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Unleashing the POWER of GIS at Questa Mine

July 11th, 2013

Jeff Schoenbacher, Senior Environmental Engineer
Chevron Mining, Inc.
Environmental Department

Location: Questa, New Mexico
[Northeast New Mexico](#)

Elevation: 7000 to 10,000 Feet

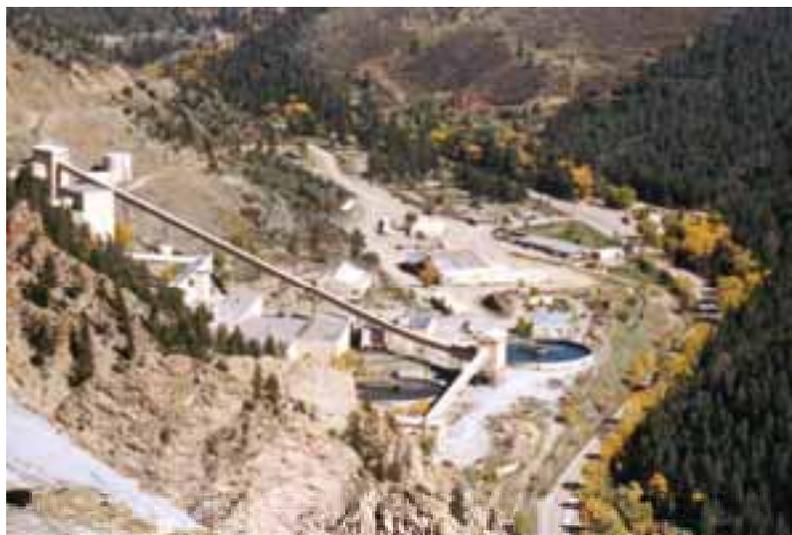
Challenge: Questa Mine site was added to the Superfund National Priorities List for federal cleanup in September 2011.

Information: http://www.epa.gov/region6/region-6/nm/nm_molycorp.html



Questa Mine Background Information

Questa Mine Mill



- Primary Molybdenum Disulfide Producer.
- Mined 1800's through 1900.
- 1976 Peak Production (23 mm/lbs Mo)
- 1983 Production went underground where it remains today.
- 2011 USEPA listed Questa Mine on the Superfund National Priority List for federal clean-up.
- Mine Property Acreage 3,773
- Tailing Disposal Acreage 2,046
- **Total Acreage 5,819**



Questa Mine's Unique and Sensitive Environment

- [Largest New Mexico Fish Hatchery](#)
- [Red River Watershed](#)
- Rio Grande River Watershed (situated to the west)
- Carson National Forest
- Columbine Hondo Wilderness Area (Federally Protected 2012)
- Abundance of wildlife ([elk, big horn sheep, deer, bear, ect](#))
- Sensitive and Endangered Species (Peregrine Falcon)
- High Public Exposure due to tourism.
- Local complex acequia systems that is used to irrigate local agriculture.
- Questa Mine is between two municipalities; the Town of Red River and Village of Questa.

Regulatory Oversight

- Regulated under Superfund Record of Decision signed 2011.
- MMD Mining Permit (1)
- NMED Clean Air Act Permit (1)
- NMED Ground Water Permits (4)
- USEPA Clean Water Act Permit (3)



Because of the permits alone, Questa Mine has over 180 compliance benchmarks related to surface and ground water quality that are required to be monitored and evaluated on a routine basis.

Weekly

Monthly

Quarterly

Semi-Annual

Annual

The question was, what was the best product to manage all of these datasets and compliance obligations?

AND THE ANSWER WAS – GIS.





First Important Step Drafting of a “Needs Assessment” for Questa Mine.

- What we had, what was missing, what was needed?



The assessment included:

- Compiling a dataset “wish list” for what the Environmental Department needed.
- Inventory of Permit Compliance Obligations.
- Prioritizing the most important datasets that needed to be completed first.
- Researching internal and external datasets.
- Identifying staff that wanted to be users.
- Designed the geodatabase structure and schematic.



