US Magnesium Superfund Site Documents
Annotated Bibliography

This bibliography describes existing documents organized by topic. Within each topic are multiple documents. Each document is summarized in a brief statement. Additional detailed information is provided in an outline formatted to match document structure with solid bullets indicating document section titles and open bullets providing pertinent content.

EPA Superfund Process

1. Environmental Protection Agency 40 CFR Part 300 National Priorities List, Final Rule No. 48/49 ***E8-20389/E9-26539 (8 pages, 2008/2009)***

Generated by the EPA to determine when a site is assigned and removed from the National Priorities List (NPL).

- Background
    - Defines EPA terms like CERCLA, SARA, NCP, NPL, CCL.
    - NPL is a guide for the EPA to determine sites that warrant further investigation.
        - "Sets guidelines and procedures for responding to releases and threatened releases of hazardous substances into the environment."
    - Describes the process by which a site is placed and removed from the NPL.
    - To be placed on the NPL:
        - Site has Hazard Ranking System (HRS) score that is sufficiently high (>28). US Magnesium has HRS of 59.
        - Each state may designate a single facility as its top priority regardless of HRS score.
        - If the Agency for Toxic Substances and Disease Registry has issued a health advisory that recommends dissociation of individuals from release, the EPA determines that the release poses a significant threat to public health, and EPA anticipates that it will be more cost-effective to use its remedial authority than to use its removal authority to respond to the release.
    - Placing a site on the NPL does not mean that any remedial or removal actions necessarily need to be taken, or assign liability to any party.
    - Includes rules that prevent local entities (state, tribes, small businesses etc) from being adversely affected economically by having a site on the NPL or from the resulting regulatory actions.
    - Provides locations and descriptions of documents about the site to public.
    - Gives instruction on preparing and submitting comments for NPL site review.
- Contents of This Final Rule
    - Lists the proposed additions to the NPL (US Magnesium included in this document).
- Statutory and Executive Order Review
    - Explains Executive Order 12866- determines monetary significance of the needed regulatory action on a site.
    - EPA must provide a cost-benefit analysis if local entities are expected to expend more than $100 million per year on federal mandates.

2. Administrative Settlement and Order on Consent for Remedial Investigation and Feasibility Study

***RIFS_AOC* (60 pages, 2011)**

Legal agreement and terms between the US EPA and US Magnesium for the Remedial Investigation and Feasibility Study (RI/FS) at the US Magnesium facility. Also includes two appendices: 1) the Statement of Work; and 2) a site map of the US Magnesium facility.

- Jurisdiction and General Provisions
- Parties Bound:
  - Parties bound by the Settlement Agreement.
- Statement of Purpose
  - Determine the nature and extent of contamination, as well as any threats to public health, welfare, or the environment.
  - Identify and evaluate remedial alternatives to prevent, mitigate, or otherwise respond to release or threatened release of hazardous substances.
  - Recognition that US Magnesium is an active, operating facility, and acknowledgment that this settlement provides for the performance of RI/FS and does not address current waste management practices.
- Definitions:
  - Commonly used terms and abbreviations in the document.
- EPA Findings of Fact:
  - US Magnesium Facility background information and hazardous substance releases
- EPA Conclusions of Law and Determinations:
  - Recognition that the US Magnesium is the responsible party for contamination at the site, and that remediation actions required by the Settlement Agreement are necessary to protect public health, welfare, and the environment.
- Settlement Agreement and Order
- Designation of Contractor and Project Coordinators
  - Dictates selection of contractors and personnel and notification of the EPA.
  - Designates David Abranovic from ERM-West, Inc. as the Project Coordinator for the Respondent.
  - Designates Ken Wangeurd and Bonita Lavelle as the Project Coordinator and back-up Project Coordinator, respectively, from the Office of Ecosystems Protection and Remediation, Superfund Remedial Branch, Region 8.
  - Outlines the authority given to EPA's Project Coordinators.
- Work to be Performed
  - Process for conducting the Remedial Investigation and Feasibility Study (RI/FS).
  - Process by which the Respondent and the EPA can modify the Statement of Work (SOW) and/or the Sampling and Analysis Plan (SAP).
  - Offsite-Shipment of Waste Materials.
  - Necessary meetings and deliverables (e.g., 'Progress Reports') the Respondent must provide to the EPA.
  - Required responses to address the release of Waste Material from the Site.
- EPA Approval of Plans and Other Submissions
- Quality Assurance, Sampling, and Access to Information

