



IntegrityMap HCA™ Liquid Analysis Tool

**Automated, Defensible and Audit-Ready
Consequence Modeling for Liquid Pipeline
Integrity and Compliance**

Altamira's proprietary IntegrityMap HCA™ liquid analysis tool provides a practical, automated approach to evaluating liquid pipeline high consequence areas (HCAs), spill consequences, worst case discharge (WCD) scenarios and emergency flow restricting device (EFRD) effectiveness. By integrating pipeline, operating, terrain, hydrologic and geographic information systems (GIS) intelligence into a single workflow, operators gain consistent, repeatable results that support regulatory compliance, integrity management and engineering decision-making.

Built around physics-based spill runout modeling, the tool evaluates how released product moves across terrain, enters waterways, travels downstream and ultimately affects sensitive resources and HCAs. Rather than relying on fixed-distance buffers, the workflow accounts for operating conditions, shutdown response, drain-down volumes, terrain, hydrologic connectivity and isolation scenarios to produce defensible consequence assessments.

The result is a scalable solution that reduces analysis time, improves consistency across asset portfolios and generates audit-ready outputs that support integrity management programs, EFRD evaluations, engineering studies and regulatory review.

YOUR COMPETITIVE ADVANTAGE:



CONSEQUENCE BASED ANALYSIS

Evaluate where a release can travel, what resources it can affect and how isolation strategies change spill volume, travel distance, response time and consequence.



DEFENSIBLE RESULTS

Physics-based methodologies provide repeatable analyses supported by traceable assumptions, modeled pathways and documented release scenarios.



GIS AUTOMATION

Reduce manual analysis through automated release modeling, terrain routing, hydrologic tracing, HCA impact evaluation and EFRD scenario assessment.



AUDIT-READY DELIVERABLES

Generate GIS layers, impact footprints, HCA intersections, pipeline segmentation, scenario comparisons and regulator-style documentation suitable for compliance and engineering review.

COMPLIANCE-DRIVEN PIPELINE RISK INTELLIGENCE

Supporting liquid HCA analysis, worst case discharge determination and EFRD assessments through a repeatable GIS-driven workflow that transforms 49 CFR Part 195 requirements into actionable pipeline risk intelligence.

WHAT WE DELIVER



WORST CASE DISCHARGE & RELEASE MODELING

- Scenario-Specific Release Volumes
- Shutdown & Response Evaluation
- Pipeline Drain-Down Calculations
- Elevation-Based Volume Assessment
- Operating Condition Modeling
- Release Hydrograph Development
- Valve-to-Valve Segment Analysis
- Available Spill Volume Determination



SPILL ROUTING & CONSEQUENCE MODELING

- Terrain-Controlled Overland Flow Analysis
- Pooling & Low-Slope Identification
- Thin-Film Manning Flow Calculations
- Waterbody & Waterway Entry Detection
- Hydrologic Network Connectivity Analysis
- Downstream Channel Routing
- Travel Time & Velocity Assessment
- DEM-Based D8 Routing



HCA IMPACT ANALYSIS

- Modeled Impact Footprints
- HCA Intersection Analysis
- Source-to-Impact Traceability
- Pipeline Consequence Segmentation
- Spill Spacing Evaluation
- Could-Affect Determination
- Consequence-Based Asset Classification
- Spatially Defensible Impact Assessment



EFRD SCENARIO ANALYSIS & REPORTING

- Baseline Isolation Evaluation
- Alternative EFRD Scenario Modeling
- Release Volume Reduction Assessment
- Travel Distance Comparison
- HCA Exposure Reduction Analysis
- Consequence Ranking of Alternatives
- GIS Data Deliverables
- Audit-Ready Documentation & Reporting

CONFIDENCE IN EVERY ANALYSIS

Whether supporting high consequence area analysis, evaluating emergency flow restricting device strategies, assessing worst case discharge scenarios or preparing for regulatory review, IntegrityMap HCA provides a repeatable and defensible framework for understanding liquid pipeline consequence and risk across the asset lifecycle.