Herding Data Internal and External

- AutoCad Files
- Consultant Shape Files
- Hard Copy Maps
- County Parcel Data
- United State Forest Service
- New Mexico Resource Geographic Information System
- ArcGIS Online





Dataset Transitioning Methods

- AutoCad Files
 - Custom Projection
- Consultant Shape Files
 - Mine Coordinates to NAD83
- Hard Copy Maps
 - Georeferencing

Geodatabase Structure



The screenshot shows a geodatabase catalog window for 'BaseGDBII.gdb'. The tree view includes folders like 'BASEGDB.mdb', 'Administrative', 'AirMonitoringStations', 'CADOverlay', 'Consultants', 'DGPS', 'EmergencyResponse', 'GroundWater', 'GroundWaterMonitoring_DP1055', 'GroundWaterMonitoring_DP153', 'GroundWaterMonitoring_DP933', 'GroundWaterMonitoringDP132', 'GWDP933_Pipeline_Inspections', 'Hydrology', 'HydroScar', 'MineSitePropertyBoundary09', 'MiscSampling', 'NPDESNM0022306', 'Pipeline', 'Reclaim', 'SDWA', 'SnowLysim', 'SPCCProgr', 'Stormwater', 'TopoMaps', 'Underground Footprint', and 'UnderGroundWaterManagementSystem'. Three callout boxes are present:

- Administrative Callout:** A list of feature classes with checkboxes. 'Administrative' is checked. Other items include Buildings, Contours 20 ft (2005), Topo 20' (2005), Electrical Line, Gas Line, Pipeline (checked), Tailings Facility - Reference Taos Co. (checked), Tailings_Facility_Lower_Sump, Questa Mine Boundary (checked), QuestaTownshipParcels, Roads, and Utilities.
- NPDES - NM0022306 Callout:** A list of feature classes with checkboxes. 'NPDES - NM0022306' is checked. It contains 'NPDES Permit Outfalls' (checked), 'Active', and 'Outfalls' (indicated by a green dot).
- WATER PERMITS Callout:** A list of feature classes with checkboxes. 'Monitoring_DP-933' is checked. It contains 'Quarterly Report Sampling Obligations' (checked), 'DP933 - Extraction Wells', 'DP933 - Ground Water Monitoring', 'DP933 - Seeps and Seepage Barriers', 'DP933 - Springs', 'DP933 - Surface Water Sample (Decant)', 'DP933 - Tailings Analysis', 'DP933 - Upper/Lower Dump Sump MW', 'DP933 - Picometers', and 'DP933 Seepage Barrier'. A bracket on the right labels this group as 'Permit monitoring points.'

WorkingMDD01302012.mxd - ArcMap - ArcView

158.000

Layer: Administrative

Georeferencing Layer: ElevRaster

Table Of Contents

- Layers
 - Administrative
 - Air Monitoring
 - Consultant Datasets
 - Emergency Response
 - Miscellaneous Sampling
 - SurfaceDrilling0801128
 - USA Counties
 - Hydrology
 - Raster
 - Reclaim
 - SDWA
 - Snow/Met/Lysimeter
 - SPCC Program
 - Stormwater
 - Survey
 - Underground
 - WATER PERMITS
 - Monitoring - Historical
 - Monitoring_DP-132
 - Monitoring_DP-933
 - Monitoring_DP-1055 
 - Extraction Wells
 - Ground Water Monitoring Well
 - Ground Water Wells - NP
 - Mit Water
 - Red River Sampling
 - Springs/Seeps
 - Test Plot Wells
 - Storm Detention Ponds
 - Stormwater Catchments
 - Water Elevations Monitoring
 - Monitoring_DP-1539
 - NPDES - NM002306
 - Permit Improvements
 - Online Reference Datasets
 - Base Aerials



-105.533 36.756 Decimal Degrees

8:15 AM
1/15/2012



The Back End Data Repository

- A MSAccess [Database](#) was created with the intent to retain all of the water sampling data and connect to the GIS “Front End”.
- DBMS tables were structured to allow a seamless join to the GIS tables.
- The MXD files feed from the “Back End” DBMS tables to project a dynamic and up-to-date datasets.
- Product Example: [NPDES Seep Inspection](#) and [NPDES pH monitoring of trends](#).