- Site Access and Institutional Controls
- Compliance with Other Laws
- Retention of Record
  - Process for maintenance of records by Respondent
- Dispute Resolution
  - Process by which disputes arising under the Settlement Agreement will be resolved
- Stipulated Penalties
- Force Majeure
  - The Respondent agrees to perform all requirements under the Settlement Agreement unless delayed by any event arising from causes beyond the control of the Respondent despite the best efforts to fulfill the obligations.
- Payment of RI/FS Response Costs
- Covenant Not to Sue by EPA
- Reservations of Rights by EPA
- Respondent's Covenant Not to Sue and Reservation of Rights
- Other Claims
  - The United States and EPA assume no liability for injuries or damages to persons for injuries or damages to persons or property resulting from any acts or omissions of Respondent
- Contribution Protection
- Indemnification
- Insurance
- Financial Assurance
- Integration/Appendices
- Administrative Record
- Effective Date and Subsequent Modification
- Notice of Completion of Work
- Statement of Work
  - Sets forth the requirements for conducting an RI/FS on the Site.
  - Describes the "deliverables" and other documents the Respondent will provide to the EPA

Hazard Ranking System Score Development

1. Correction to HRS Documentation Record for U.S. Magnesium

***DocketCorrection23Sep08* (1 page, 2008)**

Correction for HRSPackageUSMagnesium to change ppt (parts per trillion) to ppb (parts per billion) in measure of PCBs. This change was made in FinalHRSPackageUSMagnesium.

2. Hazard Ranking System Package

***HRSPackageUSMangesium* (36 pages, 2008)**

Older version of Hazard Ranking System (HRS), does not include edits from DocketCorrection23Sep08.

3. HRS Documentation Record

FinalHRSPackageUSMagnesium (36 pages, 2008)

Hazard Ranking System (HRS) package for US Magnesium generated by EPA. Soil and air exposure pathways were scored (groundwater pathways were not scored) based on previous site measurements.

- Introduction
  - US Magnesium has an HRS site score of 59.18 (calculation given on pages 3-6).
- Site Description
  - Tables of polychlorinated biphenyls (PCB) and hexachlorobenzene (HCB) measurements associated with various piles on site.
  - Values for contaminants measured in anode dust boxes (designed to collect off-gassing and dust by-products) on site including PCB, HCB, arsenic, chromium and mercury.
  - Fugitive emission of dioxins, HCB, and PCBs have all been measured at source (stacks) and non-point source air releases.
- Soil Exposure Pathway
  - Concern for soil contamination and transport.
  - Multiple bird fatalities for birds that fly over the facility, including birds on the Utah Sensitive Species List.
  - Workers must contact the contaminated areas in the course of their regular duties as well as for collection of dead birds.
  - Elevated concentrations of PCBs and HCB measured in soils
- Air Migration Pathway
  - Air is the exposure medium of primary concern at the Superfund site.
  - All work occurs within one quarter mile of the anode container and workers enter the facility within one quarter mile of emission stacks.
  - A toxicological study of 30 workers found elevated levels of HCB and PCBs.
  - Toxic mobility characteristics in air are provided for measured hazardous substances.

Site Overview

1. US Magnesium Superfund Site Overview
***us-magnesium-poster-7-6-18-2014* (1 page, 2014)**

- Aerial photo with location of plant, landfill, ditches, smut pile, barium sulfate, gypsum slurry, gypsum pile, and waste lagoons.

2. US Magnesium Superfund Project Description
***us-magnesium-poster-1-6-18-2014* (1 page, 2014)**
Outlines project activities and provides background on site.

