length and diameter will automatically populate.

6.3.3   Assessment Planning (Create) – Pipeline Data

The *Pipeline Data* grid appears at the bottom of this page. This table only displays pipeline data if the user has integrated their GIS system with CIM. The data in this table cannot be edited.

➢ Click Save to be taken to the Assessment Planning (Edit) page.

➢ Alternatively, click Save & New to simultaneously save the assessment that was just created, and create a new assessment, which will open a new Assessment Planning (Create) page. This saves the step of saving the assessment, navigating back to the Assessment Planning Home page and clicking +New to create a new assessment.

6.4   Create Follow-up Assessment

A second way to create a new assessment is to create a follow-up assessment. To do this,
➢ Navigate to the last assessment or assessment you'd like to copy
➢ Click Create Followup
➢ Populate the **Assessment Name**, (Assessment) **Method**, and **Due Date**
➢ If the copied assessment is an inline inspection, populate the **ILI Technology**.

➢ Click Save

This new assessment will then show up in the Assessments grid. You will need to Checkout the assessment to edit the assessment.

6.5 Edit an Assessment - Assessment Planning (Edit)

The assessment details can be viewed and edited using the following boxes and tabs. See Definitions for descriptions of these fields.

6.5.1 Assessment Planning (Edit) – Assessment Detail
- **Segment:** (not editable)
- Assessment **Name:** (open text)
- **Method:** (not editable)
- **Tool Technology:** (dropdown)
- **Re-Run #:** (not editable)
- **Flow Direction:** (not editable)
- **Begin Eng'r Station (ft)** (not editable)
- **End Eng'r Station (ft)** (not editable)
- **Assigned To:** (dropdown)

6.5.2 Assessment Planning (Edit) – Assessment Summary
These fields are automatically populated from GIS and are not editable.
- **Length (ft)**
- **Length (mi)**
- **HCA Length (mi)**
- **Diameter(s) (in)**

6.5.3 Assessment Planning (Edit) – Management of Change
- **MOC Number:** (open text)
- **MOC Start Date:** (open text, calendar)
- **MOC End Date:** (open text, calendar)

6.5.4 Assessment Planning (Edit) – Assessment Dates
- **Due** (open text, calendar)

- **Execution Start** (editable in Planning tab)
- **Execution End** (editable in Planning tab)
- **Integrity Review** (open text, calendar)
- **Team Closure** (open text, calendar)

6.5.5 Assessment Planning (Edit) - Pipeline Data tab

This tab shows pipeline data that is sourced and ingested from the user's GIS.

6.5.6 Assessment Planning (Edit) - Planning tab

The *Planning/Execution Information* table provides the list of tool runs for this assessment. A combination tool run will be listed as one run. If technologies were added in *Assessment Detail* after the assessment was created, the tool technology that was added after will be listed separately.

For the Merge and Split buttons to appear, the Execution Dates must be blank.

Merging Technologies
You can merge technologies by using the Merge arrows. In the example below, Deformation and MFL are together, but IMU is separate.

If you want to combine them because all 3 technologies were run at the same time:
➢ Click on the arrow button in the **Merge** column of the technology you'd like to merge. (If there are only two rows, you can click on either arrow.)
➢ Select the technology or technologies you'd like to merge.
➢ Click Merge in the **Merge ILI Tool Technologies** box.

In the example below, the Merge arrow was selected on "Deformation, MFL" and therefore the IMU technology was the only technology available for merging to the Deformation and MFL in the **Merge ILI Tool Technologies** box.

Split Technologies

To split technologies, follow a similar process as merging.

➢ Click on the arrow button in the **Split** column.

➢ Select the technology you'd like to Split. It will then move from **Available** to **Assigned**.

➢ Click Split in the **Split ILI Tool Technologies** box.
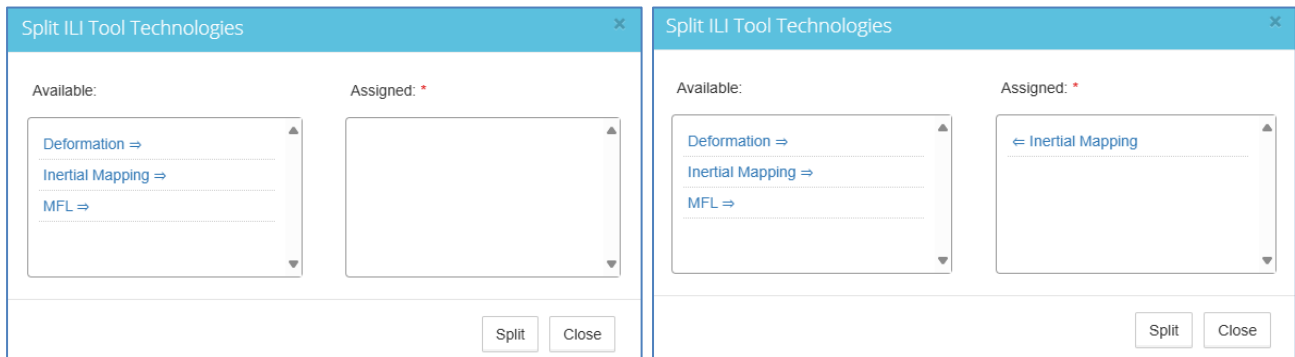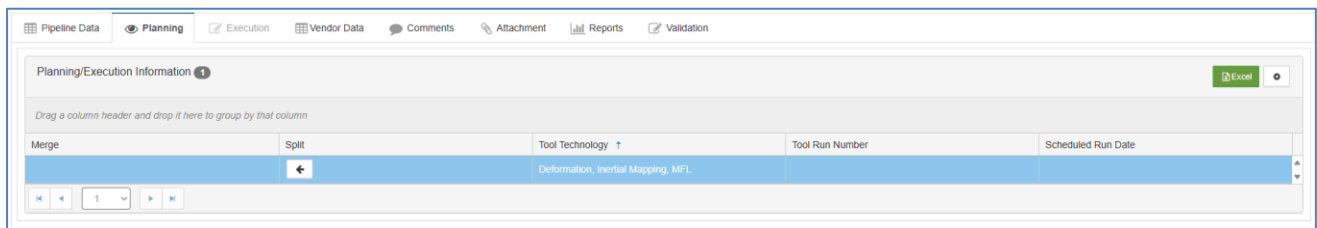
This is helpful if the user has since discovered after planning that a deformation tool needs to be run separately. This is quite common for first time inline inspections or if the gauging or plate pig indicated obstructions in the line that may prevent a large combination ILI from successfully running in the pipeline. In this instance, the deformation run would happen at a sooner date than the MFL.

The user may also need to split out a technology if a technology fails and a rerun of the failed technology will happen at a later date.

Assessment Planning Details can be input on this page (*Required Fields).
Planning and Scheduling
- **Scheduled Run Date**: (open text or calendar)

- **Work Order Number** (open text)

Planning Year
- **Planning Year** (open text)
- **Planning User** (click the person icon to auto-populate the user creating the assessment)

Execution Dates
- **Start Date** (open text or calendar)
- ***End Date**: (open text or calendar)

Field Planning and Scheduling:
- **Launcher and Receiver Site Name** (open text)
- **Launcher and Receiver State/Province** (dropdown)
- **Date Pipeline Questionnaire Issued** (open text or calendar) refers to the date that the pipeline questionnaire was sent to the field for completion.
- **Date Pipeline Questionnaire Received** (open text or calendar) refers to the date that the pipeline questionnaire was completed and sent back to the integrity personnel managing the inspection.
- **Estimated Run Date** (open text or calendar)

Vendor Planning and Scheduling
- **Vendor Name** (dropdown)
- **Decontamination Required** (checkbox)
- **Decontamination Vendor** (dropdown)
- **Reference #** (open text)
- **Run Length (mi)** (open text)
- **Decontamination Work Order**: appears conditionally (open text)
- **Date Pipeline Questionnaire Issued**
- **Estimated Run Date**

6.5.7 Assessment Planning (Edit) - Execution tab (accept or reject)

Once the planning tab is complete, the ability to accept or reject the assessment on the <u>Execution</u> tab becomes available. In this section, the user can assign a result status (Accept, Reject, Partial) for each tool technology as well as select which of the tools is the controlling technology. The *Assessment Planning Results* grid shows a listing of each tool run. Clicking on any of the records in this grid refreshes the **Tool Technology Results** sections underneath the grid to show data specific to the highlighted run. Each inspection can be accepted or rejected one at a time.

How to accept or reject an ILI:
➢ Highlight the tool run in the *Assessment Planning Results* grid
➢ Enter *Accepted* or *Rejected* for the Result Status in *Tool Technology Results*.
➢ Click <u>Save</u>.

To re-run an ILI:
➢ Highlight the rejected tool in the *Assessment Planning Results* grid and click <u>Rerun</u> at the top right of the grid.
➢ Click <u>Yes</u> to confirm the re-run.

The *Accepted/Rejected Segments table* summarizes the segments and corresponding inspection results that have been accepted or rejected.

6.5.8   Assessment Planning (Edit) - Accept or Reject a Partial Segment

➢ Highlight the tool run from the Assessment Planning Results grid
➢ Select *Partial* for the Result Status in the *Tool Technology Results* section – this will make the *For Partial Status* section available.
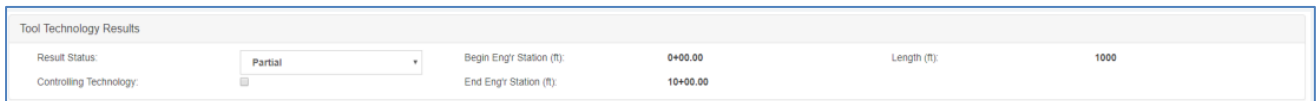
➢ Enter the partial results in the *For Partial Status – Enter Accepted/Rejected Segments* section. Each linear segment will require the **Segment Status**, **Begin Eng'r Station**, **End Eng'r Station**, and **Tool Technology**.
➢ Click Edit on Begin Eng'r Station (ft)
➢ Enter the Begin Engineering Station #
➢ Enter the End Engineering Station #
➢ Click Save
➢ Click Add Segment to add the new segment to the Accepted/Rejected Segments grid below.
➢ Repeat until all partial segments have been entered.

Note: Denoting a rejected segment is for administrative purposes only; CIM will still analyze all data provided in the uploaded pipe tally.

6.5.9   Assessment Planning (Edit) – Upload Vendor Report

➢ Click +New to upload a new assessment as seen in the screenshot below.
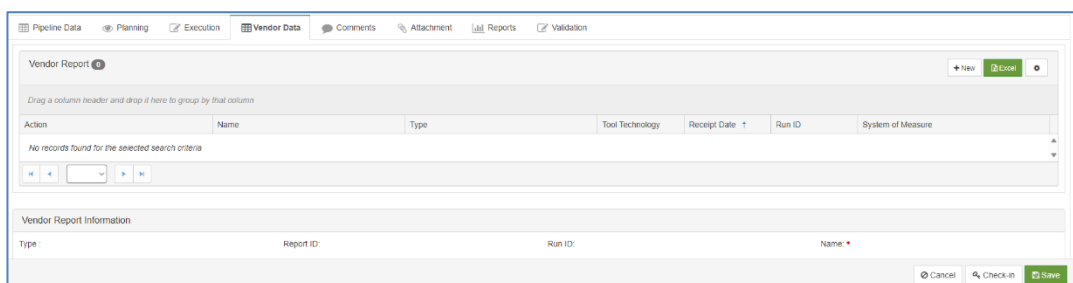
The following fields are to be filled out for a new report (*Required fields):

- *(Report) **Type**: Preliminary, Final (dropdown)
- ***Tool Technology** e.g. IMU, Deformation, MFL (dropdown)
- ***Name** (open text)
- **Description**: descriptor comments regarding the report that user would like to add (open text)
- **Vendor Report ID** (open text)
- ***Receipt Date** (open text, calendar)
- ***System of Measure**: the measurement system that the vendor report utilized (imperial, metric)

➢ Click Save to return to the Assessment Planning (Edit) screen.

The assessment report's name will appear in the *Vendor Report* grid.

➢ Upload the ILI pipe tally by clicking Upload Vendor Report (Up arrow) under the **Action** column header.

The upload may take several minutes, depending on the size of the file. CIM automatically aligns the ILI report to any historical ILI reports in the selected system as well as any GIS data. You can click on Jobs at the top right of the CIM dashboard to see the status of the ingestion process.

The *Validation* tab can be used to check for any errors that may have occurred during the upload process.

Once the vendor report is uploaded, the Upload button changes to a down arrow to indicate a Download button, so later users can review the inspection results. This table lists all vendor data that has been uploaded for this pipeline assessment.

The *Vendor Report Information table* shows the following fields. All fields in this table are editable except for Run ID and System of Measure.

- (Report) **Type** (dropdown)
- (Vendor) **Report ID** (open text)
- **Run ID** (not editable)
- (Report) **Name** (open text)
- **Receipt Date** (open text, calendar)
- **Transmittal 1 Date** (open text, calendar)

- **Original Transmittal 1 Date** (not editable)
- **Transmittal 2 Date** (open text, calendar)
- **Original Transmittal 2 Date** (not editable)
- **System of Measure** (not editable)
- **Tool Technology** (can delete technologies but not add)
- **Description** (open text)
- **Linked Assessment Information** (not editable)

6.5.10 Assessment Planning (Edit) – Comments tab

➢ Add comments by clicking Select Comment Type and then inputting comments.

This allows users to not only maintain notes regarding the assessment, but also use it as a collaboration tool by sending a notification to other users when a comment is entered. Comment types are typically company-specific and are therefore not defined here.

6.5.11 Assessment Planning (Edit) – Attachment tab

➢ Add supporting files for the assessment e.g. the vendor report that's typically provided in pdf format by clicking +New and navigating to the desire file, similar to how one would attach a file to an email.

6.5.12 Assessment Planning (Edit) – Reports

This tab shows a list of several reports that may be helpful when performing an initial review or pre-analysis of the assessment data that was uploaded in Vendor Data. See the Reports Description document for more information regarding available reports. The following have proved particularly useful for users in this pre-analysis stage:

- Assessment Summary
- Pipe Properties – GIS vs Vendor
- Unity Plots (Historical)
- Weld Alignment

6.5.13 Assessment Planning (Edit) - Validation

This tab helps the user view any validation error that requires attention before an analysis is created. For example, if the execution dates are not entered in the *Planning* tab, a validation error will appear.

6.5.14 Check-In assessment

➢ Click Check-in at the bottom right of the screen to save and "check-in" the assessment.

6.6 Creating a Default Analysis

Users can create an analysis from Assessment Planning by navigating to the *Vendor Data* tab of Assessment Planning (Edit), and clicking on the Create Default Analysis button (3 gears icon) in the **Action** column of the *Vendor Report* grid. This will create an analysis using the Default Analysis: (01) U.S. Liquid (CFR 195).

Action	Name	Type	Tool Technology	Receipt Date ↑	Run ID	System of Measure	Related Analysis Count
⬇ ⚙	2023 Violet to T...	Final	Deformation, Inerti...	04/02/2024	150458	Imperial	1

6.7   Assessment Planning (View)

➢ Click <u>View</u> (eye icon) which will take you to <u>Assessment Planning (View)</u>, to view any assessment. The same tabs that are available in <u>Assessment Planning (Edit)</u> will be shown without editing capability.

7. Integrity Compliance

The Integrity Compliance process analyzes the assessment results uploaded in Assessment Planning, informs the user on how the assessment results compare to required mitigation conditions per pre-defined regulatory or company criteria. Anomalies are identified per various conditions and can also be added at the user's discretion. The product of this process will be a list of anomalies selected for some type of action. Theoretically an unlimited number of analyses can be conducted on one assessment report.

7.1   Workflow

On the Integrity Compliance home page, users can search for an analysis, similar to how a user can search for an assessment. The analyses are also displayed in grid. at the bottom of the home page. Users can create a new analysis or view/edit an analysis that's already been created.

