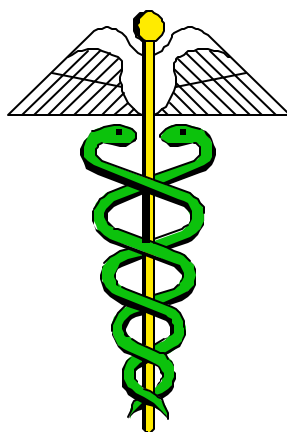


**Rocky Mountain Arsenal
Medical Monitoring Program Recommendation
Final Report**



**Prepared By:
Rocky Mountain Arsenal
Medical Monitoring Advisory Group**

**Submitted To:
Colorado Department of Public Health and Environment**

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Preface

I am appreciative of having had the opportunity to be a part of this sometimes tedious but always stimulating endeavor.

Hats off to my fellow citizen volunteers who contributed so many hours and so much energy toward this project. Whether your input was in full agreement or emphasized differences with direction or scope, your intent and concern to produce the best possible plan for the surrounding communities was clear to all. Your persistence undoubtedly influenced a philosophical approach weighted to produce a strategy protective of the public health.

Thanks also to all the staff from the many agencies and offices involved. Your dedication and skill were most appreciated and admired.

A special word of thanks goes out to the personnel that represented the Colorado Department of Public Health and Environment. The quantity and quality of your work was absolutely incredible.

This process was very task oriented while being open and inclusive. Substantial effort was expended to hear and discuss a variety of viewpoints, with protection of the public health the goal and paramount concern. That type of direct, frank discussion—while producing an impressive set of recommendations—does leave some things more gray than black and white.

A remediation project of this magnitude is bound to create differing views on its direction and scope. These recommendations do not represent lockstep agreement with the parties or the regulators points of view. Neither do they fulfill the ideal desires of every faction of the MMAG. What these recommendations do represent is a genuine, sincere attempt to complete our charge—to develop and submit specific recommendations defining goals, objectives, and the methodology of a program designed to respond effectively to the health concerns of the community related to the RMA remediation. Attempts to portray this group as having not fulfilled its charge are inaccurate and is a disservice to all involved in this two year plus effort. We were required to act within a definite set of realities, not infinite what ifs and maybes. This set of realities included financial and technological restraints. The prime example is available technology. The technology in the field of remediation is relatively primitive as compared to other scientific endeavors. Over the lifetime of this project I am sure this will change as experience increases and unknowns are reduced.

By most reasonable measures the charge was generally fulfilled. I only qualify the result because there are unknowns ahead.

I offer a final observation. There was an obvious trust gap throughout this process toward the parties and regulators from some members of the MMAG. Past actions, policies and practices by the RMA community contributed to this lack of trust. Trust issues will only be dealt with through the passage of time and performance that meets expectations. We can continue to operate on fear and distrust or we can utilize and believe in an approach based on reasonable concern and that those in positions of authority will work with the best interest and safety of citizens in mind. I choose to trust that the unknowns of this endeavor will be dealt with professionally, effectively and in the best interest of the community.

Sincerely,

Bennie L. Milliner
Chair, MMAG

Introduction

This document reports the Rocky Mountain Arsenal Medical Monitoring Advisory Group's (RMA, MMAG) recommendations to the Colorado Department of Public Health and Environment (CDPHE). The report includes a brief history of the creation and responsibilities of the MMAG, a summary of the MMAG's recommendations demonstrating how each interrelates to the others, the full text of each recommendation, and related materials.

Record of Decision

The On-Post Record of Decision (ROD), which describes the selected remedial action for the RMA cleanup, was signed by the U.S. Army, the U.S. Environmental Protection Agency (EPA) and the CDPHE on June 11, 1996 with concurrence of the U.S. Fish and Wildlife Service and Shell Oil Company. The U.S. Army, serving as the lead agency, and Shell will implement the ROD which includes 31 restoration projects for contaminated soil, structures and ground water. Federal, state and local public health agencies will conduct regulatory oversight. The cleanup effort includes the excavation of greater than 2 million cubic yards of contaminated soil over more than ten years. In response to community concerns that public health protection play a paramount role in the site remediation, a provision was included in the ROD directing that a medical monitoring program be instituted.