- Magnesium chloride feedstock is produced in 60,000 acre solar evaporation ponds.
- The facility is the largest producer of primary magnesium in the Western Hemisphere and employs 500 people and 125 contractors.

3. US Magnesium Preliminary Investigation Areas
***us-magnesium-poster-3-6-18-2014* (1 page, 2014)**
Map of the 18 preliminary investigation areas grouped into operable units intended to organize EPA site-management and decision making.

4. US MagnesiumRemedial Investigation Activities
***us-magnesium-poster-2-6-18-2014* (1 page, 2014)**

Pictures of the remedial investigation activities: air sampling, geophysical survey, monitoring well installation, staff gauge installation, surface soil sampling, and surface water sampling.

- EPA oversight of all activities per National Contingency Plan (NCP).

5. US Magnesium Site Scale Comparison
us-magnesium-poster-6-6-18-2014 **(1 page, 2014)**

- Compares site extent to the scale of downtown Salt Lake City.

Ecological Risk Assessment

1. Environmental Endangerment at the U.S. Magnesium Facility, Rowley, Utah
ecora05feb07 **(109 pages, 2007)**
An expert report by Mark Stackhouse and Douglas Beltman (Stratus Consulting) regarding environmental endangerment at the US Magnesium facility.

- Chapter I- Introduction and Summary of Opinions
- Chapter II - Birds and Wildlife at and near the Facility
  - Highlights the importance of the Great Salt Lake as a habitat for migratory birds and other wildlife.
  - Potential for exposure of different species to contaminants.
- Chapter III - Environmental Contamination Caused by the USM Facility
  - Organochlorine chemicals are produced and released into the environment at the US Magnesium facility.
  - Organochlorine contaminants are persistent and are able to biomagnify up food webs, they are a significant threat to wildlife, particularly those at the top of the food web.
- Chapter IV - Threats to the Environment from the Chlorinated Hydrocarbon Contamination at the Facility
  - The concentrations of dioxins, furans, PCBs, and HCB determined in the soils and sediments, organisms at base of food web (plants, invertebrates, and mice), and in bird eggs.
  - Results indicate that chemical concentrations are thousands of times higher than environmental thresholds corresponding to mortality, persistence and reproduction of birds and other species.
  - Areas of highest concern are the sanitary lagoon, active waste pond, gypsum pile, and the old waste pond near its former inlet. In particular, the water in the active waste pond has a pH <1, causing distress in birds that come into contact with this water.
- Chapter V - Environmental Threats from Highly Acidic Pond Water
  - Waste areas with the highest concentrations of organochlorine compounds are recommended to be remediated to reduce risk to wildlife, as well as the potential risk to the greater GSL ecosystem should another pond failure occur. It is recommended that attempts be made to raise the pH of the active wastewater pond and to stop discharging highly acidic waste to the area.

2. Rebuttal Report of Douglas Beltman
EcoRA_Rebuttal08Jun08 **(50 pages, 2008)**
Rebuttal to the Stubblefield ecological risk assessment (ecora05Feb07 document).