The minimum steps for creating and editing an analysis are:
➢ Navigate to Processes
➢ Click Integrity Compliance
➢ Click +New at top right of the *Analysis* grid – this will take you to Integrity Compliance (New)
➢ Enter the required data: **System Name**, **Name, Analysis Type**, **Assessment, Vendor Report** (to be analyzed)
➢ On the General tab, select the required data: **Default Analysis, Tool Tolerance, Tool Tolerance Applied To, Operating Pressure** (source), **Corrosion or SCC Growth Rate, Crack Growth Rate**, and **Growth Method**.
➢ Go to the *Pipe Properties* tab and select the **Pipe Properties** source.
➢ Go to the Interacting Threats tab and select which assessment to utilize for the interaction algorithm.
➢ Go to the Growth tab to identify which assessment to use for the growth rate calculation, if applicable.
➢ Go to the Conditions tab and select or deselect the desired anomaly Conditions. Pre-populated conditions are based on the default analysis selected on the General tab.
➢ Click Save – this will take you to Integrity Compliance (Edit)
➢ Click Process Analysis
➢ Click Analysis Results to view assigned anomalies and potentially add additional anomalies for action on the Analysis Results page.
➢ Click Assign Action to assign an action to all assigned anomalies on the Integrity Compliance (Assign Action) page
➢ Go to the Validation tab and click the Refresh button to clear any errors
➢ Once complete, click the Submit button

7.2   Integrity Compliance (Home)

Create a new analysis or search, view or edit an existing analysis.

7.2.1   Integrity Compliance (Home) - Filters

The <u>Integrity Compliance</u> home page lists all analyses that have been performed. Users can find an analysis by filtering on the categories listed below and are defined in <u>Definitions</u>.

- **Analysis ID** (open text)
- **Division** (dropdown)
- **System Name** (dropdown)
- **Analysis Method** (dropdown)
- **Last Modified By** (dropdown)
- **Status** (dropdown)

7.2.2   Integrity Compliance (Home) - Analysis

In the *Analysis* grid, users can click on several actions. Each **Action** type allows you to take the following actions with each analysis:

- <u>View</u> button (eye icon) allows the user to open and view an analysis without editing.
- Click <u>Analysis Results</u> button (+ icon) allows the user to add additional anomalies to the "dig list" or list of anomalies identified for mitigation or repair.
- <u>Assign Action</u> button (wrench icon) allows the user to assign pre-determined actions to each anomaly identified by the analysis.
- Additional actions can be selected from a dropdown list to the right of the <u>Assign Action</u> button:
  - **Change Discovery Date:** to change the discovery date from the date the analysis was created to a different date
  - **Change Transmittal Date**: to change the date of the transmittal (See Assessment Planning.)
  - **Copy Analysis**: to copy the analysis
  - **Delete:** will "hard delete" the analysis.
  - **KML Export:** exports a kml file of the dig locations, typically used for plotting the locations with Google Earth

The <u>Settings</u> button (gear icon) on the top right side of the grid allows the users to customize the layout. See <u>Grid Settings and Features</u>.

Analyses can be searched by the following column headers and are defined in <u>Definitions</u>:

- Analysis ID
- System Name
- Analysis Name
- Status
- Anomaly Count
- Method
- Last Modified By
- Created Date
- Notes
- Discovery Date
- Transmittal Date

7.3   Create a New ILI Analysis

➤   Create a new analysis by clicking <u>+New</u> at the top right of the grid and selecting **ILI Analysis**. See <u>Appendix C</u> for how to create an API 1163 analysis.

7.3.1   Integrity Compliance (Create) – Analysis Information

Once **ILI Analysis** is selected, the user will be taken to <u>Integrity Compliance (Create)</u>, seen below.

Fill in the following required information.

- **System Name** (dropdown)
- **Name** (of Analysis) (open text)
- **Analysis Type** (dropdown)
- **Method** (dropdown)
- **Assessment(s)** (dropdown) If the Data Migration Utility is still running, you will not see your new Assessment in this list until it's complete. You can view the status of the migration on the Jobs page or in the Notification (bell icon) pop-out.
- **Vendor Report Available** (dropdown)

Revision Number is a non-required field and refers to the analysis revision. You can select multiple assessments to analyze at the same time. For example, you can review all the 49 CFR Part 195.452(h) conditions for every in-line inspection ever conducted on a particular pipeline, if desired.

7.3.2   Integrity Compliance (Create) – Dates

The following dates are required:
- **Discovery** (Date) (open text, calendar): auto populates as today's date.
- **Deration** (Date) (open text, calendar): auto populates as today's date. (This is an administrative field only and is not used in any calculations.)

Transmittal Date is a non-required field. **Creation Date** is automatically populated by CIM based on the date that the user created the analysis.

7.3.3   Integrity Compliance (Create) – Pipeline Data tab

This tab shows pipeline data that is sourced and ingested from the user's GIS, identical to the Pipeline Data tab in Assessment Planning.

7.3.4 Integrity Compliance (Create) – General tab

Here the conditional criteria on which the assessment data will be analyzed is selected. The required selections are described below.

Default Analysis (dropdown): This default analysis will select a group of conditions per the following descriptions. (If a default analysis is selected, it's important to review all conditions to ensure conditions meet the user's requirements.)

- (01) U.S. Liquid (CFR 195): all required conditions per 195.452(h) shall be selected for the analysis of the assessment.
- (02) U.S. Liquid (CFR 195) + Growth = conditions from (01) plus all conditions based on metal loss growth rate and methodology, found on the Conditions tab.
- (03) U.S. Liquid (CFR 195) + Growth + Crack = all conditions of (02) plus the Crack conditions found on the Conditions tab.
- (04) U.S. Liquid (CFR 195) + Growth + Risk = conditions from (02) plus two conditional criteria based on a risk assessment. (Only applicable if the Risk Management module is turned on.)
- (05) U.S. Liquid (CFR 195) + Growth + Crack + Risk = conditions from (03) plus Risk
- (10) U.S. Gas (CFR 192) = all required conditions per 192.933.
- (11) U.S. Gas (CFR 192) + Growth = conditions required by (10) plus all conditions based on metal loss growth rate and methodology, found on the Conditions tab.
- (12) U.S. Gas (CFR 192) + Growth + Interacting = all conditions of (11) plus Interacting
- (13) CSA Z662:23: all repair conditions required of the Canadian Standard
- (15) PDAM = all repair conditions per the Pipeline Defect Assessment Manual
- (20) PRCI = repair conditions, specific to the Pipeline Research Council International

Once a default analysis is selected, the following are auto populated but can be changed:
Tool Tolerance (dropdown): This determines what error percentage to apply to the predicted depth of metal loss and crack anomalies, as it applies to the sizing accuracy defined in API 1163.

- **Analysis Attributes**: see metal loss depth tolerance and crack depth tolerance on the *Attributes* tab.
- **None**: the in-line inspection results are taken "as-is"
- **Provided in ILI file**: sizing accuracy shall be provided from the ILI assessment(s) identified in Integrity Compliance (Create) - Analysis Information. This will apply tool tolerance per anomaly as defined in the Vendor Report. If CIM does not find a tolerance value in the ILI file, it will use the values specified in the *Attributes* grid.
- **User Defined**: this option pulls tool tolerance data from the *Tool Tolerance* upload template. This template can be downloaded from the Upload Data page. To use this option, the user would select *User Defined* on the Instructions tab of the Excel template. Tolerance data can then be edited on the *Tool_Tolerance* tab of the Excel template.
- **Vendor Provided:** this option pulls data from the *Tool Tolerance* upload template. This template can be downloaded from the Upload Data page. To use this option, the user would select *Vendor Provided* on the Instructions tab of the Excel template. Tolerance data can then be edited on the *Tool_Tolerance* tab of the Excel template.

Tool Tolerance Applied To (dropdown): identifies what anomalies the tolerance is applied to. This can be utilized to increase conservatism.

- **All**: all anomalies
- **HCA**: only anomalies located in an HCA; only works if GIS data is imported into CIM

- **Non-HCA**: only anomalies located outside of an HCA; only works if GIS data is imported into CIM.

Operating Pressure (dropdown): identifies the pressure to use when comparing the calculated burst/failure pressure or safe operating pressure. For example, an immediate condition on gas pipelines covered under 49 CFR Part 192, Subpart O is an anomaly with a predicted burst pressure that is less than or equal to 1.1 times the MAOP. This selection asks where to source the MAOP value.
- **Evaluation Pressure:** user can specify the evaluation pressure to be used by uploading pressure data into CIM using the *Operating Pressure Data* template. The template can be downloaded from the Upload Data page.
- **MOP from ILI File**: the MOP or MAOP defined in the ILI report shall be used.

Corrosion or SCC Growth Rate defines how the growth rate for metal loss and stress corrosion cracking (SCC) will be calculated. The options for calculating corrosion growth are:

1. Pit to Pit: CIM matches metal loss anomalies across multiple assessments. If the "current" anomaly matches multiple historic anomalies, it can calculate either the minimum, maximum or average change in anomaly depth based on the user's selection.

- Example scenario: An anomaly reported in a 2019 report has a depth of 51%. It has no match in the 2018 assessment but matches two 2017 anomalies of 23% and 49%.
- **Pit to Pit Maximum:** calculates the maximum change in depth. In the example above, the change in corrosion depth would be 51% - 23% = 28%
- **Pit to Pit Minimum:** calculates the minimum change in depth**.** In the example above, the change in corrosion depth would be 51% - 49% = 2%**.**
- **Pip to Pit Average:** calculates the average change in depth. In the example above, the average corrosion depth would be (28+2) / 2 = 15%

Positive Growth Anomalies: If matching results in a positive growth i.e. the current anomaly has a greater depth than previous, CIM takes the change in depth calculated as described above, divides by the time elapsed between the two measurements from the matched anomalies, and converts that into an annualized growth rate, reported in mils per year (mpy) to provide a linear growth rate. CIM will perform this calculation utilizing the two most recent ILI reports that were selected on the *Growth* tab.

Negative Growth Anomalies: If matched anomalies result in a zero or negative growth i.e. the current anomaly has a depth that is less than a previously reported depth, CIM will use **Fixed Growth Rate**. If an anomaly has no previous match and is therefore a new anomaly, CIM will use **Half-Life**.

2. Historical Growth Trend: a growth rate is calculated from 3 or more reported depths by fitting a multi-point trend line through the anomaly depths. This requires 3 or more inline inspection results.
- Zero or negative growth: **Fixed growth rate** is applied.
- New or unmatched anomalies: **Half-life** is applied.

3. Fixed Growth Rate: a default rate of 12 mpy is applied to all anomalies; value can be edited on the *Attributes* tab.

4. User Defined: the user can define a corrosion growth rate for any feature that has a Sublog ID by downloading the *Corrosion Growth Rate Template* from the Upload Data page.

5. Half-life: assumes a linear growth rate initiating from half the life of the pipeline to the current ILI reported metal loss depth and extrapolates forward in time to estimate remaining life. Therefore, it divides the reported depth by time of inspection minus installation/construction year and then divides by 2 to account for initiation time.

6. Half-Life Plus: calculates the growth rate using the half-life calculation, with the following exceptions for the minimum CGR that is provided:

- For internal metal loss: if calculated CGR is < 1 mpy, 1 mpy is provided as the CGR i.e. 1 mpy is the lowest or minimum CGR that will be returned by the calculation.
- For external metal loss with a depth > 60%: if calculated CGR is < 12 mpy, 12 mpy is provided as the CGR.
- For external metal loss with a depth <= 60%, the lowest CGR that can be returned by the calculation is .02 in/yr*depth (%) i.e. for metal loss with a 50% depth, the lowest CGR that can be provided by half-life plus is .02 in/yr*0.5 = 0.010 in/year = 10 mpy.

Crack Growth Rate: Defines how to calculate a growth rate for any crack or crack-like defects identified by the ILI report(s) being analyzed. For more information regarding crack analysis, see Appendix B.

- **Crack to Crack:** matches a crack or crack-like defect across ILI results to determine the change in depth and ultimately a deterministic growth rate, similar to the Pit-to-Pit calculation. Unlike pit-to-pit, this calculation assumes a non-linear growth rate, derived from the Paris Law.
- **Pressure Cycle Fatigue Analysis (PCFA):** Applicable to cracks that are subject to cyclic fatigue, this calculates a probabilistic growth rate dependent on operational pressure data provided by the user. Pressure data (typically obtained from SCADA) is populated in a Pressure History spreadsheet, provided by your Account Executive (to be available for download in a later version of CIM.) CIM must have GIS integration in order to use PCFA. See Appendix B for additional steps and inputs required for a PCFA.
- **Simplified Fatigue Analysis (SFA): Functionality is being updated - Do not use.**

Growth Method: Users can also select how the growth rate is calculated from the following 3 options:

- **Individual**: each anomaly has an individual corrosion growth rate calculated from pit-to-pit matching.
- **Percentile**: performs a statistical analysis that calculates a growth rate over a moving distance along the pipeline calculated from pit-to-pit matching. The "probabilistic growth grouping distance" can be changed by the user on the *Attributes* tab.
- **Nth percentile** (only applied to unmatched or new anomalies): the same methodology as Percentile but does not consider any anomalies on a different pipeline joint when calculating a corrosion growth rate. Uses 95% percentile as the default for the statistical average but can be changed by editing "Probabilistic Growth Percentile" on the *Attributes* tab. (Pit-to-pit or historical growth trend is applied to matched anomalies.)

7.3.5 Integrity Compliance (Create) – Pipe Properties

User has three options to source relevant pipe data:
- **GIS**: If user's GIS has been linked to CIM, select "GIS."
- **Vendor Provided in ILI File**: if user wants the pipe properties listed in the ILI report to be used.
- **Default Pipe Properties**: user has the option to enter default values for:
  - **Nominal Wall Thickness (in)**
  - **Yield Strength - SMYS (psi)**
  - **Diameter (in)** refers to the outer diameter of the pipeline; this is what CIM will utilize in its calculations.
  - **Nominal Diameter (in)**
  - **Seam Type**: Seam welded or Seamless: used to determine long seam interaction as well as what tool tolerance to apply from the Tool Tolerance Template. (Many ILI service providers provide different performance specifications for seamless pipe versus seam welded pipe; a lower performance is typically achieved in seamless pipe.)
  - **Installation Date** (open text, calendar)
  - **MOP** (psig)
  - **Use Calculated MOP**: select this for CIM to calculate an internal design pressure per 195.406, using a seam joint factor of 1 and a design factor of 0.72. Applicable only to liquid pipelines with the assumption that internal design pressure equals MOP.

7.3.6 Integrity Compliance (Create) – Interacting Threats

➢ Select which assessment results to use in CIM's Interacting Threat matching algorithm.

All assessment results selected on this tab will be analyzed for interaction by proximity. Interacting features vary depending on multiple factors, including weld alignment, the anomaly density, size of anomalies, etc.

7.3.7 Integrity Compliance (Create) - Growth

If a corrosion growth rate (CGR) calculation that uses pit-to-pit matching was selected, the user can identify which assessments should be utilized for this calculation. This is especially helpful if the user would like to exclude a particular assessment from matching.

The user can also adjust the inline inspection results by filling out the **Growth Bias Adjustment** in the second column. To do this, enter the bias value provided from an API 1163 Level 3 analysis. In CIM, this value can be seen on the Level 3 tab of the API 1163 report, seen below. This value can be negative or positive.