The ROD also stipulated that a medical monitoring advisory group be formed to evaluate information concerning exposure pathways and to identify and recommend appropriate public health actions and to communicate this information to the community. The Advisory Group recommendations are intended to define the goals, objectives and methods of a program designed to respond effectively to RMA-related health concerns of the community. The ROD directed that the MMAG include representatives from the affected communities, regulatory agencies, local governments, Army, Shell Oil Company, U.S. Fish and Wildlife Service, and independent technical advisors.

The ROD stated that the primary goals of the Medical Monitoring Program are to monitor any off-post impact on human health due to the remediation and provide mechanisms for evaluation of human health on an individual and community basis, until such time as the soil remedy is completed.

Medical Monitoring Advisory Group

The first meeting of the RMA Medical Monitoring Advisory Group was held December 6, 1995. The initial steps in this and subsequent meetings of the MMAG were to develop its ground rules and the following statement of purpose:

“On behalf of the communities surrounding the RMA, develop and submit to CDPHE and Agency for Toxic Substances and Disease Registry (ATSDR) specific recommendations defining goals, objectives, and the methodology of a program designed to respond effectively to the health concerns of the community related to the RMA remediation.”

Since the drafting of the statement of purpose, ATSDR has shifted its responsibility from co-recipient and implementor of the Program with CDPHE to providing technical program consultation to EPA. This change results in CDPHE functioning as the principal recipient of the MMAG’s recommendations. The CDPHE will use these recommendations to develop and implement the Program.

Another initial action of the MMAG was to identify the following goals:

- < Inform the communities about the remediation
- < Identify the health concerns related to remediation
- < Use technical expertise to formulate scientifically sound goals and objectives addressing the identified health concerns
- < Identify scientifically sound methods to achieve the goals and objectives which will provide conclusive, definitive and clearly interpretable results
- < Prevent exposure and or disease
- < Be sensitive to non-health-related community concerns and values
- < Continuously communicate the MMAG’s process, conclusions and decisions with the affected communities and encourage their feedback into the process

The MMAG agreed that elements of the program may include medical monitoring, surveillance of sentinel events, environmental monitoring, health and community education or other tools. Program design was to be determined through an analysis of community needs, feasibility and effectiveness.

The MMAG undertook a process to identify the breadth of the group’s expectations and to identify areas of general consensus or “key performance areas.” This process ultimately led the MMAG to focus on four key performance areas: Baseline/Human Health Assessment, Emergency Preparedness, Environmental Monitoring, and Public Involvement and Education. Completing this task required two years, using a process of data collection, analysis and discussion followed by recommendation preparation.

The MMAG made a significant effort to achieve consensus among its members. Although most recommendations sent to the full MMAG for approval were finalized with consensus among the originating subcommittee members, a number of areas remain in disagreement.

Because of the diversity of opinions within the full MMAG, and the need to move forward with timely program recommendations, a voting mechanism was adopted which placed greater weight on the opinion of community representatives than on that of members representing government agencies. This

mechanism took the place of consensus voting.

The voting mechanism ensured community participation in decision making. When voting to accept or reject a recommendation, the following requirements were satisfied: Seventy-five percent of the MMAG members must be present. Seventy-five percent of the community representatives, or five out of the six, must be present. Of the community members present, the majority carries the vote.

The MMAG membership was not able to reach agreement on all topics and agreed that if members believe the final recommendations have not addressed critical issues, those members have the opportunity to submit a minority report. A minority report identifies the unresolved issue and states the MMAG or subcommittee member's minority opinion.