- Section I - Introduction

    - An overview of identified deficiencies in the Stubblefield ecological risk assessment (Section II)
    - Response to rebuttal (by Stubblefield) of Beltman and Stackhouse 2007 risk assessment
    - Response to the expert report on Wildlife Observations by Boyle (2007) (Section IV).
- Section II - Review of Stubblefield (2007)
    - Criticisms include:
        - Long term risks of the US Magnesium site were not assessed by Stubblefield (2007)
        - The risk (Hazard Quotient) for each Waste Management Area was calculated separately, as if each site were isolated and surrounded by uncontaminated land rather than being contiguous.
        - No assessment of risk to plants, invertebrates, or microbiota at the site (ignoring possible effects of bioaccumulation and biomagnification within the food web).
        - Hazard Quotient calculations do not include all relevant exposure pathways and are based on unsubstantiated assumptions about bird and mammal diet.
        - Does not include HCB in toxic equivalent calculations (TEC).
        - The red-tailed hawk was used as representative avian predator at the site, whereas other species such as barn owl likely attain greater exposure.
- Section III - Beltman's response to Dr. Stubblefield's rebuttal to "Environmental Endangerment at the U.S. Magnesium Facility, Rowley, Utah" (Beltman and Stackhouse, 2007)
    - Points of agreement
        - Lack of specific data on toxicity for US Magnesium site could cause variance in toxicity outcomes depending on literature values used by Beltman and Stackhouse
    - Points of disagreement
        - Toxicity thresholds used for birds.
        - Assumption that operating conditions at the site are unchanging
        - Comprehensive risk assessment must include risks to plants, invertebrates, and microbiota.
        - Bird toxicity from the waste pond was not considered.
- Section IV - Response to Boyle (2007)
    - Points of agreement
        - Field methods used by Beltman and Stackhouse (2007) to observe wildlife activity and behavior on US Magnesium site were sufficient.
        - Conclusions made by Beltman and Stackhouse regarding wildlife presence at the site were accurate.
    - Points of disagreement
        - Attraction of US Magnesium site versus GSL shoreline as a feeding and visiting area for birds.
        - Degree to which bird "unusual behavior" observed by Beltman and Stackhouse indicates stress or harm.

3. US Magnesium Conceptual Site Model for Ecological Receptor Exposure
us-magnesium-poster-4-6-18-2015 **(1 page, 2014)**

- Flow diagram begins with the source (US Magnesium) and traces possible contamination pathways to receptors.

Human Health Risk Assessment

1. Expert Report of Dr. Richard DeGrandchamp, PhD
***HHRA06Feb07* (108 pages, 2007)**

Evaluation by Dr. Richard DeGrandchamp (hired by U.S. Department of Justice) of the toxicological assessment and risk assessment for exposures to uncontrolled releases of toxic contaminants .

- Summary of Opinions
  - Dioxins and HCBs are the two primary contaminants of concern that pose health threats to past and current employees, facility workers' families, commercial laundry service (charged with washing coveralls), and future workers.
- Primary Sources of Information and Data
  - Sources used in informing expert report.
- Introduction
  - Health risks of HCB and dioxins. Greatest risk corresponding to cancer which can manifest as late as 10 years after exposure.
  - Chronic HCB and dioxin exposures are not readily detected due to lack of odor or visibility.
- Dioxin and HCB Toxicity
- EPA's Risk Range
- Toxicological Evaluation of Facility Employees
  - Total dioxin body burden levels measured in Facility workers are well above U.S background levels (about eight times higher).
    - High cancer risk.
    - Additional noncancer risks (workers reported dioxin body burdens 16 times higher than recommended safe exposure level) .
  - HCB body burdens in Facility workers are nonzero (ideal HCB body burden is zero).
    - High cancer risk.
    - Additional noncancer risks (worker HCB body burdens were as high as 38 times recommended safe exposure level).
- Take-Home Contamination
  - Facility coveralls are highly contaminated with dioxins and HCB, and it is probable that workers have contaminated their vehicles and homes.
  - Families of facility workers may inadvertently be exposed to dioxins and HCB as a result of take-home contamination.
  - Workers for the contract off-site laundry service that cleans Facility workers' coveralls are unknowingly being exposed to toxic contamination.
- Risk Assessment for Remote Areas
  - Contamination in some remote areas of the site could pose significant cancer risk to future workers.
  - Slow degradation of these chemicals leads to concern for future exposures.

2. Expert Rebuttal Report of Dr. Richard L. DeGrandchamp, PhD.
***HHRA_Rebuttal15Jun08* (85 pages, 2007)**

Rebuttal response by Dr. DeGrandchamp to critiques by Drs. Finely and Lyons on the toxicological risk assessment by Dr. DeGrandchamp (*HHRA06Feb07*).