7.3.8 Integrity Compliance (Create) – Conditions

Conditions are criteria that an anomaly meets to be identified for an action. Conditions are grouped by

categories defined by regulations, standards, or pipeline operators. Users can select from over 500 conditions within various groups. See the *CIM Conditions* document for a description of each condition.
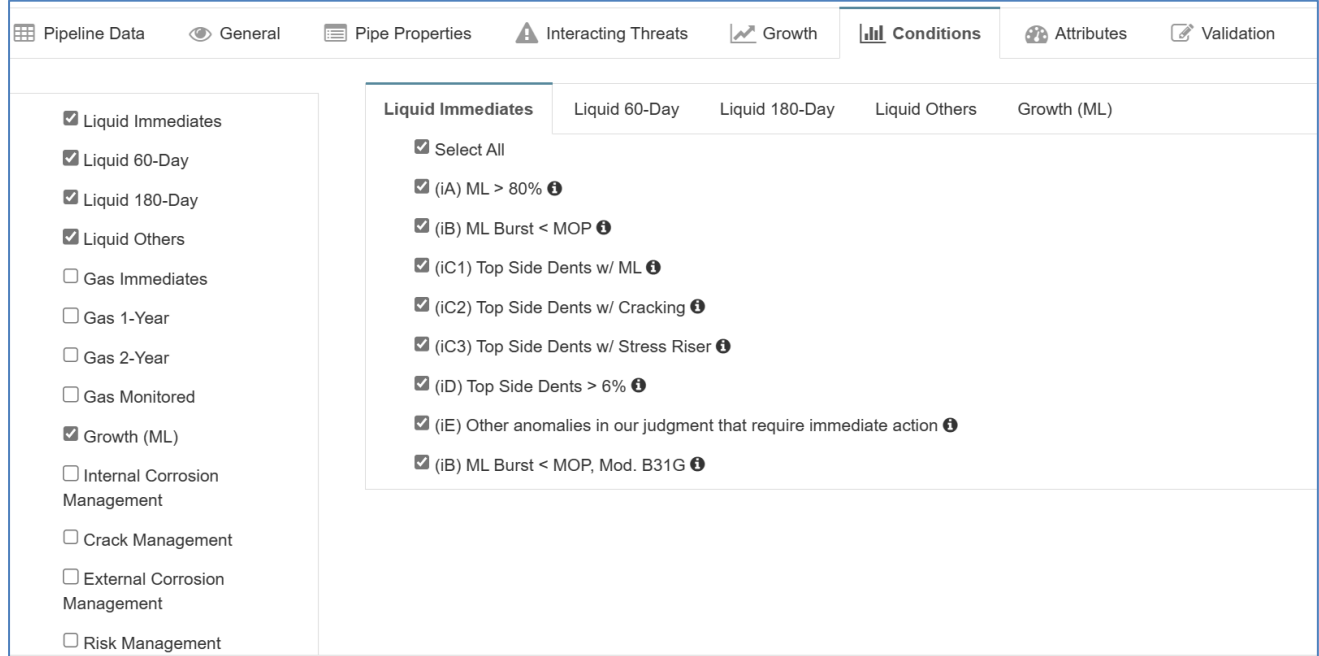
7.3.9   Integrity Compliance (Create) – Attributes

Attributes are values used by the analyses conducted within Integrity Compliance and can be edited by the user to customize the analysis. Defaults are provided as necessary. See Appendix A for a description of each attribute.

7.3.10 Integrity Compliance (Create) – Validation

This tab will alert the user of any validation errors once the analysis is saved.

7.4   Integrity Compliance (Edit)

➢   Click Save once the analysis set-up is complete. This will take you to Integrity Compliance (Edit).

7.4.1   Pre-Analysis and Post-Analysis Reports

Once saved, the tabs for Pre-Analysis Reports and Post-Analysis Reports become available. These reports are also available in the Reports module.

➢   Click Process Analysis at the bottom-right of the grid to process the analysis was designed.

This analysis may take several minutes, depending on the number of features and complexity of the analysis. The Jobs page at the top right of the main dashboard indicates the status of the analysis process. The *Validation* tab can also be used to check for any errors.

7.5   Integrity Compliance (View)

➢   Click View (eye icon) on the *Analysis* grid to view how the analysis set-up and inputs are used.

7.6   Analysis Results (Formerly Add Anomalies to Analysis)

➢ Click Analysis Results (+ icon) to review the anomalies that met the conditions selected in the analysis set-up. The user can also add anomalies from this screen.
➢ From Analysis Results, click Filter
➢ Select *Show Assigned Only*

This will list all the "Assigned Anomalies," also known as "Actionable Anomalies," that met the criteria for a selected condition and are therefore assigned that Condition. Anomalies can be further filtered or sorted by column headers, from this grid.

➢ To add additional anomalies that did not meet a condition from the *Available Anomalies* grid, click Add Anomaly (plus icon) for a selected anomaly.
➢ Click the Bulk Add Anomalies button to add multiple anomalies.
➢ Alternatively, select multiple rows of anomalies at once and then click Assign Selected, select an **Action**, click Apply and then close the window.
➢ Edit the **Action** for each Assigned Anomaly by changing the selection for that anomaly in the Action column.

Once all edits are complete, click Close at the bottom right of the screen.

7.6.1   Analysis Results – View

➤ Click the View (eye icon) in the *Available Anomalies* grid to see more detailed information about the selected anomaly. You will also see this screen when you assign actions to an assigned anomaly.

Notice that the filters contained underneath **Filter Anomalies By** are not editable here. You must click on Assign Action in the *Integrity Compliance – Analysis* grid to use the filters as well as to change the **Action** and **User Prioritization**. This view contains three sets of information: **Anomaly Information**, **Pipeline Information** and **Other Information**.

Anomaly Information provides additional information for the identified anomaly, sourced from the pipe tally or assigned/calculated by CIM.

- **Site ID:** an auto-generated number assigned by CIM which equals the joint number plus the distance to the upstream weld**.**
- **Condition Category**: the most severe condition whose criteria the anomaly met (source: assigned by CIM analysis)
- **Odometer (ft)**: the linear location of the anomaly where the start of the ILI is zero. (source: uploaded ILI pipe tally)
- **Eng'r Station (ft)**: the engineering station number at the location of the anomaly e.g. 1459+23 (source: uploaded pipe tally)
- **ML Depth (%)**: the depth of the metal loss, if applicable (source: ILI pipe tally)
- **ML Depth w/Tol**: the depth of the metal loss, if applicable, with the tolerance applied, expressed in %. (source: calculated by CIM)
- **Internal/External**: the reported location of the anomaly on the pipe wall (source: ILI pipe tally)
- **Length**: the length of the anomaly (source: uploaded ILI pipe tally)

- **Metal Loss Subclass**: a subclass of the metal loss anomaly type classification (source: assigned by CIM based on information found in the ILI pipe tally)
- **Width**: the width of the anomaly (source: uploaded ILI pipe tally)
- **Anomaly Type**: classification of the anomaly e.g. external corrosion (source: assigned by CIM, based on information found in the uploaded ILI pipe tally)
- **Orientation**: the location of the anomaly, if looking at the pipe like a clock face (source: pipe tally; converted to degrees from clock position by CIM)
- **Cluster**: identifying whether the anomaly is part of a cluster/group of anomalies with Y(es) or N(o). (source: uploaded ILI pipe tally)
- **Cluster ID**: the identifier of the cluster that the anomaly is part of. Metal loss can be identified as isolated pits or clusters. ILI service providers may have different reporting requirements e.g. individual pits are reported when found to be isolated; groups of pits are reported as clusters only (and not the individual pits that make up the cluster.) (source: uploaded ILI pipe tally)
- **Vendor Comment**: what the anomaly was classified by the ILI service provider in addition to any comments (source: uploaded ILI pipe tally)
- **Vendor Report Name**: the name of the uploaded ILI pipe tally by the user (source: user input)

Pipeline Information provides additional information for the pipeline or pipeline joint where the anomaly is located, from various sources.

- **Joint Length (ft)**: the longitudinal length of the joint of pipe that the anomaly was found. A joint that is different in length may have been modified during construction or maintenance. (source: pipe tally)
- **Diameter**: the diameter of the pipeline that was inspected (source: specified in Pipe Properties, either GIS, pipe tally or Default Pipe Properties)
- **U/S Joint Number**: the number of the pipe joint upstream from the pipe joint that the anomaly is located on (pipe tally)
- **Wall Thickness (in)**: the thickness of the pipe wall (source: specified in Pipe Properties, either GIS, pipe tally or Default Pipe Properties)
- **Joint Number**: the number of the pipe joint that the anomaly is located on (pipe tally)
- **Install Date**: the date that the pipeline was installed/construction (source: specified in Pipe Properties, either GIS, pipe tally or Default Pipe Properties)
- **D/S Joint Number**: the number of the pipe joint downstream from the pipe joint that the anomaly is located on. (source: uploaded ILI pipe tally)
- **Grade**: a pipe property that denotes the strength of the pipe e.g. Grade B would denote a Specified Minimum Yield Strength (SMYS) of 35,000 psig. (source: ILI pipe tally)
- **Seam Type**: the longitudinal pipeline seam. Certain seam types reduce the pipeline design pressure. (source: uploaded ILI pipe tally)
- **MOP (psig)**: Maximum Operating Pressure of the pipeline per 49 CFR 195.406(a) for hazardous liquid pipelines and 49 CFR 192.619 for gas pipelines, referred to as Maximum Allowable Operating Pressure. (source: specified in Pipe Properties, either GIS, pipe tally or Default Pipe Properties)
- **Seam Orientation (deg)**: location of the long seam, if looking at the pipeline like a clock face. Many ILI technologies cannot detect the long seam orientation and therefore this field is left blank. (source: pipe tally)
- **Design Pressure**: the pressure carrying capacity, calculated from pipe properties per 49 CFR 195.106 and 49 CFR 192.105. CIM defaults to the Design Pressure calculation for hazardous liquid pipelines unless "Class Location" is detected by CIM in either the uploaded pipe tally or

pipeline data provided by GIS. Then the gas class design factors found in the Attributes tab will be used.

- **Affecting Long Seam**: identifies whether the anomaly is affecting the long seam with Y(es) or N(o). If the seam orientation is left blank and therefore not identified, this value defaults to "N." This determination of affect is based on direct overlap, where the anomaly box (derived from orientation and width) overlaps the seam orientation. If a tolerance for the anomaly width and orientation is provided either in the ILI file or *Tool Tolerance* upload template, a tolerance for width and orientation is provided and therefore an anomaly that is not overlapping but in close proximity could be identified as affecting the long seam. (source: determined by CIM)
- **Affecting Girth Weld**: identifies whether the anomaly is affecting a girth weld with Y(es) or N(o), as determined by whether the anomaly is within the greater of 1 inch or 2*wall thickness of the girth weld. (source: determined by CIM)
- **In Casing**: identifies whether the anomaly is located within a casing, determined by the GIS and ILI alignment. (source: determined by CIM via alignment between GIS and ILI)
- **DOT Gas Class**: identifies what class location the anomaly is located within per 49 CFR 192.5. (source: pipe tally)

Other Information
- **Due Date**: the date by which the anomaly is required to be repaired based on the Discovery Date and timelines provided in 49 CFR 195.452 for anomaly conditions on hazardous liquid pipelines and 49 CFR 192.933 for gas pipeline anomaly conditions.
- **In Prior Analysis**: identifies whether the anomaly was flagged by a prior analysis in CIM with a Y(es) or N(o). (assigned by CIM)
- **Safe Leak Date**:
- **HCA Status**: identifies whether the anomaly is located in an HCA with a Y(es) or N(o) (GIS) as defined by 49 CFR 195.450 for hazardous liquid pipelines and 49 CFR 192.905 for gas pipelines. (source: GIS data)
- **Safe Rupture Date**:
- **Interacting Threat**: identifies whether the anomaly has an interacting threat, determined by the "Interacting Threat" algorithm. (source: determined by CIM)
- **Burst Pressure (psig)**: the calculated burst (failure) pressure from the governing pressure calculation. For metal loss features, CIM utilizes ASME B31G and modified ASME B31G, with and without tolerance. For crack and crack-like defects, CIM utilizes J-Integral, Ln-Secant, Raju-Newman, Mat-8, and Modified Mat-8. (source: calculated by CIM)
- **Gov. Pressure Calculation**: the name of the pressure calculation that identified the anomaly as meeting a condition. If the condition that the anomaly met is non-pressure related, the name of the condition will be identified i.e. metal loss > 80%. (source: determined by CIM)
- **SOP (psig)**: Safe Operating Pressure, as defined by ASME B31G where SOP equals failure pressure multiplied by a Safety Factor. Similar to the Design Pressure calculation, CIM will use a default of 0.72 per 49 CFR 195.106 unless class location is detected. This assumes a seam joint factor of 1. (source: calculated by CIM)
- **ASME B31.8S Response**: the time in years by which the anomaly should be remediated per Figure 7.2.1-1 in ASME B31.8S-2016. (source: calculated by CIM)
- **Growth Rate (mpy)**: the calculated growth rate per the methodology selected in *Integrity Compliance (Create) – General*. (source: calculated by CIM)
- **PoE (%)**: Probability of Exceedance is the probability that the actual corrosion growth rate is higher than the value calculated by CIM. The higher the value, the higher the concern. (source:

calculated by CIM)

- **Growth Rate Source:** identifies what methodology CIM used to calculate the reported Growth Rate (source: defined by user input)
- **CIS Off Voltage mV**: the mV reading at the location of an anomaly; field will be left blank if a CIS is not associated with the pipeline (source: uploaded CIS report)
- **Depth of Cover (in)**: the vertical depth of cover provided by soil if the pipeline is buried underground. (source: GIS)
- **Coating Install Date**: date that the external coating on the pipeline at the location of the anomaly was applied. This is typically the same or similar date as the Install Date but not always. (source: GIS)
- **Coating Type:** the type of external coating that is at the location of the anomaly. (source: GIS)

7.6.2   Analysis Results - Show nearby

➢ Click Nearby (horizontal double arrow icon) to find anomalies that are within 80 feet of the anomaly in both the upstream and downstream location for a total of 160 feet.

7.6.3   Analysis Results – View all details

➢ Click View all details ("i" within a circle icon) to view feature history i.e. how the anomaly was identified in the current pipe tally versus historical pipe tallies, as well as additional information reported by the ILI service provider.

7.7   Integrity Compliance (Assign Action)

➢ Click Assign Action (wrench icon) to open the detailed view of each anomaly.

(This same screen can be accessed by clicking View on an anomaly listed on the Analysis Results page.) Each anomaly will initially show the default action of *Unclassified*. Users can scan through each identified anomaly using the right and left arrows.

➢ Select an action for each of the Assigned Anomalies using the following actions as described in the table below. Each anomaly identified by the analysis must have an action assigned to it.

Action	Description	Moves to Threat Monitoring	Included in Dig Plan
Cutout	The pipe containing this anomaly should be cut out. (This designation is typically reserved for severe anomalies or anomalies that maybe be difficult to evaluate in the field.)	Y	Y
Evaluate	The anomaly should be physically examined.	Y	Y
Hold	The anomaly will be "held" for further analysis. This is akin to placing the anomaly on a waitlist for the dig plan.	Y	N
Monitor	The anomaly should be reviewed at the next inspection or risk assessment for any changes that may require remediation. This designation was introduced in US gas regulations per 192.922(d)(3) but is available for liquid pipeline operators to use as well.	Y	N

Remove	The anomaly should be removed from the list of Assigned Anomalies. This designation can be applied when anomalies have been previously evaluated. A Validation error will show for any anomalies found in a Prior Picklist. To clear this error, the anomaly should be assigned the "Remove" action.	N	N
Repair	The anomaly should be repaired based on company's repair procedures.	Y	Y
Strikeout	The anomaly should be removed from the Dig List. This designation can be applied when additional information is known e.g. ILI service provider's original description of the anomaly was incorrect or additional engineering analysis shows that anomaly does not meet a condition.	Y	N
Unclassified	Default action. This must be changed before the analysis can be submitted for approval.	N	N
Watch	Like Monitored, this refers to any anomaly that does not meet criteria for field evaluation, however the user wants to ensure this anomaly is reviewed at the next inspection.	Y	N

7.7.1 Integrity Compliance (Assign Action) – Validation Issues tab

This tab provides any issues that would prevent submitting the analysis for approval. Each anomaly must be assigned an action other than "Unclassified." Therefore, at the start of the "Assign Action" process, every anomaly will have the error: "An Action must be selected for anomaly Site Id" until the action is changed.
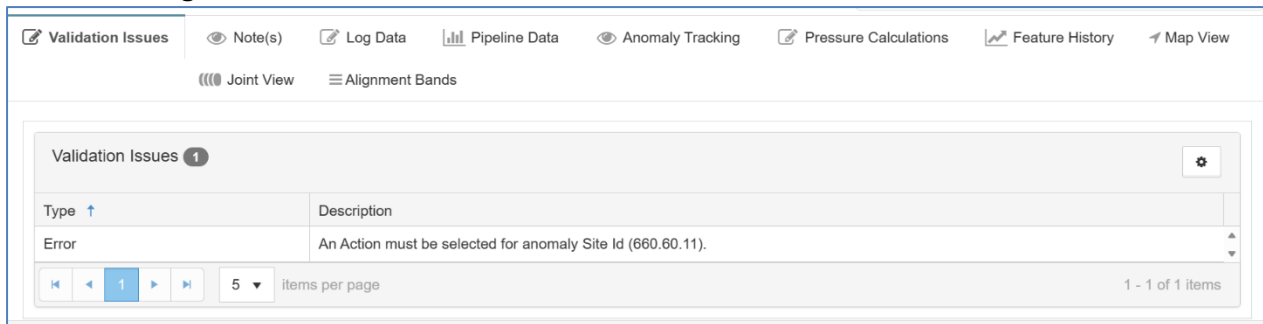
7.7.2 Integrity Compliance (Assign Action) – Note(s) tab

This tab allows the user to add a unique note or notes to the anomaly.