Value Added Products

- Questa Mine GIS Program has grown to [include](#):
- Internal Stakeholders have access to the datasets since the datasets have been published on the shared drive and can be accessed via [ArcReader](#).
- The technical services is now using GIS for permitting new claims.
- The distribution of datasets has improved staff communication and allowed others without GIS expertise to create products.
- Has increased the knowledge base of regulatory requirements.
- Has improved Operational Excellence with compliance assurance.
- The DBMS format allows all environmental themes and associated results to be in one place.

The Future of GIS at Questa Mine

- Interest continues to grow.

"If you build it, he will come." – Quote Field of Dreams.



- As our regulatory obligations grow so will the environmental GIS dataset.
- The Challenge: Keeping up with the demand.
- And keeping the datasets updated, current AND ACCURATE.

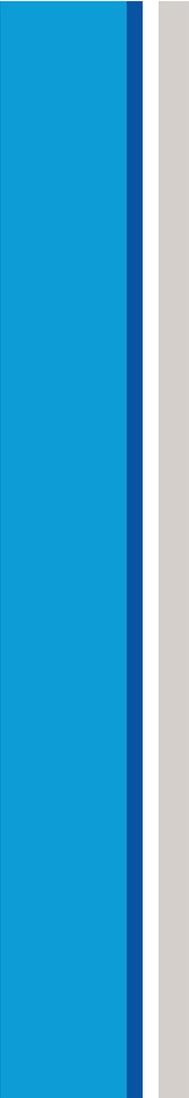


Acknowledgements

- Derek Heafey

Chevron Energy Technology Company

- Muneer Majid
- Tina Althea Morris



MonitoringREV052511 (Database (Access 2007)) - Microsoft Access

Home Create External Data Database Tools Acrobat

AutoExecBase



Chevron Mining, Inc - Questa Mine

Data Entry Reference Module

Jeff Schoenbacher, Senior Environmental Specialist X753:
 kbj@chevron.com - 575-586-7537 - 575-691-5493
 (505) 18741 - 888-377-4575 (EX smartlines34 page01)
 Red River Fish Hatchery 575-586-0222

[I: Drive](#) [JTS Pi: Drive](#)
[O: Drive](#) [GIS Drive](#)

[Surface Water/Seep SOP](#)

[Spring 13 Peregrine Falcon Notification](#)

[Close Application](#)

[Phone List](#) [Plotter](#)
[Emergency Phone List](#) [MSDS Review](#)

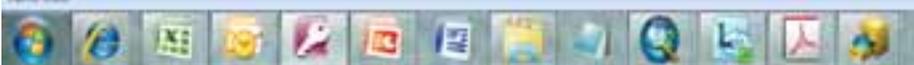
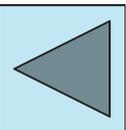
Important Dates | SPCC Plan Module | Spill Reporting Module | TRI Reporting Module | UST Monthly Testing | Vendor Invoice Tracking | Water Permits | COC | Phone Numbers | SOWA | Safety