- Introduction
- Summary of Rebuttal Responses
  - Points of agreement
    - Current and future health risks to workers in remote regions of the facility are at acceptable levels.
    - Significant risk may be associated with exposures in the central and main ditches (highly contaminated).
  - Additional information
    - Dioxins and HCB exposures and health risks are slightly higher than previously reported.
- General Rebuttal Comments for Facility Workers
  - Points of disagreement
    - Toxins are above background levels and maximum contaminant values could affect the health of workers.
- Specific Rebuttal Responses to Finely's Report
  - Points of disagreement
    - Contaminants of concern at the site include dioxins, furans, and HCB, and do not include DL-PCBs.
    - Facility cohort has dioxin body burden levels above background (e.g. facility cohort exhibits a mean body burden of 41.5 ppt, which is outside the normal background range of 15.7 to 22.8 ppt).
    - Carcinogenicity of dioxins.
  - Recalculated cancer risks are presented based on updated WHO values
- Specific Rebuttal Responses to Lyons' Report
  - Points of disagreement
    - Breadth of exposure among workers (77 of 93 workers in cohort had elevated HCB in body).
    - Source of elevated levels of HCB and dioxins in workers.
    - Influence of outlier HCB and dioxin body burdens on cancer risk level.
    - Potential health hazards corresponding to low HCB body burdens.

3. US Magnesium Conceptual Site Model for Human Exposure
***us-magnesium-poster-5-6-18-2014* (1 page, 2014)**

- Flow diagram showing exposure pathways (inhalation, oral, dermal) from contaminated media (air, liquid, solid), and receptors (workers and offsite individuals).

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Community Documents

1. US Magnesium Superfund Site-- Community Involvement Plan
***USMag_CIPSep2012* (56 pages, 2012)**

Summary of the Superfund decision-making process to determine final remedial actions, the progress being made to implement the remedy, and the general concerns from various members of the community about the site and the remediation process.

- Introduction
  - Describes the CERCLA legislation that implements the National Contingency Plan (NCP) for dealing with heavily contaminated sites on the National Priority List (NPL), commonly called "Superfund" sites, as well as describing the importance of a Community Involvement Plan at Superfund sites.
- US Magnesium and nearby community description and background
  - Provides an overview of the magnesium extraction process, site overview, maps of the facility and surrounding areas, as well as profiles of the communities around the US Magnesium facility.
- Community interests and concerns - Summary of community interviews and EPA responses
  - Current knowledge of site
  - Environmental concerns
  - Superfund stigma
  - Health concerns
  - Economic concerns
  - Remedial investigation, feasibility study, and sampling investigation concerns.
  - Communication and public outreach.
- Community involvement plan
  - Levels of engagement various community groups have with the US Magnesium facility and the remediation.
  - Tools EPA will use to interact and involve the public in decision-making process and the superfund process.
  - Contact information for federal, state, and local officials involved with the remediation at the US Magnesium facility.

2. US Magnesium Community Involvement Activities at NPL Sites
***us-magnesium-poster-7-6-18-2014* (1 page, 2014)**

- Remediation and public involvement steps

3. *US Magnesium_Region 8_US EPA* (12 pages, 2015)
An overview for the general public of the US Magnesium Superfund site.

- Site Description
  - Site location and magnesium extraction process.
- Site Risk
  - Hazardous chemicals at the site and environmental and human receptors.
- Cleanup Progress
  - Date site added to NPL (2008).
  - US Magnesium appeal to NPL listing rejected by the District Court of Appeals.
  - Phase 1A Sampling and Analysis Plan issued in 2013 by EPA (described in detail in under usmag_finalphase1a-ri-sap_14sep2013).
- Community Involvement
  - Goals of the community involvement program:
    - Inform affected communities throughout the cleanup process.
    - Provide opportunities for communities to comment and offer input

about site cleanup plans.
        - Facilitate the resolution of community issues tied to site.
    - Public comment period held by EPA in 2008 prior to NPL listing. 115 letters received expressing approval and 3 letters opposed.
    - Friends of the Great Salt Lake (FOGSL) requests and receives an EPA Technical Advisory Grant (TAG) in 2013 to help interpret data and communicate with the community.
- Land Use Controls and Other Institutional Controls
    - Institutional Controls (ICs) are emplaced to prevent further human exposure and will be implemented as the site investigations are undertaken.
- Five Year Reviews
    - The EPA conducts a review every 5 years if a contaminant is left on site. So far these reviews have not been required.
- Site Contacts
    - Includes contacts for the EPA, UDEQ, and Site Information Repositories.
- Photos
- Links