- **Dig Note**: any comments that may be helpful to the person(s) tasked with physically examining the anomaly.
- **Justification**: additional explanation for why the anomaly was selected for the type of action

| Validation Issues | Note(s) | Log Data | Pipeline Data | Anomaly Tracking | Pressure Calculations | Feature History | Map View |
| Joint View | Alignment Bands |

| Dig Note | Justification |
| The MOP at this location is 1440 psig. Please confirm location of upstream girth weld. | Accelerated growth rate. |
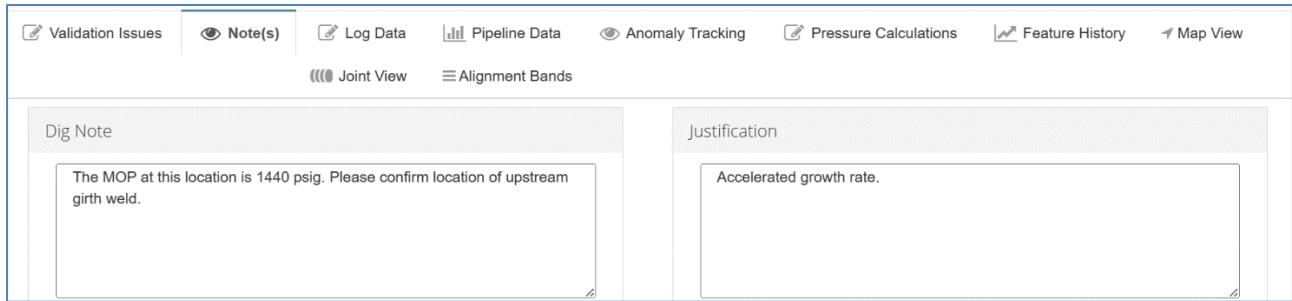
7.7.3 Integrity Compliance (Assign Action) – Log Data tab

Provides all features that are on the same joint of the identified anomaly, in the standardized CIM format.

| Validation Issues | Note(s) | Log Data | Pipeline Data | Anomaly Tracking | Pressure Calculations | Feature History | Map View |
| Joint View | Alignment Bands |

Log Data 4   Excel ⚙

Site ID ↑	Feature ID	Odometer (ft)	Eng'r Station (ft)	Route ID	Measure (ft)	Classification Description	Vendor Comment	Vendor Report Na
660.00.00	660	1841.46	0+00.00			Girth Weld	Girth Weld	2023 Violet to Ted
660.00.00	660	1824.99	0+00.00			Girth Weld	WELD	2020 Violet to Ted
660.00.00	660	1826.75	0+00.00			Girth Weld	WELD	2017 Violet to Ted
660.60.11	40000002	1901.58	0+00.00			External Corrosion	External Metal Los…	2023 Violet to Ted

7.7.4 Integrity Compliance (Assign Action) – Pipeline Data tab

Also found in Assessment Planning (Edit), this tab shows the pipeline data that is sourced and ingested from the user's GIS.

7.7.5 Integrity Compliance (Assign Action) – Anomaly Tracking tab

This tab shows any anomaly that has already been repaired on the same joint of the identified anomaly.

7.7.6 Integrity Compliance (Assign Action) – Pressure Calculations tab

This tab shows the output of the calculations from various models that predict failure pressure and safe operating pressure of metal loss and crack/crack-like anomalies, as well as other outputs. A model name that includes "with Tolerance" means the sizing accuracy tolerance regarding depth has been applied to the pressure calculations.

The following models are typically used to analyze metal loss anomalies.
- B31G
- B31G (with Tolerance)
- Modified B31G
- Modified B31G (with Tolerance)
- B31G Rectangular
- B31G Rectangular (with Tolerance)

The following models are typically used to analyze crack & crack-like anomalies:
- J-Integral
- J-Integral (with Tolerance)
- Raju-Newman
- Raju-Newman (with Tolerance)
- LN-Secant Rectangular
- LN-Secant Rectangular (with Tolerance)
- LN-Secant Elliptical
- LN-Secant Elliptical (with Tolerance)
- MAT-8
- MAT-8 (with Tolerance)
- Modified MAT-8
- Modified MAT-8 (with Tolerance)

7.7.7   Integrity Compliance (Assign Action) – Feature History tab

This shows if the anomaly that is being reviewed matches anomalies from previous ILI reports via a table and graph. (In the example below, it's interesting to note that the anomaly in the 2010 report was called external corrosion but identified as internal corrosion in the two previous reports.)
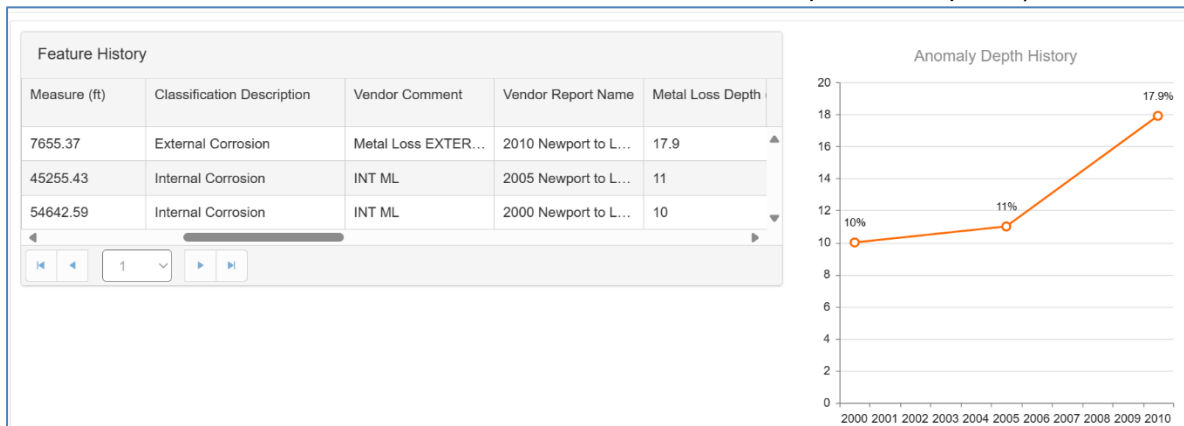
7.7.8   Integrity Compliance (Assign Action) - Map View tab

This tab shows the geographic location of the anomaly aligned on the pipeline along with other anomalies, repairs, CIS readings, features & fittings. The user can perform multiple actions to navigate the Map View e.g. zoom in/out and drag across the plane. Additionally, there are 6 map base layers from which to choose from.
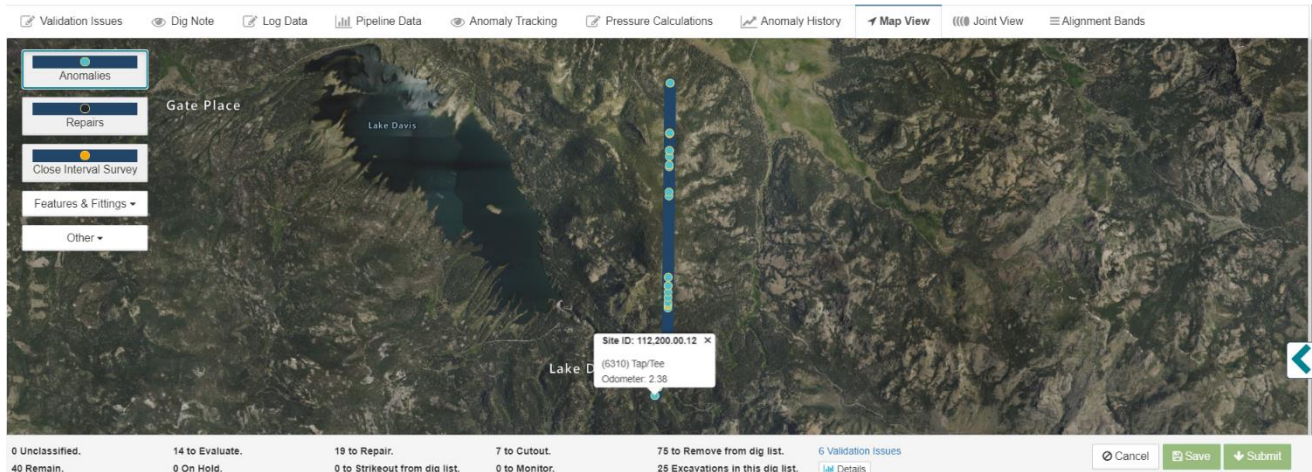
7.7.9   Integrity Compliance (Assign Action) - Joint View tab

This tab shows the 3-D view of the pipe joint where the identified anomaly resides, including any anomalies in the vicinity from previous ILIs.
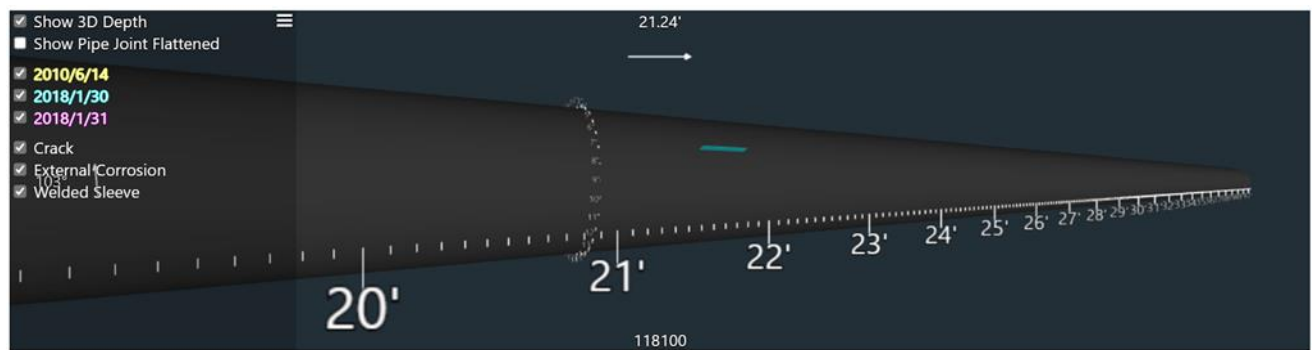
7.7.10 Integrity Compliance (Assign Action) - Alignment Bands tab

This tab shows various data sets aligned linearly. For ILI data sets, hovering over each anomaly reveals its key data.
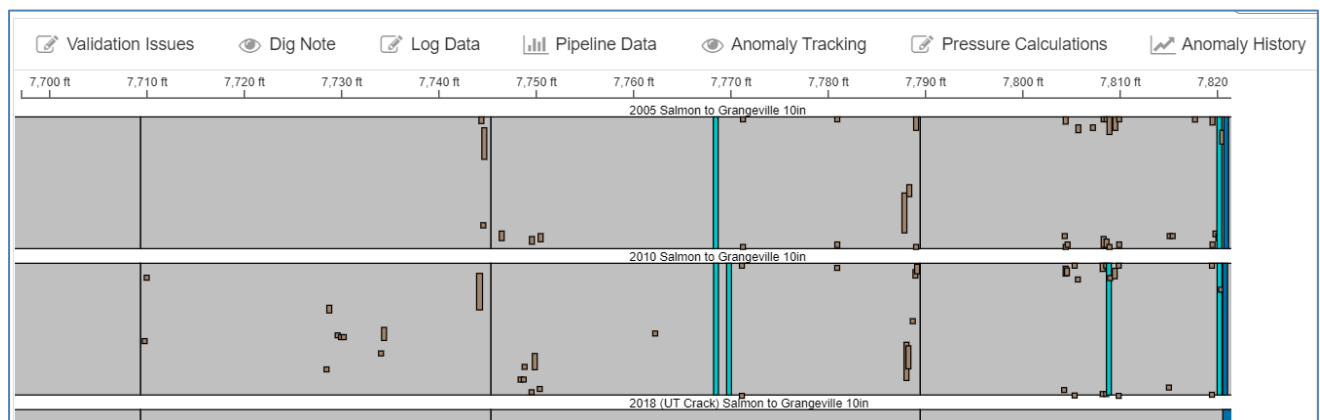
7.8   Submit Analysis

- Each flagged anomaly must have an Action assigned to it.
- If an anomaly is showing that it was "found in Prior Picklist," the Action for that anomaly should be "Remove."

➢ Click Save (bottom right corner) once all identified anomalies have been assigned an action.

➢ Click Submit (bottom right corner) once the analysis is complete and ready for review.

If an analysis requires approval, the approver will need to approve the analysis before the anomalies are available in Dig Management or Threat Monitoring. You can see the status of this by opening the Workflow page (top right of the mega menu.) Once an analysis is approved, users can create digs for those anomalies.

The options under the More Actions button (ellipsis icon) in the *Analysis* grid change depending on the analysis status. Once the user has approved the analysis, the user can access a read-only version of the analysis. Additionally, the user can click More Options (3 dots icon) and then *Analysis Results* option from the drop-down menu, which takes the user to a read-only Analysis Results page.

8. Dig Management

The Dig Management process helps the user organize anomalies identified by the Integrity Compliance process into digs and produce information needed to evaluate said anomalies.

8.1   Workflow

The minimum steps for creating a dig plan are:

➢   Navigate to Processes
➢   Select Dig Management
➢   Click +Create Dig Plan at the top right of the *Dig Plans* grid – this will take you to Create Dig Plan
➢   Enter the required data: **System Name, Segment Name, Analysis Name(s)** and **Name of the Dig Plan**
➢   Click Save. This will take you to Dig Plan Details.
➢   Click +Smart Dig or +Manual Dig at top right of *Digs* tab to add anomalies (organized into digs) to the Dig Plan. This will take you to Dig Create.
➢   Enter the **Vendor Report Name(s)** from which you would like the anomaly information to be pulled from.
➢   Click Search (This will pull in all the actionable anomalies from the **Vendor Reports** identified in the previous step.)
➢   Select anomalies to include in the dig. (This process will be different for Manual Dig versus Smart Dig. See below for more information.)
➢   Press Save.

8.2   Dig Management (Home)

On the Dig Management home page, users can search, view and edit dig plans that have already been created or create new dig plans.

8.2.1   Filters

Similar to Assessment Planning and Integrity Compliance, Dig Plans can be searched using filters, either by entering in part of all of the dig plan **Name** and/or selecting **System Name** from a dropdown.

8.2.2   Dig Plans

All existing dig plans will show in the *Dig Plans* grid. Here you can perform the following functions for dig plans in the *Dig Plans* grid:

- View will show you the Dig Plan details of a dig plan that has already been submitted and approved.
- Edit will allow the user to edit the Dig Plan via the Dig Plan Details screen.
- Delete will allow the user to delete a Dig Plan that hasn't been approved.

8.3   Create a Dig Plan

➢ Click on +Create New Dig Plan at the top right of the *Dig Plans* grid to create a new Dig Plan. This will take you to Create Dig Plan where the following questions shall be answered:
   • **System** (Dropdown)
   • **Segment** (Dropdown)
   • **Analysis** (Dropdown): this links the Dig Plan with a particular analysis; the user may select one or multiple analyses. Actionable anomalies that are either *Waiting for Approval Submission* or *Waiting for Process Analysis* in the Integrity Compliance process will not be available for selection in this step.
   • **Name** (open text): provide a unique name for the Dig Plan
➢ Press Save

8.4   Editing a Dig Plan

The Dig Plan Details page shows Dig Plan information at the top of the screen as well as various tabs at the bottom of the screen:
   • **Digs:** lists the digs included in the dig plan.
   • **Attachments:** allows the user to add attachments such as work orders to the dig plan.
   • **Reports:** shows reports pertinent to the dig plan e.g. the Dig Summary report.
   • **Workflow:** shows the approval status of the dig plans.
   • **Comments:** allows the user to add comments related to digs.
   • **Map:** provides a map of the pipeline with an overlay of the dig locations

8.4.1   Manual Dig

➢ Click +Manual Dig to organize anomalies from an analysis or analyses manually into digs; this will open Dig Create.