MMAG Membership

Consistent with the Record of Decision, the MMAG had initial representation from the affected communities, including Commerce City, Montbello, Henderson, and Green Valley Ranch, from regulatory and local government agencies, including ATSDR, Colorado Department of Public Health and Environment, Denver Health and Hospitals (now Department of Environmental Health), Environmental Protection Agency and Tri-County Health Department (TCHD), as well as from Army, Shell Oil Company, U.S. Fish and Wildlife Service, and the Site-Specific Advisory Board (SSAB). Independent technical advisors also participated at the MMAG's request. Many people have participated over the life of the MMAG. The individuals listed below have demonstrated a long-term commitment and are responsible for the development of the recommendations contained in this report.

MMAG Members

Bennie Milliner - Montbello citizen
MMAG Chair

Roland Russell - Commerce City citizen
MMAG Co-chair

Dot Colagiovanni, PhD - Citizen SSAB member
Bruce Cooper, MD - Interested Physician
Mary Davis, PhD - Montbello citizen
Ronel Finley - USF&WS/RVO
Beth Gallegos - Commerce City citizen
Tim Kilgannon - Army/RVO

Larry Kimmel - EPA
Scott Klingensmith, PhD - Shell/RVO
Betty Pepin - Commerce City citizen
John Student - Denver Dept. Envir. Health
Chris Wiant, PhD - TCHD
Michael Wilson, PhD - CDPHE

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Greg Bogdan, PhD - Rocky Mountain Poison
and Drug Center
Tom Butts - TCHD
Dan Collins - TCHD
Cindy Fullerton - TCHD
Sandy Jaquith - Citizen
Julia Korndorfer - CDPHE
Holly Mangers - CDPHE and
MMAG Coordinator
Jim McKinley, MD - Shell Consultant
Dan Mulqueen - Citizen
Barbara Nabors - CDPHE

Chris Poulet - ATSDR and
EPA consultant
Karen Prochnow - Gannett Fleming and
EPA consultant
Glenn Tucker, PhD - ATSDR and
EPA consultant
Susan Ulrich - RVO
Rick Warner - Citizen
Cathy Coffey-Weber - MGA and
Shell Consultant

Independent Technical Advisors

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Medicine, University of Colorado

Subcommittee Process

The MMAG used a process known as “Affinity Diagraming” to identify its key performance areas. Affinity Diagraming grouped the broad and numerous topical interests of the Advisory Group members. The MMAG believed that by specifically addressing these six areas, the result would be a plan for a successful program. These six elements included: 1) Baseline Health Study, 2) Emergency Preparedness, 3) Public Involvement, 4) Human Health Monitoring, 5) Environmental Monitoring and 6) Public Education/Communication. The most effective way to accomplish this task was for the MMAG to form small working groups, or subcommittees. Each subcommittee was then assigned one or two of the six key performance area topics.

Subcommittee Mission Statements

Each subcommittee produced a mission statement in order to focus their work on developing recommendations.

- < *Baseline/Human Health Assessment Subcommittee:* Design methodology to address health concerns, status and risks of the community related to the RMA remediation.

- < *Environmental Monitoring Subcommittee:* To understand, review and evaluate environmental monitoring procedures for the RMA/surrounding community and develop recommendations concerning their adequacy for meeting human health and environmental

criteria during remediation.

- < *Emergency Preparedness Subcommittee:* To review existing emergency preparedness plans for the Rocky Mountain Arsenal and surrounding communities to ensure continuity and identify necessary processes that will provide community awareness, safety and notification during remediation activities.
- < *Public Involvement and Education Subcommittee:* Identify and recommend strategies to promote public awareness and ensure opportunities for community involvement in the RMA Medical Monitoring program.

Subcommittee Recommendations and Minority Reports

A list of the MMAG's recommendations and minority reports is provided below and are categorized according to Advisory Group's subcommittees and key performance areas. Following this listing, a summary highlights the primary elements of each recommendation and describes how they are functionally interrelated. The complete text of each recommendation and minority report is included as appendices to this report.