4. US Magnesium, Community Advisory Group Informational Presentation, June 19, 2014 *us-magnesium-cag-presentation-6-19-2014* (38 pages, 2014)

Overview and timeline of site remediation.

- Overview
    - US Magnesium produces ~60,000 metric tons/year of Mg and ~30 million gallons of Cl liquid.
    - Byproducts of the process include: liquid slurry containing hydrochloric-acid and chlorinated-organic compounds including hexachlorobenzene, polychlorinated biphenyl (PCB); dioxins/furan, gaseous streams containing chlorine, and hydrogen-chloride particulates/aerosols containing chlorinated organic compounds.
- Timeline
- Phase1A
- Community Advisory Group (CAG)
    - Represents diverse interests of the community.
    - Intersection between the community and the EPA.
    - Responsibilities of CAG members, example mission statements, and process for organizing members.

5. US Magnesium Site Photo Slideshow from the June 18th, 2014 Open House *us-magnesium-open-house-site-photos-6-18-2014* (70 pages, 2014)

Photographs of: ditches, waste ponds and lagoons, gypsum pile, smut piles, the barium sulfate area, landfill, surrounding buffer areas, sanitary lagoon, and airshed.

Phase 1A

1. Phase 1A Remedial Investigation Sampling and Analysis Plan to Identify Chemicals of Potential Concern in Soils, Sediment, Solid Waste, Water, and Air, and Receptor Surveys *usmag_finalphase1a-ri-sap_14sep2013* (394 pages, 2013)

Phase IA (remedial investigation phase) covers sampling and analysis of chemicals of potential concern (COPCs), and identifies exposure pathways and receptors.

- Section A (Project Organization)
  - Personnel responsibilities, communication pathways, special training, and planning sessions.
- Section B (Preliminary Conceptual Site Model and Problem Definition)
  - Site setting, potential nature and extent of contamination, conceptual site model (CSM) for human and ecological receptors.
    - Identification of data gaps and needs, and overview of investigation approach.
  - Hydrologic setting:
    - Topographic high underlain by silts and sands with high transmissivity, allowing hydraulic communication between wastewater and surrounding aquifer.
    - Unconfined aquifer surrounding site presumably drains into Great Salt Lake.
    - Mounded groundwater beneath site suggests leakage from waste ponds to surrounding aquifer.
  - Primary COPCs in soil and sediment are PCDDs/PCDFs, PCBs, and HCB.
  - Groundwater contamination less extensive than soil and sediment contamination. Groundwater contaminants include HCB, PCDDs, and PCDFs in isolated areas, and localized VOC plume.
  - Title V operating permit for Cl_2 and HCl pose far lesser health threat relative to contaminants in soil and water.
- Section C (Data Quality and Objectives)
  - Data quality objectives and sampling strategies for Phase 1A.
  - Exposure unknown to facility workers and other individuals (ranchers, brine-shrimp collectors, recreational visitors, and hunters). Human Health Exposure Survey Work Plan to be conducted.
  - Final Habitat and Wildlife Survey and Mapping developed to characterize ecological receptors and pathways.
- Section D (Sampling and Analysis)
  - Measurement performance criteria, secondary data criteria and limitations, project goals, timelines, and sampling locations.
- Section E (Quality Assurance)
  - Standard operating procedures, instrument calibration and maintenance, quality assurance, verification, and validation worksheets.

2. Aerial Photos

usmag_finalphase1a-ri-sap_attachment10a-aerialphotos_082313 **(9 pages, 2013)**

Aerial photos of the site from 1966, 1981, 1986, 1987, 1993, 1998, 1999, 2002, and 2009.