➢ Select *Vendor Report Name* to identify which actionable anomalies from which to create digs. If the Integrity Compliance analysis was conducted on multiple assessments, this provides a way to exclude a vendor report from the dig plan. For example, if an analysis was conducted on a 2024 ILI and a 2018 ILI, but the user only wanted to create a dig list from the 2024 ILI, only select the 2024 ILI vendor report here.

➢ Click Search. The available anomalies from the related analysis and vendor reports will be shown in

the *Dig Features* grid.

Select	Condition Category	Assigned Action	Distance to Next Anomaly (ft)	Site ID	Feature ID	Odometer (ft) ↑	U/S Weld Distance (ft)	D/S Weld Distance (ft)	Joint Number	Joint Length (ft)	Latitude	Longitude	Anomaly Type
☐	Growth	Evaluate	12782.12	117,500.00.02	12669113	1496.76	0.02	43.27	117500	43.62	39.86695845	-120.4479231	External Corrosio
☐	Growth	Evaluate		149,300.00.05	2411240	14278.88	0.05	28.64	149300	28.81	39.90180135	-120.4454736	Internal Corrosion

Dig Features (2)

Drag a column header and drop it here to group by that column

10 ▼ items per page   1 - 2 of 2 items

➢ Select the anomaly or anomalies you'd like to include in a single dig by clicking the checkbox in the **Select** column of the *Dig Features* grid.
➢ Press Save to create the dig.
➢ Press Create to confirm the creation of the dig.

⚠ Confirmation ✕

Are you sure you want to create this dig in dig plan "2024 Salmon to Grangeville Digs"?

⊘ Cancel   ✔ Create
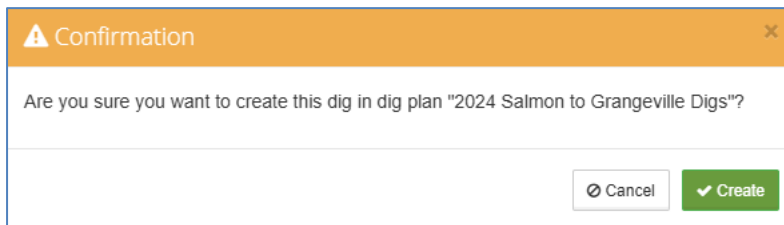
8.4.2 Smart Dig

With Smart Dig, CIM will organize anomalies into digs for you, dependent on the maximum distance between anomalies that the user selects in *Dig Create – Filters* using a sliding scale.

➢ Click +Smart Dig to be taken to Dig Create.
➢ Select *Vendor Report Name* to identify which actionable anomalies from which to create digs. If the Integrity Compliance analysis was conducted on multiple assessments, this provides a way to exclude a vendor report from the dig plan. For example, if an analysis was conducted on a 2024 ILI and a 2018 ILI, but the user only wanted to create a dig list from the 2024 ILI, only select the 2024 ILI here.
➢ Identify the maximum distance between anomalies by sliding the distance to a value between 0 and 100 feet. (Notice that the number of digs will change based on the distance you select.)

Dig Create

Q Filters

System Name: * Salmon to Grangeville 10in   Related Analysis: *   Vendor Report Name: *
2024 Salmon to Grangeville Dig Forecasting #2   2010 Salmon to Grangeville 10in ✕
2018 (MFL/DEF) Salmon to Grangeville 10in ✕

Distance between Anomalies (10 (ft)): *

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

Dig Estimate
The selected criteria will result in 1 dig(s) grouped a minimum of 10 ft. apart.

Create 1 Dig(s)

➢ Click +Create "x" Digs to create the digs per the distance identified.

➢ Click Create Digs to confirm your dig creation.

> ⚠ **Confirmation**   ✕
>
> Are you sure you want to create 1 dig(s)?
>
> ⊘ Cancel   ✔ Create Dig(s)

8.5   Dig Plan Details – Digs tab

You can view, edit or delete digs in your dig plan via the *Digs* grid of the Dig Plan Details - Digs tab.

8.5.1   Edit Dig – Dig Details

➢ Click on Edit in the Digs grid to edit the dig details for a particular dig such as:
- **Dig No.** (open text): Dig Number
- **Project Number** (open text): for the dig, if the dig is part of a project with a number associated with it.
- **Work Order Number** (open text): if the dig has a work order number associated with it.
- **Start Date** (open text, calendar): the date that the dig was started
- **End Date** (open text, calendar): the date that the dig was completed
- **Compliance Date** (open text, calendar): auto populated to the date by which the anomaly should be evaluated by, as determined by the Integrity Compliance condition that the anomaly met. If there are multiple anomalies in one dig, the soonest date shall be displayed.
- **Inspector First Name** (open text): first name of the person who inspected or evaluated the anomalies within this dig.
- **Inspector Last Name** (open text): first name of the person who inspected or evaluated the anomalies within this dig.
- **Inspector Email** (open text): email of the person who inspected or evaluated the anomalies within this dig.
- **Safey Related Condition Reportable** (checkbox): if any anomaly within the dig meets the definition of a Safety-Related Condition per 49 CFR 195.55.
- **Safety Related Condition Reported** (checkbox): to indicate that an anomaly within this dig has been reported.

8.5.2   Edit Dig – Dig Features tab

The grid within this tab shows the anomalies and anomaly details for all anomalies contained within the dig. Within this grid, you can edit or delete an anomaly within each dig.

➢ Click Edit to bring up the Threat Monitoring – Edit page for the anomaly. This is where evaluation and repair data can be entered. This page can also be accessed from the Threat Monitoring process.
➢ Click Delete to delete the anomaly from the dig.

In the top right of the *Dig Features* grid, you can also click on +Add Feature to add a actionable anomaly to the dig, if there are still flagged anomalies that haven't been assigned a dig yet. You can also click Excel to export the *Dig Features* grid to an Excel spreadsheet.

8.5.3 Edit Dig – Attachments

➢ Click +New to add an attachment to the dig.

8.6 Submit Dig Plan

➢ Click Save at the bottom right to save any edits to the dig plan.
➢ Click Submit once edits are complete.

Some companies may have a requirement to send the dig plan for approval. If so, a CIM user may have to be selected to approve the dig plan. Once a dig plan is submitted and approved, it will show up in the *Dig Management – Dig Plans* grid with the option to view the plan but not edit or delete.

8.7 Dig Plan Exports

➢ Click View to view an approved dig plan.

In the *Digs* grid you now can select one or multiple anomalies and then download various reports to provide information to personnel for excavating and evaluating the anomalies.

➢ Click KML to download a kml file which can be used in mapping applications like Google Earth to provide the GPS location of each dig.
➢ Click Download Attachments to download any attachments that were uploaded to the dig through CIM.
➢ Click Reports to see a dropdown of various applicable dig reports including:
  • **Feature Dig Sheet**: autogenerated report showing the anomaly details that are helpful for digging. See below for a screenshot of a Feature Dig Sheet.
  • **Dig Feature Worklist**: provides additional information for the "target" anomalies contained within the digs in a tabular format.
  • **Repair Template Export**: provides the template with which evaluation and repair information can be populated and uploaded back into CIM
  • **Export Dig Package**: downloads all 3 reports into one zip file
➢ Click Excel to download the *Digs* grid into an Excel spreadsheet.

oneBRIDGE

Assessment: 2018 (MFL/DEF) Salmon to Grangeville 10in	
Vendor Report: 2018 (MFL/DEF) Salmon to Grangeville 10in (Deformation, MFL)	
Company: OneBridge Solutions	
Division / District: Central	
Region / Group:	
Section: Route 1719	
Repair Deadline: 6/7/2025	

Salmon to Grangeville 10in

Dig Sheet

Dig #18-0001

Priority: Growth Calculated ML @ Girth Weld >= 50% within HCA before ReAssessment

oneBRIDGE Flow Forward™

Weld Location

117500 Girth Weld
1496.74 ft

AGM's

		AGM1 (557+75) 772.79 ft		AGM2 (573+96) 2376.77 ft	AGM3 4411.50 ft	AGM4 6174.05 ft

0.00 ft | 772.79 ft | 723.95 ft | 880.03 ft | 2034.73 ft | 1762.55 ft

Valve's

		Valve 0.00 ft		Valve 14326.98 ft	Valve 25174.55 ft	

0.00 ft | 0.00 ft | 1496.74 ft | 12830.24 ft | 10847.57 ft | -25174.55 ft

Appurtenance's

Pipe Type Transition 927.41 ft	Welded Sleeve 1272.54 ft	Welded Sleeve 1278.16 ft		Welded Sleeve 1800.27 ft	Welded Sleeve 1801.86 ft	Pipe Type Transition 1840.11 ft

345.13 ft | 5.62 ft | 218.58 ft | 303.53 ft | 1.59 ft | 38.25 ft

Girth Weld's

Joints # | 117000 | 117100 | 117200 | 117300 | 117400 | 117600 1540.36 ft | 117700 | 117800 | 117900 | 118000

43.53 ft 52 Anomalies	43.52 ft 8 Anomalies	43.47 ft 113 Anomalies	43.48 ft 168 Anomalies	43.51 ft 78 Anomalies	43.62 ft 74 Anomalies	43.68 ft 17 Anomalies	43.37 ft 19 Anomalies	43.62 ft 4 Anomalies	43.37 ft	43.67 ft 4 Anomalies

12:55 | 6:29 | 6:43 | 1:59 | 7:19 | 5:49 | 5:45 | 10:40 | 8:37 | 9:41 | 9:42

Anomaly Information

Feature ID: 12669113

Feature Type: External Corrosion		**Lat:** 39.86695845 deg
Odometer: 1,496.76 ft		**Long:** -120.4479231 deg
Orientation: 2:00		**Elevation:**
Dent Depth:		**MOP:** 1,655.00 psig
ML Depth: 23.1%		**Pipe Grade:** X-52
Crack Depth:		**Pipe Wall:** 0.221 in
Crack Depth Min:		**Pipe Seam:** ERW
Crack Depth Max:		**HCA:** Y (Ec)
Length: 4.92 in		**Long Seam:** N
Width: 10.03 in	**Int / Ext:** External	**Eng'r Station:** 6769+02.22
Comment: EXT Metal Loss	**Identifier:** 11003-1,496.76-18-0001	**Milepost:** 128.3188 mi
Priority Code Description: Growth Calculated ML @ Girth Weld >= 50% within HCA before ReAssessment		**Action:** Evaluate

Dig Note: The MOP at this location is 1655 psig.

9. Threat Monitoring

Threat Monitoring provides a list of all actionable anomalies organized by assessment and, like Dig Management, provides a place to add repair information to each anomaly. i.e. Threat Monitoring – Edit.

9.1 Workflow

On the Threat Monitoring Home Page, find the anomalies from which you'd like to view and/or edit:
➢ Select **System Name**, at a minimum
➢ Select **Assessment Name**
➢ Select **Vendor Tool Run(s)**
➢ Select **Action**
➢ Click on Edit to edit an anomaly. This will open the Threat Monitoring – Edit page, which can also be accessed from Dig Management.
➢ Edit the anomaly
➢ Click Save

9.2 Threat Monitoring – Home

9.2.1 Threat Monitoring - Filters

At the top of the Threat Monitoring home page are filters from which to find actionable anomalies.

Anomalies can be filtered by:
• **System Name** (dropdown)
• **Assessment Name** (dropdown)
• **Vendor Tool Runs** (dropdown)
• **Action** (dropdown)

Anomalies that meet the selection criteria will automatically populate.

Click Reset to remove the selection from the filters.

9.2.2 Threat Monitoring – Anomalies grid

The list of anomalies that meet the search criteria selected in *Filters* above can be found in the *Anomalies* grid at the bottom of the Threat Monitoring home page. If one of more anomalies is selected in the left-most grid, the Bulk Delete and Bulk Edit buttons become available.

	Action	Site ID	Feature ID	Divisions	Odometer (ft)	Vendor Anomaly Type	Actual Anomaly Type	Tool Run Name	Eng'r Station (ft)	Assigned Action	Discovery Date	Due Date	Metal Loss Depth (in)
☑	✎	112,200.0...	12669131	Central	2.38	Tap/Tee		2018 (MFL/DEF) Salmon to Grangeville 10in	6754+21.60	Evaluate	10/18/2018	10/18/2019	
☑	✎	112,300.0...	12669133	Central	3.94	Pipe Support		2018 (MFL/DEF) Salmon to Grangeville 10in	6754+23.16	Repair	10/18/2018	10/18/2019	
☑	✎	115,700.0...	12669204	Central	841.88	Unknown Feature		2018 (MFL/DEF) Salmon to Grangeville 10in	6762+53.00	Evaluate	10/18/2018	10/18/2019	

➢ Select Bulk Delete to delete multiple anomalies at once.
➢ Select Bulk Edit to change the assigned action for multiple anomalies.

➢ Select Excel to export the Anomalies grid to an Excel spreadsheet.

9.3   Threat Monitoring – Edit

Click on the Edit button beside an anomaly to see the Threat Monitoring - Edit pop-out. Here the user can use various tabs to view and edit information regarding the anomaly.

9.3.1   Threat Monitoring – Edit, General tab

On the Threat Monitoring - General tab, general evaluation and repair details can be populated in the left column. Non-editable information regarding the anomaly is found in the right column.

The following fields can be populated:
- (Repair) **Action** (dropdown)
- **Repaired By** (open text)
- **Repair Required** (dropdown for Yes or No)
- **Repair Type** (dropdown)
- **Repair Date** (open text, calendar)
- **Repair Date** (Manually Entered) (open text, calendar)
- **Evaluation Date** (open text, calendar): to distinguish between the date that the anomaly was evaluated and the date that the anomaly was repaired.
- **Field Priority Code** (dropdown): provides the user the ability to update the Condition Code from the Condition that originally flagged the anomaly as an actionable anomaly to another Condition Code.
- **Actual Anomaly Type** (dropdown)
- **Actual Anomaly Description** (open text)
- **Field Repair Note** (open text)

- **Work Order Number** (open text)
- **Document Number** (open text)
- **Assigned To** (open text)
- **Recommended Repair Type** (open text)
- **Repair Start Odometer (ft)** (open text)
- **Repair End Odometer (ft)** (open text)
- **Repair Length (ft)** (open text)
- **Recoat Start Odometer (ft)** (open text)
- **Recoat End Odometer (ft)** (open text)

The following fields in the right column are not editable and are either auto populated from CIM, sourced from previously uploaded information, or populated from the *Repair Template Export*:

- **Dig Number**: assigned by CIM but can be edited in Dig Management
- **Odometer (ft):** sourced from pipe tally
- **Vendor Anomaly Type**: sourced from pipe tally
- **Vendor Report Name**: the name provided by user when the pipe tally was uploaded
- **Eng'r Station (ft)**: engineering station # of the anomaly, provided by pipe tally
- **Discovery Date**: auto populated by CIM
- **Due Date**: auto calculated by CIM
- **HCA**: (Y/N) provided if GIS is synced with CIM
- **Prioritization**: Priority Code assigned by CIM
- **Dig Note**: user input in Integrity Compliance
- **Justification**:
- **Run ID**: auto generated number by CIM
- **Sublog ID**: auto generated number by CIM and assigned to every feature
- **Analysis ID**: auto generated number by CIM
- **Analysis Name**: name provided by the user when the analysis that generated the actionable anomaly was create in Integrity Compliance
- **No Tolerance Dig**: (Y/N) indicates whether a tolerance was added to the depth during the Integrity Compliance analysis; selected on the Integrity Compliance (Edit) General tab.
- **MOP (psig):** the maximum operating pressure at the location of the anomaly; selected on the Integrity Compliance (Edit) General tab
- **Long Seam Status**: (Y/N) same as **Affecting Long Seam** found in Integrity Compliance (Assign Action)
- **Field Found Anomaly**: (Y/N) answer imported from the *Repair Template*. This is applicable to anomalies that were found during a pipeline evaluation/excavation but were not identified by the ILI / are not contained within the pipe tally.
- **Target Found** (Y/N): identifying whether the target anomaly was found; answer imported from Repair Template
- **Found Anomaly Different than Reported (Y/N):** denotes whether Actual Anomaly Type differs from CIM anomaly classification; answer autogenerated by CIM
- **Indication Evaluated** (Y/N): to indicate if the anomaly was evaluated; answer imported from Repair Template
- **Indication Not Evaluated Comment**: provides reasoning for why the anomaly was not evaluated e.g. anomaly was found to be previously recoated or repaired; answer imported from Repair Template

- **Field Found Anomaly Joint Number**: the joint number that the anomaly was found on; answer imported from Repair Template
- **Latitude**: sourced from pipe tally
- **Longitude**: sourced from pipe tally
- **Magnetic Particle Testing** (Y/N): indicates whether MPT was performed on the anomaly (typically used to check for cracks); answer imported from Repair Template

9.3.2 Threat Monitoring – Edit, Measurements tab

On the Measurements tab, evaluation measurements can be populated into the left column. Measurements from the inline inspection are provided in the right column. Those fields without an input box can be populated using the *Repair Template*.