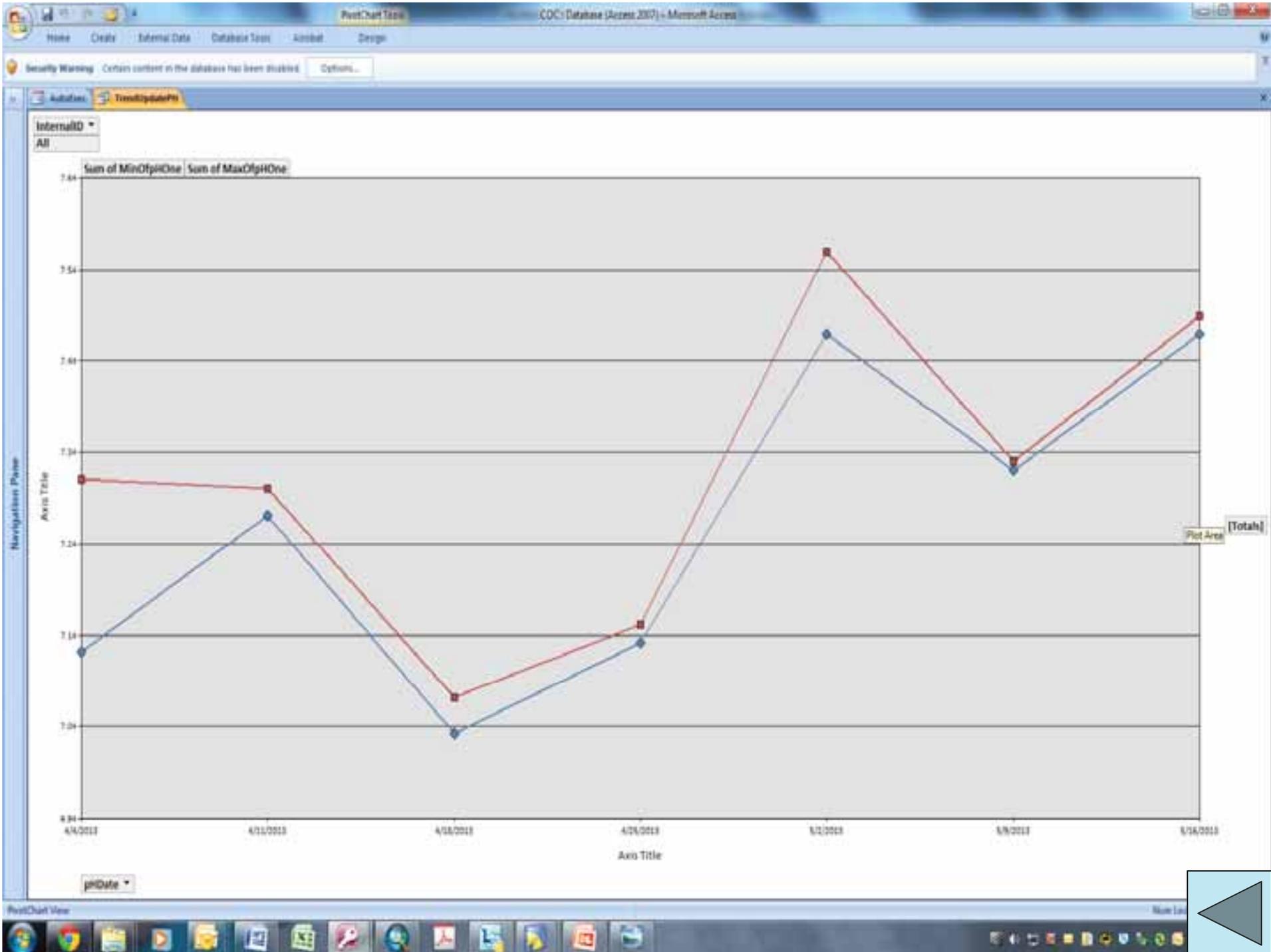
Permit Corrective Actions | Quarterly Submittal Filings

<p>GW Permit DP-1055 Folder</p> <p>Monthly Seep/Spring Inspection Module</p> <p>DP1055 Compliance Module</p> <p>DP1055 Meter Reading</p> <p>DP1055 Tank Reading</p> <p>DP1055 Wastewater Facilities Inspections</p> <p>DP1055 Sampling</p> <p>DP1055 Package Plant</p>	<p>GW Permit DP-933</p> <p>DP933 Compliance Module</p> <p>DP933 Meter Reading</p> <p>DP933 Tank Reading</p> <p>DP933 Wastewater Facilities Inspections</p> <p>DP933 Sampling</p> <p>DP933 Package Plant</p> <p>USEPA Copy Mailing Label</p>	<p>GW Permit DP-132 Folder</p> <p>DP132 Compliance Module</p> <p>DP132 Meter Reading</p> <p>DP132 Tank Reading</p> <p>DP132 Wastewater Facilities Inspections</p> <p>DP132 Sampling</p> <p>DP132 Package Plant</p> <p>GW Permit DP-1539 Folder</p> <p>DP1539 Compliance Module</p>	<p>NPDES NM0022306</p> <p>NPDES Data Entry</p> <p>NPDES Meter Reading</p> <p>NPDES Tank Reading</p> <p>NPDES Wastewater Facilities Inspections</p> <p>NPDES Sampling</p> <p>NPDES Package Plant</p> <p>Username: CMC Password: Guntarwin13</p> <p>Wesley Nguyen 214 663 6434 Kelly Blue 214 663 6436 kellyn.huddle@LA.Sun Kelly Huddle 225 218 3386</p>
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Navigation Pane