3. Site Photographs

usmag_finalphase1a-ri-sap_attachment10b-aerialphotos_082313 **(73 pages, 2013)**

Site photos of preliminary remedial investigation areas (PRIs) including: ditches, landfill, sanitary lagoon, gypsum pile, waste lagoons, smut piles, barium sulfate area landfill, ATI titanium plant, US Magnesium ancillary worker exposure area, and buffer areas.

4. Cover Letter

***usmag_finalphase1a-ri-sap_coverlettter-attachemnts_26sep2013* (149 pages, 2013)**

Cover letter to Mr. Gibby, the Environmental Manager at US Magnesium, and the following attachments:

- Attachment 1: EPA Response to ERM and US Magnesium May 21,2013, Letter.
  - EPA has final decision making authority and is not required to agree with ERM/US Magnesium.
  - EPA denied alternative sampling method suggested by ERM/US Magnesium.
  - ERM/US Magnesium requested to skip or delay the COPC selection step denied.
  - ERM/US Magnesium request denied regarding bypass of deep sediment sampling for COPCs on basis that historic and current contamination processes are equivalent.
  - ERM/US Magnesium request denied regarding bypass of waste lagoons sampling on the basis of difficulty. EPA denied request on the basis of need for random sampling.
  - EPA required repeat air samples by ERM/US Magnesium on basis that initial samples did not follow EPA protocol.
- Attachment 2: EPA response to ERM June 6, 2013, Comment Letter
  - Response to ERM's comment letter on Draft Phase 1A. Most responses reference Attachment 1.
  - Majority of comments refer to incorrect methods and typographical errors in Draft Phase 1A.
- Attachment 3: EPA Response to June 12,2013, Memorandum Regarding PCB Method 680/8270 Analysis
  - Letter to Mr. Abranovic (ERM) detailing the steps necessary to approve the use of Method 680/8270.
- Attachment 4: EPA Responses to ERM Comments on May 2013 Draft Phase 1A SAP
  - Tabular record of ERM's comments and the EPA's responses.
- Attachment 5: Agency (EPA) Consideration of the RI/FS Process for Inner PRIs: 1, 3, 4, and 5-7
  - ERM states that ditches, sanitary lagoon, gypsum pile, and waste ponds too heavily contaminated to be sampled.
  - EPA approved ERM request to skip Phase 1A and assess the extent and nature of the contamination during Phase 1B for the above PRIs.
- Attachment 6: Final Phase IA Remedial Investigation Sampling and Analysis Plan (CD)

5. Technical Memorandum for Oversight of the Phase 1A Remedial Investigation in PRI Areas 2 and 8 through 17

***us-magnesium-ou1-tech-memo-phase-1a-ri-8-19-2014* (227 pages, August 19, 2014)**

Details oversight and split sampling activities during Phase 1A event (Oct 2013-May 2014).

- Introduction:
  - General split sampling and oversight approach
  - Summary of field oversight activities and split sample collection
- Phase 1A Remedial Investigation Field Observations:
  - Deviations from Phase 1A OS QAPP
    - Alterations and inconsistencies between the quality assurance project plans (QAPP) and the sampling events
  - Deviations from Phase 1A RI SAP