9.3.3 Threat Monitoring – Edit, Deration/Extension

This tab is to record information associated with the requirement in certain instances to reduce the pipeline pressure (deration) to maintain safety. The following fields are available for input:
- **Pressure Control Exec Date** (open text, calendar)
- **PHMSA Notification Exec Date** (open text, calendar)
- **Deration Pressure (psig)** (open text)
- **Extension Due Date** (open text, calendar)
- **MOC Number** (open text)
- **Deration Start Date** (open text, calendar): auto populated from Integrity Compliance (Create)
- **Deration Rescinded Date** (open text, calendar)
- **Deration Type** (dropdown): Deration/Extension
- **Deration Comment** (open text)
- **MOC Start Date** (open text, calendar)
- **MOC End Date** (open text, calendar)

9.3.4 Threat Monitoring – Edit, Attachments

Attachments can be uploaded and attached to an anomaly e.g. NDE reports.
➢ Click +New to open the File Navigator and upload an attachment.
➢ Once attachments are uploaded, click Save.

9.3.5 Threat Monitoring – Edit, Comments

An open text field is available to add any comments. Click Save after entering comments.

9.3.6 Threat Monitoring – Edit, Map

A map of the geographic location of the anomaly will display here if the anomaly has a longitude and latitude associated with it.

9.4 Uploading Repair Information

➢ Use the *Repair Template Export*, downloaded from the Dig Plan in Dig Management to record field measurement and repair data.
➢ Navigate to Upload Data at the top of the CIM home page.
➢ In **Template(s) to Submit**, select **Repair Template** for the **Template**

➢ Input a job name to name the "job" for uploading the template. (This could be any name and is only provided, so the user can identify the job status.)
➢ Click Browse to Select Files
➢ Click Upload

10. Reports

CIM provides a comprehensive collection of reports from the <u>Reports</u> module. These reports pertain to analytical outcomes related to the different processes within CIM. Reports are categorized under seven primary headings.

- Administrator
- Integrity Engineer
- Other
- Preview
- Regulatory
- Supervisor
- User Defined

The user can download reports for distribution as an Excel, PDF, and/or Word document. The user is notified when the reports are ready for download through the Notifications (bell icon) at the top right corner of the main CIM dashboard.

For a complete description of all reports, please see the separate CIM Reports document.

Also found within the <u>Reports</u> heading are the following subpages or dashboards.

10.1   Growth Analysis Report

<u>Growth Analysis</u> can be accessed through the <u>Reports</u> menu on the Main CIM dashboard. Users can select a pipeline system of interest and then filter by ILI for more specific information.

One of the primary functions of the <u>Integrity Compliance</u> analysis is the calculation of remaining life estimates using corrosion growth rates. The <u>Growth Analysis</u> dashboard visually displays the outputs of these calculations.

10.1.1 Growth Analysis – Summary tab

The <u>Summary</u> tab in the report provides the total reported anomaly count, the average calculated growth rate, the maximum calculated growth rates for each ILI, total growth by buckets, and growth by station and orientation. Users can click on individual bars in the histograms or segments in the pie charts for more details.
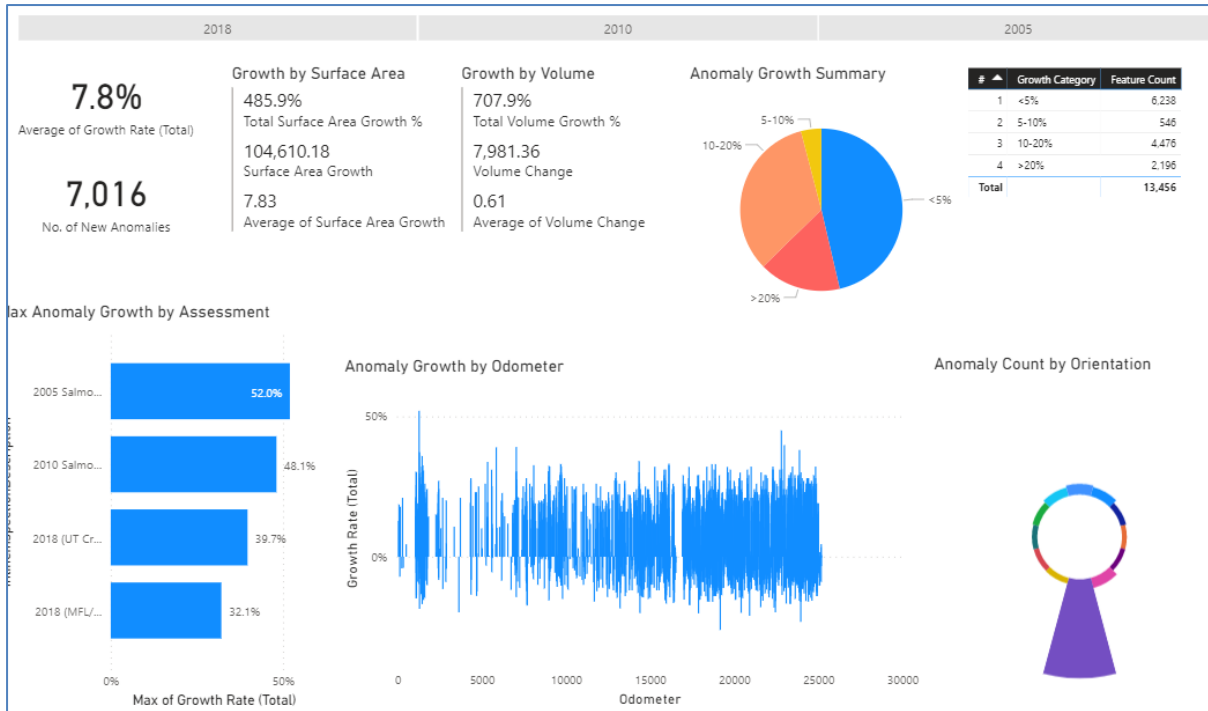
10.1.2 Growth Analysis – Growth by Anomaly

The Growth by Anomaly tab lists all anomalies by ILI. Users can right-click on a given anomaly to drill down to detailed information, including a 3D schematic joint view and map of the anomaly location on the pipeline system. This helps users visualize the condition of the individual joint, useful for planning digs. The three bars on the top left of the Joint Viewer also show the color codes and dates of the ILI. The filter and focus modes can be used for full screen views.

10.1.3 Growth Analysis – Growth by Pipe Joint

The Growth by Pipe Joint tab lists all joints with reported anomalies by the ILI. Again, users can right-click on a given joint to drill down to more detailed information.

10.2   Threat Detection Report

This report focuses on interacting threats of various types. CIM reviews its aligned data and highlights interacting anomalies such as corrosion, cracks, and dents. The basic threat interaction selections are based on feature alignment, but CIM also has a pattern detection capability to highlight potential integrity threats.

10.2.1 Threat Detection – Summary tab

The Summary tab in the report provides an overview of the type of threat, their counts, and the total

threat area by assessment.
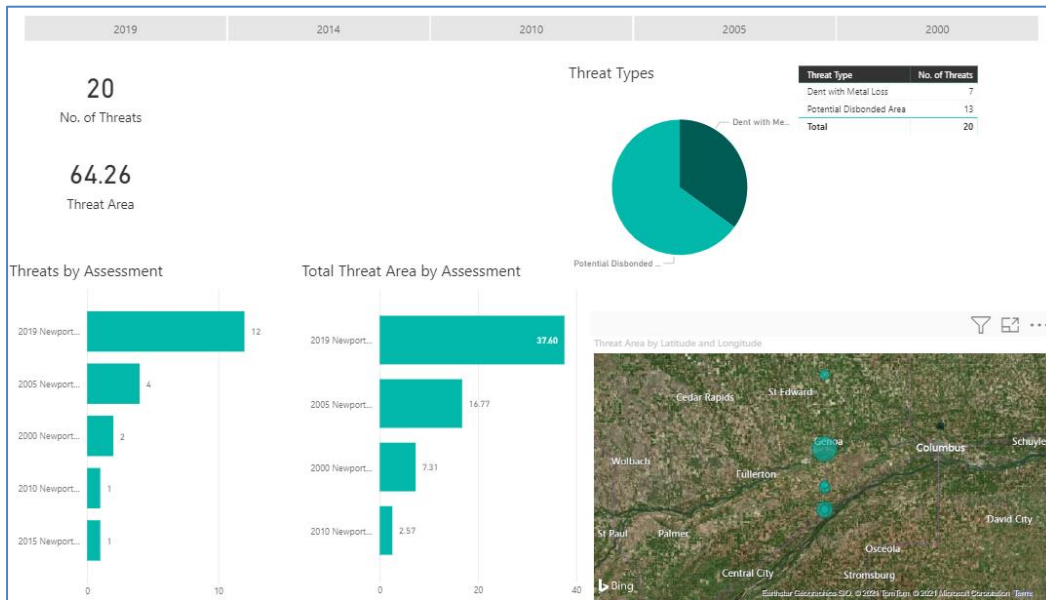
10.2.2 Threat Detection – Pattern Detection tab

The pattern detection algorithm has two functionalities. The first is based on the premise that some coatings will disbond and sag in service. This allows accumulation of water on the lower sides of the pipeline at the 4 and 8 o'clock position that may lead to external corrosion.

The second is based on the premise that internal corrosion may appear in the bottomside of the pipeline and therefore a simple algorithm looks for instances of internal metal loss at the bottom 40 degrees of the pipeline.
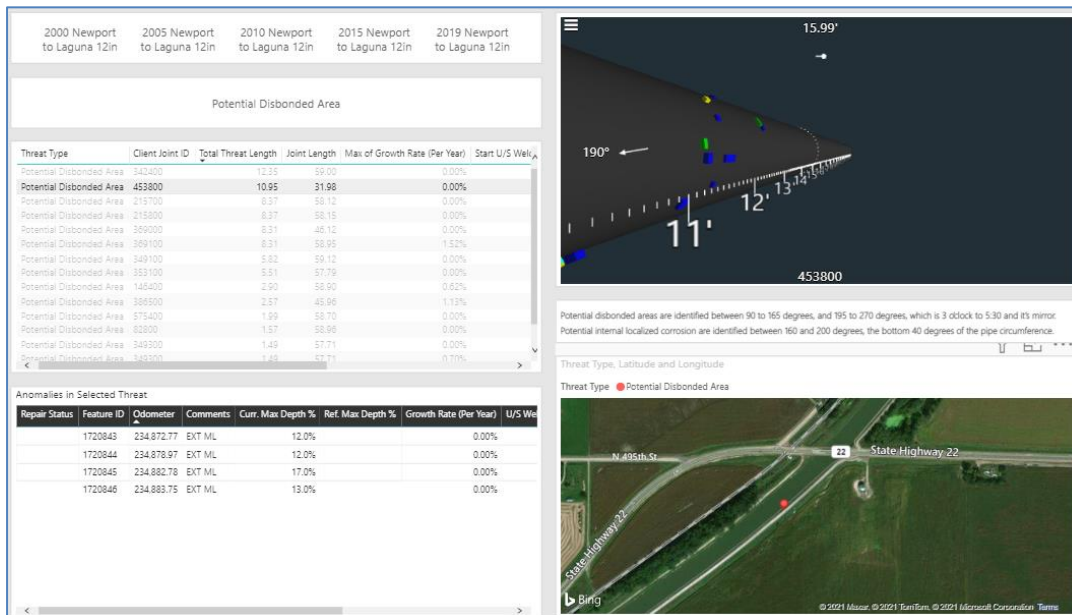
10.2.3 Threat Detection - Interacting Threats Tab

The <u>Interacting Threats</u> tab provides a summary of the anomalies identified to be interacting with other features, for example dents with metal loss. The user can also visualize these anomalies in a 3D or map view.

11.   Appendix A: Attributes

Attribute	Description	Value	Needed for What
ACVN - Long Seam	Area Charpy V-Notch Value for Long Seam. Users with sub-sized CVN test samples may adjust this value.	0.124 sq-in	Integrity Compliance – Log-Secant Crack Failure Pressure calculations
ACVN - Pipe Body	ACVN Value for Pipe Body	0.124 sq-in	Integrity Compliance – Log-Secant Crack Failure Pressure calculations
CIS Voltage Distance	The CIS reading that is reported for a particular anomaly if the CIS reading is within 50 pipeline feet of the anomaly.	50 ft	Integrity Compliance – Other Information
Crack Depth Saturation Limit	Attribute used by several crack depth conditions which are effectively "Any crack flaw with depth > x% OR where the depth exceeds the depth saturation / detection limit of the tool". This attribute represents the deepest flaw size that the tool could detect. This typically only applies to older UT crack tools.	0 mil	Integrity Compliance - Conditions
Crack Depth Tolerance	See Tool Tolerance in [Definitions](). A value of "0" means there is no error associated with the predicted depth of the crack anomaly reported by the ILI report versus actual depth.	0%	Integrity Compliance - General tab - Tool Tolerance
Crack Depth Tolerance mils	See Crack Depth Tolerance but reported in mils, instead of a % of wall thickness.	0	Integrity Compliance - General tab - Tool Tolerance
Crack Length Tolerance	See Tool Tolerance in [Definitions](). A value of "0" means there is no error associated with the predicted length of a crack anomaly reported by the ILI report versus actual length.	0 in	Integrity Compliance - General tab - Tool Tolerance
CVN - Long Seam (Brittle)	Default Charpy V Notch Toughness value for a brittle long seam.	4 ft-lb	Integrity Compliance – Raju-Newman failure pressure calculations
CVN - Long Seam (Ductile)	Default Charpy V Notch Toughness value for a ductile long seam	25 ft-lb	Integrity Compliance – Log-Secant failure pressure calculations
CVN - Pipe Body (Brittle)	Default Charpy V Notch Toughness value for a brittle pipe body	4 ft-lb	Integrity Compliance – Raju-Newman failure pressure calculations
CVN – Pipe Body (Ductile)	Default Charpy V Notch Toughness value for a ductile pipe body	25 ft-lb	Integrity Compliance – Log-Secant failure pressure calculations
Cyclic Index	Static value that characterizes the pressure cycling severity for the entire pipeline, in quarter yield cycles or	200 quarter yield cycles/year	Integrity Compliance – General – Crack Growth Rate -

	25% SMYS, when referencing [Table 4.1 in TT05](#)		Simplified Fatigue
D-C	The distance an external metal loss anomaly must be within the start or end of a casing to be identified as within in or near casing.	50 ft	Integrity Compliance – Conditions, specifically UCDIVF1 and UCDIVF1NONHCA
D-FLC	The distance an anomaly must be within a foreign line crossing to be identified as an anomaly "at a foreign line crossing."	120 ft	Integrity Compliance Liquid 180-day condition (iiiF1)
Dent proximity	Used to determine if there are multiple dents in close proximity	10	Integrity Compliance – Conditions, specifically UCD3005A1 conditions "Multiple top side dent in close proximity"
DF-GC1	Design Factor for gas pipelines in Class 1	0.72	Integrity Compliance – Other Information - SOP
DF-GC2	Design Factor for gas pipelines in Class 2	0.6	Integrity Compliance – Other Information - SOP
DF-GC3	Design Factor for gas pipelines in Class 3	0.5	Integrity Compliance – Other Information - SOP
DF-GC4	Design Factor for gas pipelines in Class 4	0.4	Integrity Compliance – Other Information - SOP
DF-L	Design Factor for hazardous liquid pipelines	0.72	Integrity Compliance – Other Information - SOP
Ef	Young's modulus: a pipe material property used for analysis of crack anomalies.	30,000,000 psi	crack failure pressure calculations
Fixed Corrosion Growth Rate	Static value that characterizes the rate of corrosion growth for every metal loss and SCC (crack-field) anomaly on the entire pipeline in mils per year.	12 mpy	Integrity Compliance – General – Crack Growth Rate
Include Clusters in Pit-to-Pit Growth	Adjacent pits interact to form clusters, as defined by each ILI service provider. "True" means CIM will include clusters in the growth rate calculation	True	Integrity Compliance – General – Corrosion or SCC Growth Rate
Metal Loss Depth Tolerance	See Tool Tolerance in [Definitions](#). A value of "0" means there is no error associated with the predicted depth of the metal loss anomaly reported by the ILI report versus actual depth.	0%	Integrity Compliance - General tab - Tool Tolerance
Metal Loss Depth	Metal Loss Depth Tolerance but	0 mil	Integrity Compliance -