Start Menu

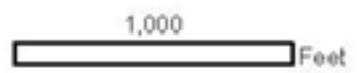




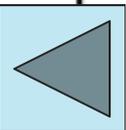
Capulin Canyon Drainage Improvements and Repairs



Map Projection
Source: USGS National Wetland Inventory
Date: 10/18/2011
Scale: 1:5000
Projection: UTM Zone 12N
Units: Feet US
Central Meridian: 106° 15' 00.00" W
Scale Factor: 0.9999
False Northing: 0.0
False Easting: 1,640,000.00



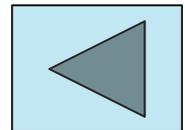
Map Produced: September 19, 2011
 By: Jeff Schoenbacher, Senior Environmental Specialist

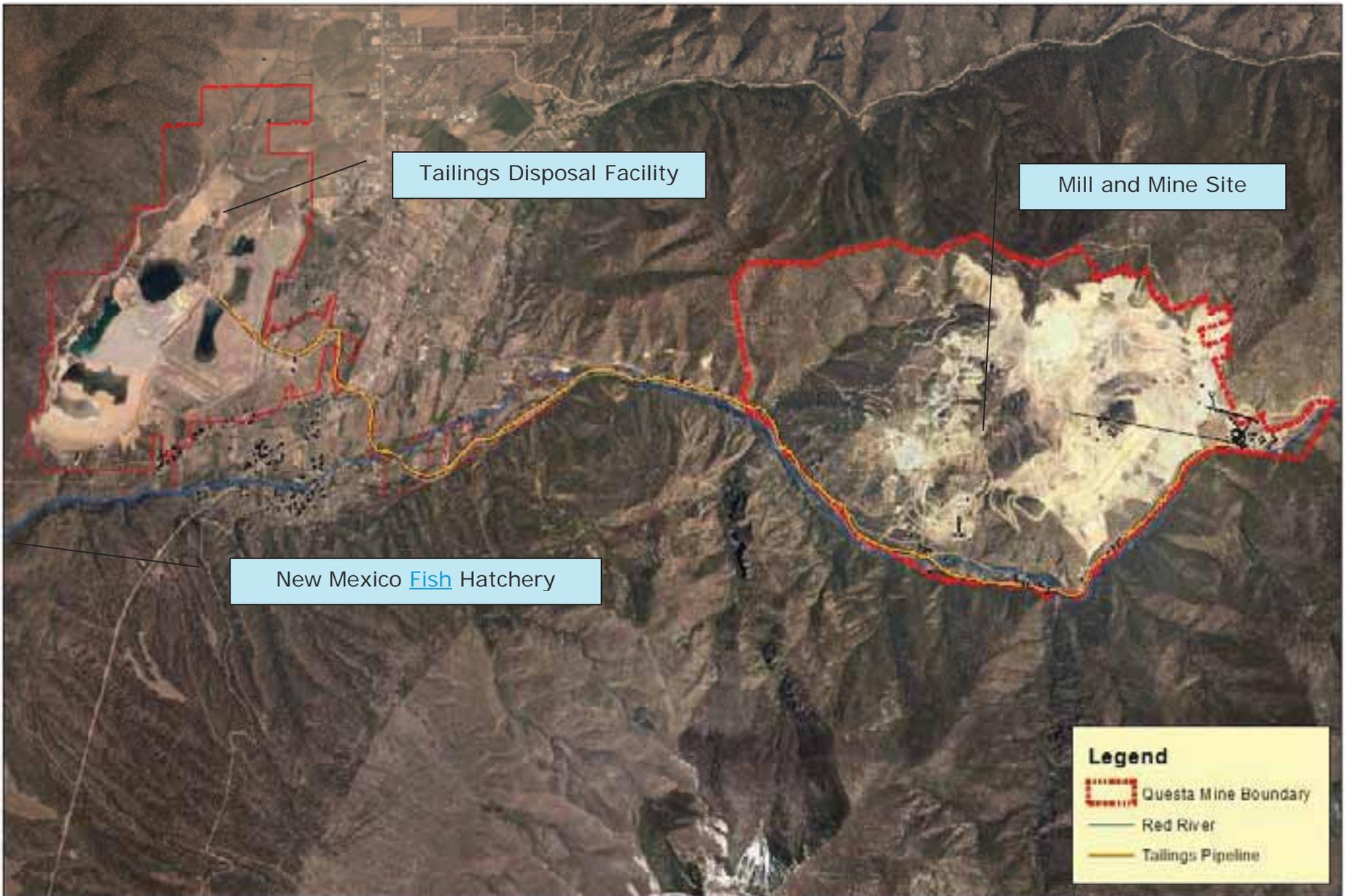


Red River Fish Hatchery

Hatchery constructed in 1941.

Average Production 224,976 lbs/year.