        - Alterations and inconsistencies between the sampling and analysis plan (SAP) and the sampling events
    - Observations and other field activities
        - Each PRI divided into four quadrants, with two Phase 1A target sampling stations chosen at random within each quadrant for sieve sample collection rather than based on soil type
        - Samples processed for shipment at Muskrat Fire Station, Tooele County.
        - Breach of wastewater from PRI Area 6 occurred starting in November 2013, which extended into PRI Area 8 and northward off of US Magnesium property onto BLM-Federal Land.
        - Breach of wastewater from PRI Area 6 to PRI Area 7 between February and March of 2014.
        - Variable wind conditions result in inconsistent patterns of air releases, including "looping" patterns where the plume reaches the ground near the stack, as well as the plume reaching far beyond the 5-mile radius preliminary study boundary under calm conditions.
        - Wildlife species observed in and around the US Magnesium facility
        - Five staff gauges installed to monitor water levels of waste lagoons
        - Spectrophotometer, water quality meter, and a photoionization detector (PID) that were used onsite for measurements required field calibration, and were decontaminated in general accordance with SOP USM-03 *Equipment Decontamination*.
        - Investigation-Derived Waste (IDW) disposed in accordance with SAP. Used personal protective equipment (PPE) and IDW was disposed at site.
        - Field data sheets and log books used to document field activities and has provided electronic copies to the EPA
        - Sample location coordinates logged using GPS unit in accordance with SOP USM-11.
    - Health and Safety Considerations
        - General health and safety approach
        - Health and Safety issues encountered during Phase 1A field activities
    - Specific Field Observations at PRI Areas 2, 3, 4, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, and 17
        - Site descriptions, health and safety concerns, sampling requirements, and general observations of each PRI Area listed
- Conclusions and Recommendations
    - Summary of surface solid samples, subsurface solid samples, surface water samples, and groundwater samples collected by ERM, as well as the split sampling by PWT with the support of Tetra Tech.
    - Overall consistency in application of sampling protocols and documentation, but some areas could be improved:
        - EPA and ERM should use same sample containers;
        - Investigative and split samples should have same post-processing procedure
        - Work locations should be flexible based on weather conditions and potential hazards
        - The water sample splitter's funnel shaped reservoir should be filled above the exit ports in order to have more consistent flow.

        - To the extent possible, collocated samples should be collected at the same time.
    - SOPs overall sufficient, with some areas flagged for improvement:
        - Additional aliquots should be advised for surface soil, sediment, and waste sampling
        - Ensure adequate sample volume is collected for subsurface soil, sediment and waste collection, as well as homogenization technique.
        - Identify the screened interval where samples will be collected for groundwater
        - Equipment decontamination procedures in SOP USM-10 should be revised to be consistent with SOP USM-03
- Tables
    - Sample and Split Sample summary
    - EPA Laboratory Identification
    - Phase 1A RI SAP Completed and Approved Field Modification Forms
- Figures
- Appendices
    - Log books
    - Split sampling field data sheets
    - Photographic Documentation

6. Phase 1A Remedial Investigation Sampling and Analysis Plan for Operable Unit 2- Ambient Air (Revision 1)

us-magnesium-ou2-phase-1a-ri-sap-8-6-2014 (1798 pages, 2014)

ERM-generated Phase 1A remedial investigation sampling and analysis plan (SAP) for ambient air.

- Introduction
    - Standalone document regarding air-related sampling and contamination to fill in placeholders in the 2013 Phase 1A RI SAP.
- Worksheets
    - Individual roles for risk assessment including contact information and responsibilities.
    - Generation and completion of Phase 1A.
    - Manual for quality assurance and quality control (QA/QC) and sampling techniques.
    - Standard operating procedures for labs completing analyses in Phase 1A.
    - Operation manuals for various instruments used in sampling.

7. *us-magnesium-fact-sheet-4-6-2014 (2 pages, 2014)*

Summary of US Mag_Region 8_US EPA

- Site description, site risks, cleanup progress, and community involvement.

8. US Magnesium Superfund Site Update

us-magnesium-update-fact-sheet-2-2015 (1 page, 2015)

Short progress report from February, 2015.

- Site Progress:
    - Phase 1A sampling completed in 11 of the 18 preliminary investigation areas.
    - Geophysics and drilling sampling at the landfill on site completed.

- Initial surface water sampling completed.
- Initial groundwater sampling completed.
- Preliminary site conceptual models completed.
- Phase 1A Air Sampling and Analysis Plan finalized to identify chronic airborne contaminants being released from the facility.

Pending:

Phase 1AB SAP: PRIs not covered in Phase 1A SAP (PRIs 1-7)

Completed 2015, not yet available to public

Demonstration of Methods Applicability (DMA) Report

Not yet completed