Tolerance mils	reported in mils, instead of a % of wall thickness.		General tab - Tool Tolerance
Metal Loss Length Tolerance	See Tool Tolerance in Definitions. A value of "0" means there is no error associated with the predicted length of the metal loss anomaly reported by the ILI report versus actual depth.	0 inches	Integrity Compliance - General tab - Tool Tolerance
Metal Loss Percentage for Depth Condition	Defines what the projected ML must be before the reinspection interval to flag the anomaly as meeting a specific condition.	80%	Integrity Compliance – Conditions, specifically UCD11000 conditions
Metal Loss Depth Growth Reassessment Interval Factor	For anomalies with a deterministically calculated positive growth rate, a projected time by which an anomaly will grow to 80% depth value is determined. This time is then multiplied by the value input for this factor. To add additional conservatism, a value less than 1 is used. For example, inputting a value of 0.67 (2/3) will identify the reassessment interval as the time it takes a metal loss anomaly to grow to 80% x 0.67.	0.67	Integrity Compliance – calculated growth conditions
Minimum Dent Depth (0.25" for NPS < 12")	Defines a minimum depth for a geometric feature to be considered a dent.	0%	Integrity Compliance – Conditions, all dent conditions
ML-IC	Metal Loss Percentage Inside Casing. Used to define the depth % threshold for flagging if there is metal loss within a casing.	40%	Integrity Compliance – Conditions, specifically UCDIVF1 and UCDIVF1NONHCA - External ML in or near a casing
ML-OC	Metal Loss Percentage Outside Casing to define the depth % threshold for flagging metal loss "near" a casing.	50%	Used by UCDIVF1 and UCDIVF1NONHCA - External ML in or near a casing.
O'clock -TSS	The boundary that denotes topside: the orientation must be greater than 8 o'clock but less than the o'clock - TSE	240 degrees (8 o'clock)	Integrity Compliance – various conditions
O'clock - TSE	The boundary that denotes topside: the orientation must be less than 4 o'clock by greater than O'clock - TSS	120 degrees (4 o'clock)	Integrity Compliance – various conditions
Paris Law Coefficient	A value used in the Paris law equation for fatigue crack growth. Value provided by API 579 Appendix 9F. Alternative values are available in API 1176 Appendix G.	8.61E-10	Integrity Compliance – General – Crack Growth Rate- PCFA
Paris Law Exponent	A value used in the Paris law equation, utilized to estimate fatigue crack growth.	3	Integrity Compliance – General – Crack Growth Rate- PCFA

Probabilistic Growth Grouping Distance	The linear distance of anomalies that are considered when utilizing "Percentile" for the growth rate calculation.	<blank>	Integrity Compliance – General – Corrosion or SCC Growth Rate - Percentile
Probabilistic Growth Percentile	Refers to Nth percentile growth method where anomalies on a different joint are not considered when calculating a corrosion growth rate. Uses 95% percentile as the default for the statistical corrosion growth rate average	95%	Integrity Compliance – General – Growth Method
Reassessment Interval Period	The elapsed time in between assessments, typically used to determine if a metal loss or crack condition will grow to a certain depth or grow to a size that yields a Failure or Safe Operating pressure that is less than MOP before the next reinspection. The default is based on the 5-year inspection interval for hazardous liquid pipelines that contain an HCA ([49 CFR 195.452(j)](#))	60 months	Integrity Compliance – Conditions – Growth (ML)
Section Length	Related to risk management module	1000 ft	Risk Management Module
Stress Intensity Threshold	The minimum stress intensity that produces crack growth. A stress intensity factor lower than this value will not produce crack growth. This value is related to the amplitude of the pressure cycle and the crack size.	3000 psi*sqrt(in)	Crack Failure Pressure Calculations
Suction / Discharge Ratio	The pressure difference between the suction and discharge pressure when referring to the pressure upstream and downstream of a compressor or pump station, provided as a ratio. A value of "1" denotes that there is no difference between the suction and discharge pressure. This default is typically conservative when discharge pressure is known and the model therefore assumes the entire pipeline is at discharge pressure and no pressure decay occurs.	1	Integrity Compliance – General – Crack Growth Rate - PCFA
Widespread Circumferential Corrosion Threshold	The percentage of circumferential coverage i.e. width of a metal loss feature to meet the definition of "widespread circumferential corrosion"- identified as a [180-day repair condition](#) for hazardous liquid pipelines [and a one-year repair condition](#) for gas pipelines. A value of 100% means the metal loss feature	100%	Integrity Compliance – Conditions – Liquid 180-Day, Gas 1-Year

must have a width equal to the diameter of the pipeline.		

12.   Appendix B: Analysis of Crack and Crack Field Anomalies

12.1   Estimating Failure Pressure for Cracks i.e. Fracture Analysis

CIM uses the following equations/models to calculate failure pressures for crack and crack-like anomalies, with or without a depth tolerance applied:
* J-Integral
* Modified Log-Secant Rectangular
* Modified Log-Secant Elliptical
* Raju-Newman
* MAT-8

Failure pressures are provided for all models listed above and are reported on the Analysis Results and Assign Action pages of Integrity Compliance.

12.1.1 Failure Pressure Using Modified Log-Secant and Raju-Newman

To calculate the failure pressure, the following values are needed, in addition to those required for metal loss calculations i.e. pipe diameter, wall thickness, pipe yield strength, etc. These values can be adjusted on the *Attributes* tab of Integrity Compliance.
* **CVN (ft-lb)**: Charpy V-Notch impact energy from a mechanical test, which is a measure of pipe toughness. A different CVN can be selected for Long Seam vs Pipe Body.
    * The "brittle" value is used by the Raju-Newman failure pressure model
    * The "ductile" value is used by the modified Log-Secant failure pressure model.
* **ACVN (sq-in)**: Area Charpy V-Notch value, also known as the Charpy Specimen Size. CIM defaults to the standard value of 0.124 in^2. Users with sub-sized CVN test samples may adjust this value. A different ACVN can be specified for the pipe body versus long seam.
* **Young's Modulus (E) (psi)**

12.1.2 Failure Pressure Using MAT-8

To calculate the failure pressure utilizing MAT-8, additional pipeline material information needs to be provided.

Firstly, the MAT-8 Attribute Template must be populated. This spreadsheet requires the following inputs:
* **Sublog ID**: auto generated number by CIM and assigned to every feature. This value can be found in the Log Features report. Each crack and crack-like anomaly must be assigned material properties.
* **Charpy Energy** (ft-lb)
* **Residual Forming Stress** (psi)
* **CVN Test Temperature** (deg F)
* **Pipe Metal Temperature** (deg F)
* **Fracture Mode:** Upper (Shelf), Lower (Shelf), (Ductile-Brittle) Transition
* **Charpy Specimen Size:** Full, 2/3, 1/2, 1/3

- **Toughness Estimate Percentile**: Options = 5, 50, 95
  - Referring to 5% Lower Bound, Median (50th percentile), 95% Upper Bound, with the default being "50" or Median.

For more information on the MAT-8 inputs, please refer to the MAT-8 Theory Guide.

12.2 Failure Pressure for SCC / Crack Field Anomalies

Stress corrosion cracking and features identified as "crack-field" are treated as metal loss features. Therefore, the equations/models used to calculate the failure pressure for these types of anomalies are the same as those utilized for metal loss anomalies with or without a depth tolerance applied i.e. B31G, Modified B31G and B31G Rectangular.

12.3 Calculating Critical Depth of Cracks

The critical depth of a crack is found using the log-secant model, solving for the depth that provides the desired pressure i.e. failure pressure. This critical crack depth is used as the final crack depth for remaining life calculations for both fatigue growth of cracks and metal loss growth of SCC. Users may also include a critical depth criterion (typically 70-80% of the wall thickness depth) to be utilized for a secondary analysis.

12.4 Calculating Crack Growth Rate

The non-linear growth rate of a crack is determined by the Paris Law. This analysis uses the basic Irwin Equation, with no additional compliance factors to specify flaw geometry.

- **Paris Law Coefficient (C):** CIM defaults to 8.61e-10 in units of ksi, inches and cycles, per API 579 Appendix 9F. Alternative values are available in API 1176, Appendix G.
- **Paris Law Exponent (m):** CIM defaults to 3.

12.4.1 SCC Growth (Non-Fatigue)

The growth of stress corrosion cracking is treated like metal loss growth. See the descriptions of metal loss growth methods for more information.

12.4.2 Crack-to-Crack (Non-Fatigue)

Like pit-to-pit for metal loss, CIM can align and match crack features across multiple inline inspections to derive a crack growth rate. Unlike metal loss however, crack-to-crack assumes a non-linear growth rate between the two matched cracks and utilizes the Paris Law.

The growth rate derived from this method does not easily translate to a discrete value comparable to the corrosion growth rate, so Growth Rate (MPY) column in the *Analysis Results* grid will be blank. Note that the crack-to-crack growth rates should be used with caution due to the inherent sizing errors in ILI tools and the sensitivity of remaining life calculations to the Paris Law mathematics.

12.5 Pressure Cycle Fatigue Analysis (PCFA)

Incremental pressure data can be uploaded into CIM using a template. CIM then performs rainflow calculations per ASTM Standard E1049-85 to determine the pressure cycling severity at each feature location, reported as a cyclic index. This allows for an estimation of the fatigue growth for each crack

flaw.

The number of cycles to grow a crack from an initial depth to a final depth, can be inferred by integrating the Paris equation. Once the cyclic index is determined at each flaw location, the remaining life (or time to critical size) of the crack can be estimated.

12.5.1 Pressure History Template

The Pressure History Template must be filled out in order for a PCFA to be performed. Values for the following fields must be provided:
- **Start Date** (B2): the date of the first pressure reading
- **End Date** (B3): the date of the last pressure reading
- **Sample Interval** (D2): the time in between pressure readings, in minutes
- **Specific Gravity** (D3): the specific gravity of the product being transported e.g. the specific gravity of crude oil at 40 degrees F is 0.805.
- **Location Description**: description of the location of the pressure reading
  - **Measure (ft)**: the location in feet, absolute or relative of the location
  - **Elevation (ft)**: the elevation of the location in feet
  - **Diameter (in)**: the diameter of the pipeline at that location
  - **MOP (psi)**: the maximum operating pressure or MAOP of that location
- **Date and Time** (Column A, starting with A11): the date and time for each pressure reading. The data must be formatted dd-month-yy i.e. August 16, 2015, would be written as 16-Aug-15.
- **Pressure** (psi) (Columns B, C, D, etc., starting with row 11): the pressure reading at each of the listed locations. Up to 14 locations can be input into the Pressure History Template.
➢ Delete any empty pressure columns to ensure PCFA works properly.

See below for an example of a complete pressure template with readings at 3 locations. Notice that Column "E" and onward to the right has been deleted.

	A	B	C	D	E
1	**Pressure Data**				
2	Start Date and Time	8/16/2015	Sample Interval	2 m	
3	End Date and Time	8/16/2018	Specific Gravity	0.512	
4					
5	Location Description	ABC Station	Mid-way Station	XYZ Station	
6	Tag Name				
7	Measure (ft)	648636	661285	673934	
8	Elevation (ft)	753	552	575	
9	Diameter (in)	8.625	8.625	8.625	
10	MOP (psi)	990	990	990	
11	Date and Time	Pressure (psi)	Pressure (psi)	Pressure (psi)	
12	16-Aug-15 00:00:00	1549.858765	1403.650146	1403.650146	
13	16-Aug-15 00:02:00	1549.706177	1403.650146	1403.528076	
14	16-Aug-15 00:04:00	1550.316528	1404.260498	1404.382568	
15	16-Aug-15 00:06:00	1549.706177	1404.016357	1403.772217	
16	16-Aug-15 00:08:00	1549.706177	1404.016357	1403.894287	
17	16-Aug-15 00:10:00	1549.248413	1403.894287	1403.772217	
18	16-Aug-15 00:12:00	1550.16394	1404.748779	1404.748779	
19	16-Aug-15 00:14:00	1549.858765	1404.504639	1404.382568	
20	16-Aug-15 00:16:00	1549.553589	1404.382568	1404.260498	
21	16-Aug-15 00:18:00	1549.858765	1404.504639	1404.260498	
22	16-Aug-15 00:20:00	1549.553589	1404.382568	1404.260498	
23	16-Aug-15 00:22:00	1550.16394	1404.99292	1404.748779	
24	16-Aug-15 00:24:00	1549.401001	1404.382568	1404.382568	
25	16-Aug-15 00:26:00	1550.011353	1404.748779	1404.748779	
26	16-Aug-15 00:28:00	1549.553589	1404.748779	1404.382568	
27	16-Aug-15 00:30:00	1549.858765	1404.748779	1404.748779	
28	16-Aug-15 00:32:00	1549.706177	1405.11499	1404.748779	
29	16-Aug-15 00:34:00	1550.011353	1404.99292	1405.11499	

The Suction / Discharge ratio is utilized in PCFA as well and can be revised on the *Attributes* tab of Integrity Compliance. CIM defaults to a value of "1". This value denotes the pressure difference between the suction and discharge pressure when referring to the pressure upstream and downstream of a compressor or pump station, provided as a ratio. A value of "1" states that there is no difference between the suction and discharge pressure. This default is typically conservative when discharge pressure is known, and the model therefore assumes the entire pipeline is at discharge pressure and no pressure decay occurs

12.5.2 PCFA Workflow

The following provides the workflow for calculating crack growth utilizing a Pressure Cycle Fatigue Analysis. The PCFA growth rate calculation utilizes MAT-8 and therefore the MAT-8 attribute template needs to be uploaded for the calculations to work properly.

- ➢ Navigate to the Upload Data page from the CIM main header menu.
- ➢ Select *Modified MAT-8 Attribute Template* in the Template dropdown.
- ➢ Click Download to the right of the **Template** selection.
- ➢ Navigate to Reports and search for the "Log Features" report; this report is located under Integrity Engineer. Select **Log Features**. Select the *System*, *Assessment Name* and *Report* that the PCFA is being conducted on. In *Category*, check the box for "Cracks."
- ➢ Click View Report. Then press the Save button (floppy disk icon) and select **Excel**. The downloaded Excel file can be accessed from the Jobs menu. Once the *Log Features* report is downloaded, copy the Sublog IDs from the crack flaws into Column A of the *MAT-8 Attribute Template*, starting with cell A5.
- ➢ Populate columns B-H per Sublog ID.
- ➢ Once complete, upload the template on the same screen by selecting the **Template Name, Job Name,** and selecting the file.
- ➢ Click Upload.
- ➢ On Integrity Compliance (Create) - General tab, select *PCFA* for **Crack Growth Rate**. The Upload Pressure Data button will then appear below the PCFA dropdown selection.
- ➢ Click the Upload button to the right of *Upload Pressure Data* to upload the pipeline's pressure history.
- ➢ Upload the pressure data excel file for the pipeline on which the analysis is being conducted.
- ➢ Once the Integrity Compliance analysis setup is complete, click Save and +Process Analysis.

12.6 Crack Analysis Results

12.6.1 Integrity Compliance – Analysis Results (Formerly Add Anomalies to Analysis)

Once the analysis is saved and processed, there are a variety of ways to check the resultant output.
- ➢ Navigate to Integrity Compliance – Analysis Results page.
- ➢ Filter for *Crack* in **Feature Type** to view all the crack anomalies contained within the pipe tally.

Here, you can see that the **Growth Rate Source** says *Crack-to-Crack* or *PCFA* depending on what was selected as the **Crack Growth Rate** during the analysis set-up.