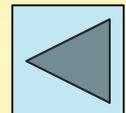


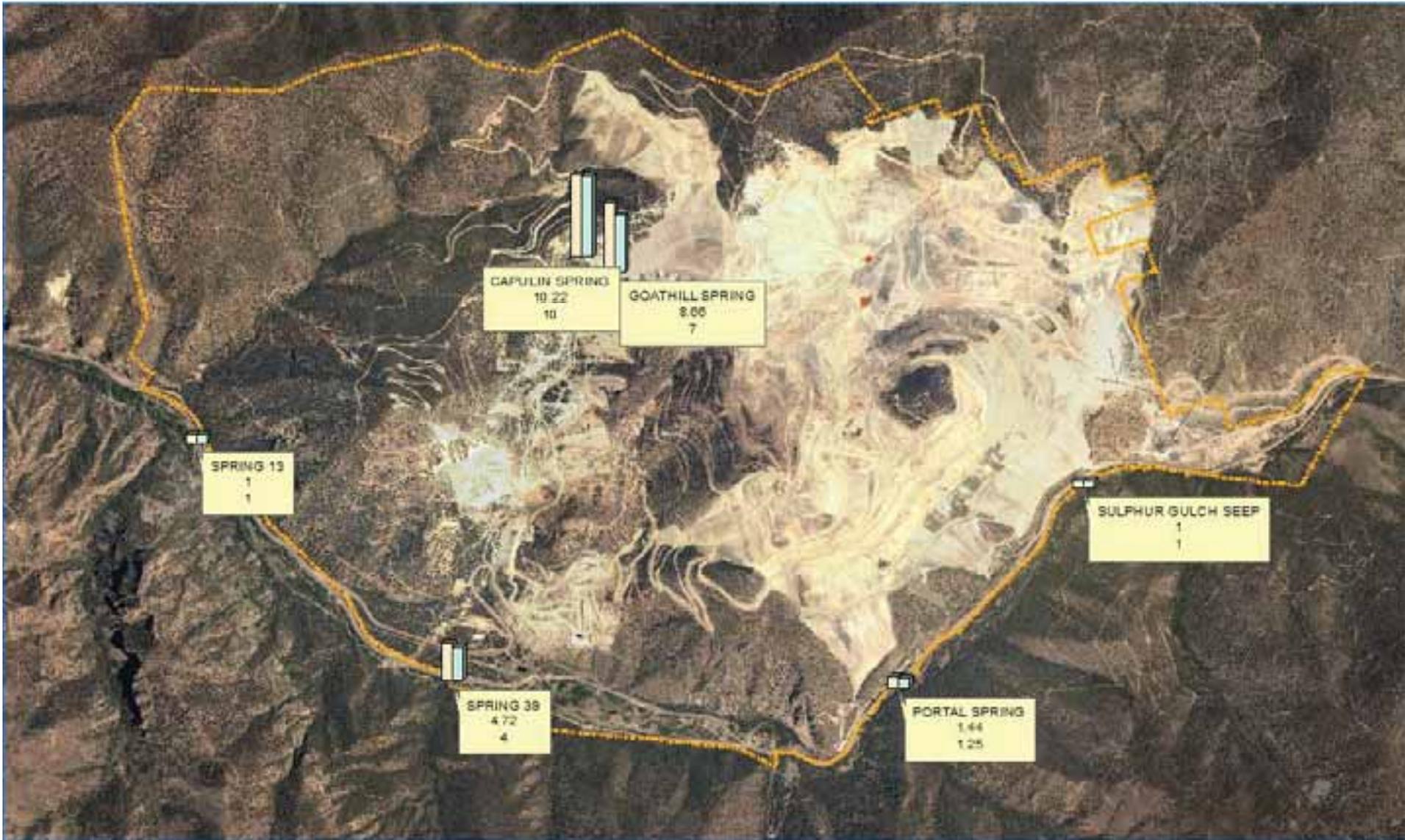
1,000
■ Feet

Questa Mine Footprint

By: Jeff Schoenbacher, Senior Environmental Engineer

Date: 8/13/2012





Annual Seep Inspection - Average Gallons Per Minute Evaluation

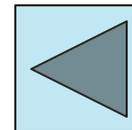


1,000
Feet



Date: 8/13/2013

By: Jeff Schoenbacher, Senior Environmental Engineer



Legend

Seeps Flow Averages

- Avg_GPM_2011
- Avg_GPM_2012
- Mine Boundary



 **Chevron Mining, Inc - Questa Mine**
NPDES Sampling Data Entry Module

NPDES Permit: NM0022306

Outfalls: 001, 002, 004, 005

Jeff Schoenbacher, Senior Environmental Specialist X7537

ksj@chevron.com - 575-586-7537 - 575-691-5493

[Reference Folder ID](#)

Exceedance Contacts

[Hannah Branning - 214-665-7489](#)
branning.hannah@epa.gov

Richard Powell - 505-827-2798

NET DMR Information

[NPDES Permit 0022036](#)

[NETDMR](#)

[ELY](#)

Username: CMI
Password: Questamine15

Helen Nguyen 214 665 6458
Kathy Bliss 214 665 6456
kathryn.huddle@LA.Gov