Note: For cracks, the Growth Rate (MPY) column will be blank. This is not a bug.

On this table, you can also review the MAT-8 burst pressure as well as remaining life and predicted failure mode. (If you cannot view these columns, they may need to be unhidden by clicking on Grid Settings – Hiding.)

12.6.2 Integrity Compliance (Assign Action)

➢ Navigate to the Pressure Calculations tab to review the output of all the crack models for failure (burst) pressure.
➢ Click on the **Burst Pressure** column to rank the burst pressure from lowest to largest.

Integrity Compliance (Assign Action) - PCFA Analysis - CIM 4.0 (100000297)

Filter Anomalies By:

Condition:	All	Type:	All	Priority:	All	Action:	All

1 of 77

← Previous   118,100.21.51 (Feature ID: 12751416)   ◉   Next →

	Action:	Unclassified		User Prioritization:		System Generated Prioritization:	(iiiG) Crack-like or Axial Planar Anomaly

Anomaly Information:

				Pipeline Information:				**Other Information:**			
Site ID:	118,100.21.51	Condition Category:	Liquid 180-Day	Joint Length (ft):	42.65'	Diameter (in):	10"	Due Date:	12/10/2024	In Prior Analysis:	Y
Odometer (ft):	1763.72'	Eng'r Station (ft):	6497+80.63	U/S Joint Number:	118000	Wall Thickness (in):	0.221"	Safe Leak Date:	--	HCA Status:	Y
Crack Depth (%):	15.5	Crack Depth (%) w/Tol:	15.5	Joint Number:	118100	Install Date:	01/01/1981	Safe Rupture Date:	--	Interacting Threat:	N
Internal / External:	External	Length (in):	3.89"	D/S Joint Number:	118200	Grade:	X-52	Burst Pressure (psig):	2512	Gov. Pressure Calc:	LN-Secant Elliptical
Metal Loss Subclass:	--	Width (in):	--	Seam Type:	ERW	MOP (psig):	1655				(With Tolerance)
Anomaly Type:	Crack	Orientation (deg):	78	Seam Orientation (deg):	77	Design Pressure (psig):	1655	SOP (psig):	1808	ASME B31.8S Response:	--
Cluster:	--	Cluster ID:	--	Affecting Long Seam:	N	Affecting Girth Weld:	N	Growth Rate (MPY):	--	PoE (%):	--
Vendor Comment:	ext Crack-Like - Possible Indication From Weld			In Casing:	N	DOT Gas Class:	--	Growth Rate Source:	--		
Vendor Report Name:	2018 (UT Crack) Salmon to Grangeville 10in							CIS Off Voltage (mV):	-899	Depth of Cover (in):	--
								Coating Install Date:	--	Coating Type:	TAPE WRAP

Validation Issues   Note(s)   Log Data   Pipeline Data   Anomaly Tracking   **Pressure Calculations**   Feature History   Map View   Joint View   Alignment Bands

Pressure Calculations 12

Controlling	Length (in)	Crack Depth (%)	Burst Pressure (psig) ↑	SOP (psig)	
Raju-Newman (With Tolerance)	3.89	15.5	2197	1581	
Raju-Newman	3.89	15.5	2197	1581	
Modified MAT-8 (With Tolerance)	3.89	15.5	2256	1624	
Modified MAT-8	3.89	15.5	2256	1624	
LN-Secant Rectangular (With Tolera...	3.89	15.5	2462	1772	

12.6.3 Reports

In addition to the reports available when conducting an inline inspection analysis, results of the PCFA will be generated in a *MAT-8 PCFA Results* report, if a PCFA was conducted. This report is available in the Integrity Compliance – Post-Analysis Reports tab. This report contains many outputs, including the critical (final) flaw depth and length, as well as the calculated fatigue and cyclic index.

System Name *:	Salmon to Grangeville 10in
Analysis *	PCFA Analysis - CIM 4.0

View Report

|◁ < 1 of 2 ? > ▷| ↻   ⊝   100% ▼   💾▼   🖨   Find | Next

oneBRIDGE Flow Forward™   MAT-8 PCFA

Feature ID	Site ID	Sublog ID	Run ID	Engineer Station (ft)	Odometer (ft)	Elevation (ft)	Int/Ext	Is HCA	Classification
12751075	135,100.02.29	1000068096	150028	6566+94.65	8,677.74		Ext	Y	Crack
12751136	140,800.17.46	1000068157	150028	6589+94.77	10,977.86		Ext	Y	Crack
12751146	142,400.20.92	1000068167	150028	6596+94.73	11,677.82		Ext	Y	Crack
12751150	143,000.13.48	1000068171	150028	6599+29.00	11,912.09		Ext	Y	Crack
12751151	143,000.22.69	1000068172	150028	6599+38.21	11,921.30		Ext	Y	Crack
12751154	143,400.21.52	1000068175	150028	6600+97.80	12,080.89		Ext	Y	Crack
12751157	143,400.35.59	1000068178	150028	6601+11.87	12,094.96		Ext	Y	Crack
12751171	143,800.30.71	1000068192	150028	6602+79.39	12,262.48		Ext	Y	Crack
12751173	144,400.40.51	1000068194	150028	6605+49.81	12,532.90		Ext	Y	Crack
12751181	146,700.18.28	1000068202	150028	6615+05.09	13,488.18		Ext	Y	Crack
12751184	149,700.36.62	1000068233	150028	6624+32.63	14,405.65		Ext	Y	Crack
12751191	152,300.04.03	1000068240	150028	6634+85.94	15,408.02		Ext	Y	Crack
12751192	152,300.07.32	1000068241	150028	6634+89.40	15,411.31		Ext	Y	Crack
12751193	152,300.40.04	1000068242	150028	6635+23.78	15,444.03		Ext	Y	Crack
12751207	148,000.06.90	1000068217	150028	6618+68.20	13,851.29		Ext	Y	Crack
12751208	148,000.22.17	1000068218	150028	6618+83.47	13,866.56		Ext	Y	Crack
12751209	148,000.26.79	1000068219	150028	6618+88.09	13,871.18		Ext	Y	Crack
12751212	148,500.07.96	1000068222	150028	6620+87.83	14,070.92		Ext	Y	Crack
12751213	148,500.10.62	1000068223	150028	6620+90.49	14,073.58		Ext	Y	Crack

	Cyclic Index	Fatigue Index	Pipe Metal Temperature (F)	Fracture Mode	Charpy Specimen Size	Toughness Estimate Percentile	Retest Interval
32	462.8617	0.0534	72	Upper	Full	50.0000	01/30/2023
32	397.0616	0.0616	72	Upper	Full	50.0000	01/30/2023
32	842.4471	0.0723	72	Upper	Full	50.0000	01/30/2023
32	824.3379	0.0578	72	Upper	Full	50.0000	01/30/2023
32	823.6291	0.0322	72	Upper	Full	50.0000	01/30/2023
32	811.5524	0.0495	72	Upper	Full	50.0000	01/30/2023
32	810.4972	0.0495	72	Upper	Full	50.0000	01/30/2023
32	798.0299	0.1057	72	Upper	Full	50.0000	01/30/2023
32	778.2889	0.1040	72	Upper	Full	50.0000	01/30/2023
32	711.6608	0.0576	72	Upper	Full	50.0000	01/30/2023
32	651.7984	0.1264	72	Upper	Full	50.0000	01/30/2023
32	589.2267	0.0534	72	Upper	Full	50.0000	01/30/2023
32	589.0250	0.0889	72	Upper	Full	50.0000	01/30/2023
32	587.0771	0.0565	72	Upper	Full	50.0000	01/30/2023
32	687.6680	0.0512	72	Upper	Full	50.0000	01/30/2023
32	686.6764	0.0574	72	Upper	Full	50.0000	01/30/2023
32	686.3767	0.0371	72	Upper	Full	50.0000	01/30/2023
32	673.5160	0.0600	72	Upper	Full	50.0000	01/30/2023
32	673.3461	0.0416	72	Upper	Full	50.0000	01/30/2023

13. Appendix C: API 1163 Analysis

As of CIM 3.40, users can create API 1163 Level 2 and Level 3 performance validation reports, based on the sizing accuracy for metal loss anomalies, specifically metal loss depth. This analysis type requires that "field" evaluation data be ingested into CIM, either through manual entry or the *Repair Template*. See Uploading Repair Information on how to enter anomaly field measurement date into CIM.

13.1 Workflow

➤ Navigate to Integrity Compliance (Home)
➤ In the *Analysis* grid, click +New
➤ Select **API 1163**
➤ Select **System Name**
➤ Input **Name** of analysis
➤ Select **Assessment**
➤ Select one **Vendor Report to Analyze** i.e. the inline inspection on which to perform the API 1163 analysis
➤ On the General tab, select one or multiple assessments for **Field Measurement Data**
➤ Fill out the other required fields on the General tab. (All error fields can be left zero.)
➤ Click Save
➤ Click Submit

13.2 API 1163 Analysis (Create)

13.2.1 Analysis Information

Input or select the following required fields:

- **System Name** (dropdown)
- (Assessment) **Name** (open text)
- **Method** (not editable)
- **Assessment** (dropdown based on selection of System Name)
- **Vendor Reports to Analyze** (dropdown based on selection of Assessment): "Reports" is a misnomer, as the performance of only one inline inspection can be analyzed at one time.
-

13.2.2 General tab

Input or select the following required fields:

- **Assessment(s) for Field Measurement Data** (dropdown based on System Name): This tells CIM from which assessment(s) to "pull" field measurement or anomaly evaluation data from.

One or multiple assessments can be selected.
- **ML Field Measurement Error (in)** (open text): the error associated with measuring the depth of a metal loss anomaly
- **Dent Field Measurement Error (in)** (open text): the error associated with measuring the depth of dent anomaly. To be left blank for CIM Version 3.40.
- **Crack Field Measurement Error (in) (**open text): the error associated with measuring the depth of a crack anomaly. To be left blank for CIM Version 3.40.
- **Field Wall Thickness Error (in)** (open text): the error associated with measuring the wall thickness of the pipeline.
- **Tool Tolerance** (dropdown: None or Provided in ILI file): directing CIM on the source of the tool tolerance, specifically for depth sizing accuracy. "ILI file" refers to the pipe tally that is uploaded on the Assessment Planning – Vendor Data tab.

- ➢ Once all fields are populated, click Save at the bottom right of the page to run the analysis.

13.3   API 1163 Analysis (Edit)

Once saved, the API Analysis (Edit) page becomes available, along with a new Reports tab.

13.3.1 API 1163 Data tab

Saving the analysis also populates the API 1163 Data tab, which is a copy of the *Data* tab from the *PRCI API 1163 Performance Validation* Excel spreadsheet.

Currently, the Data tab provides information for all metal loss anomalies, however in a future CIM version, only anomalies with field measurements associated will show in this grid. To filter out those anomalies from the grid that do not have field measurement data,
- ➢ Click Grid Settings (gear icon) in the top right corner of the API 1163 Data grid
- ➢ Select Filters
- ➢ Under Field Measurements – Depth, click the Filter button (funnel icon)
- ➢ Select "Is not null" for "Show items with value that:"

13.3.2 Exclude Anomalies from Analysis

In the *API 1163 Data* grid, the user can exclude anomalies from the analysis. To exclude anomalies,
- ➢ Navigate to left-most column in the API 1163 Data grid
- ➢ Uncheck the check box next to the anomaly or anomalies the user wishes to exclude
- ➢ Click Save

13.3.3 Reports tab

The API 1163 Level 2 and Level 3 reports are automatically generated upon clicking Save on the analysis. To review the API 1163 reports,

➢ Click one the Reports tab
➢ Click on View (eye icon) next to API 1163 Analysis Results.

A dashboard will appear with two tabs, one for the Level 2 analysis and one for the Level 3 analysis. (If data does not populate right away, click Refresh on the top left of the page.)

The calculations and outputs of the reports mirror the Analysis tab of the *PRCI API 1163 Performance Validation* Excel spreadsheet.

13.4   API 1163 Level 2 Report

The Level 2 Report displays a unity plot of ILI depth measurements versus field depth measurements with tolerance bands. Those anomalies outside the ILI depth tolerance are displayed as a different color than those anomalies that are within the tolerance provided by the inline inspection vendor. The user can hover over each anomaly to see more information regarding the anomaly.

The Level 2 Certainty and Confidence default to the PRCI recommended values, however they can be modified by using the slider on the left side of the dashboard.

The results of the Agresti-Coull calculations are displayed in the Level 2 Sizing Results box at the top of the dashboard.
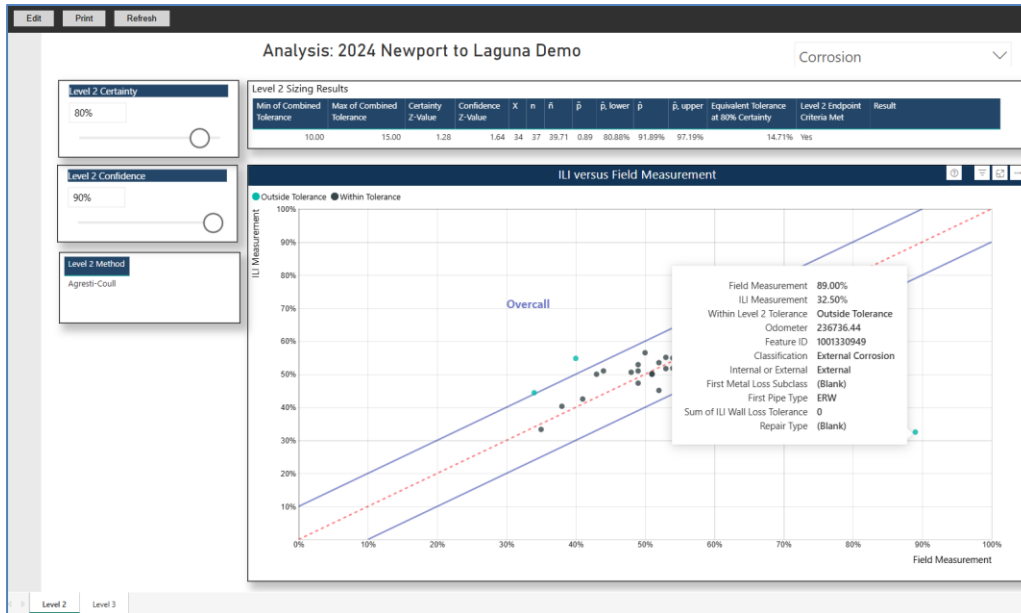
13.5 API 1163 Level 3 Report

Similar to the Level 2 report, the Level 3 report displays a unity plot of ILI depth measurements versus field depth measurements with tolerance bands. The user can hover over each anomaly to see more information regarding the anomaly.

Unlike a Level 2 analysis, a Level 3 analysis calculates the performance of the ILI system, as it relates to predicting metal loss depth. Therefore, all anomalies will show as *Within Tolerance*.

The Level 3 Certainty and Confidence values default to the PRCI recommended values, however they can be modified by using the slider on the left side of the dashboard.

The results of the Howe-Guenther calculations are displayed in the Level 3 Sizing Results box at the top of the dashboard. Of particular usefulness is the result for the Bias which indicates what the overall calculated bias is of the entire data set. From the example below, the bias shows 2.4%WT (ILI undercall). This means that overall, the ILI system under called all metal loss features by 2.4% x wall thickness. Put another way, metal loss features are greater in depth by 2.4% x wall thickness, as compared to the ILI call e.g. if a metal loss features identified by the ILI as 20% depth, it is likely that the anomaly is actually 22.4% in depth. To introduce conservatism, the user could add 2.4% to the depth for all metal loss anomalies and rerun an analysis in Integrity Compliance.

Analysis: 2024 Newport to Laguna Demo — Corrosion

Level 3 Certainty: 80.00%

Level 3 Confidence: 95.00%

Level 3 Method: Howe-Guenther

Level 3 Sizing Results

Error Mean	Error Std. Dev.	n	Degrees of Freedom	Chi-Square Critical Value	Certainty Z-Value	w	k	Bias	Tolerance Display	Tolerance Interval for ILI Measurement
-2.40	10.75	37	36	23.27	1.28	1.00	1.62	2.4%WT (ILI Undercall)	17.39%WT	[-14.99%WT, 19.79%WT]