Kathy Huddle 225 219 3786

Annual Schedule

Weekly pH: Lower Limit 6.6 and Upper Limit 8.8
DMRs due monthly before the 15th
Weekly pH: Lower Limit 6.6 and Upper Limit 8.8
March Semi Annual and Annual Toxicity Sampling
1st Quarter April 30th Due Date
2nd Quarter July 31st Due Date
Sept and Water Collection Report Due 10/1
3rd Quarter October 31st Due Date
November Semi Annual Toxicity Sampling
4th Quarter December 31st Due Date

Navigation Pane

DP 933 ESS Tracking

Outfall 002 Monthly COC

NPDES Data Entry

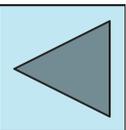
DMR Report Enter
Internal ID Number

Internal ID Look Up

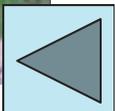
010109	1/7/2009
020109	2/2/2009
030109	3/2/2009
040109	4/1/2009
050109	5/4/2009

pH Trend Q

[Close Application](#)

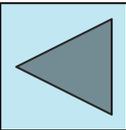


New Mexico Wildlife





© Chevron 2005





Value Added Products

- Air Monitoring
- [Emergency Response](#)
- Sampling
- Reclamation
- Safe Drinking Water Act
- Spill Prevention
- Stormwater
- Surface Drilling