Baseline/Human Health Assessment

- < Remediation Monitoring - Medical Referral & Biomonitoring Decision Tree
- < Guidelines for Public Health Responses to RMA Related Exposure and Observations of Health Concerns Among Communities and Visitors
- < Medical Referral System & Health Professional Education
- < Surveillance for Birth Defects
- < Monitoring Cancer Incidence
- < Minority Report

Emergency Preparedness

- < Emergency Preparedness Recommendations

Environmental Monitoring

- < Air Quality Monitoring
- < Odor Monitoring
- < Environmental Monitoring Community Outreach
- < Environmental Monitoring Data Presentation Techniques

Public Involvement and Education

- < Medical Monitoring Program Communication Plan

General

- < Citizen Advisory Board
- < Minority Report

Summary of Recommendations

A key component of the Rocky Mountain Arsenal Medical Monitoring Program is exposure prevention, as summarized in the recommendation *Remediation Monitoring - Medical Referral & Biomonitoring Decision Tree*. This key component relies on the effective planning of the soil remediation and a well-designed air monitoring program. Air monitoring, both on-site and at the fence line, will help site managers determine if contaminant emissions, in excess of health-protective limits, have escaped emission control efforts. This information will be analyzed and used to take corrective actions on-site and to determine whether the release poses a threat to public health. The Medical Monitoring Program is advised to use a systematic approach to evaluate the adequacy of exposure prevention and for determining when the public health is threatened and what action should be taken.

- < This systematic approach relies on the analysis of information to answer the following questions: 1) Is an RMA chemical of concern (COC) detected at the fence line? 2) Is the fence line level of the COC in excess of fence line acute or chronic limits? 3) What is the duration of the exposure beyond the fence line? 4) Are there patterns or trends in reported health conditions within the communities?
- < The most effective and responsive public health action will be dependent on a variety of toxicological and public health factors. Actions may include health outcome studies, exposure or epidemiological studies or professional education. The selection of the appropriate action will be based on a systematic evaluation of the available data.

To facilitate public health information analysis, the MMAG developed the recommendation *Guidelines for Public Health Responses to RMA Related Exposure and Observations of Health Concerns Among Communities and Visitors*. This recommendation describes a more technical and systematic procedure for initiation of a public health response through the evaluation of environmental monitoring or modeling data or medical data from surveillance systems.

- < The *Guidelines* describe the responsibilities of public agencies and the RVO with respect to citizen inquiries, complaints or medical concerns, communication of remedial activities and data analysis and public health response.
- < Included in the *Guidelines* are recommended criteria for the selection of appropriate public health activities, information on laboratory selection, an analysis of the effectiveness of biomonitoring versus air monitoring for evaluating human exposure to environmental contaminants, and in the event that biomonitoring is a selected action, a statement of the desired goals.

To support the use of the *Decision Tree* and the *Guidelines* recommendation data needs, both environmental and health status indicator data will be collected.

Throughout the cleanup, air, ground water and surface water quality will be measured to assure public health is protected. The MMAG focused on the air quality and odor monitoring programs because the air pathway has the greatest potential for impact on human health during the soil remediation due to potentially harmful levels of airborne contaminants or enjoyment of personal property due to nuisance odors. The RVO's site-wide air quality monitoring program provides for multiple layers of monitoring around each remediation project at the RMA. The goal of the monitoring program is to immediately identify unacceptable level of airborne contaminants, rapidly trigger corrective actions to control or stop unacceptable levels, and to document representative average concentrations for assessing long-term exposure conditions.

To enhance community assurance and to support the data needs of the *Decision Tree* and *Guidelines* process, the MMAG developed the *Air Quality Monitoring* recommendation. This recommendation describes additional elements that should be included in the Remediation Venture Office's (RVO) air monitoring program.

- < While the RVO's plan includes air monitors at the RMA fence line and interior locations, the MMAG recommended that additional air monitors be placed in the adjacent communities. *Air Quality Monitoring* includes recommended criteria for the selection of appropriate community locations.
- < Visitors often access the RMA Administration Area; therefore, the MMAG recommended that this area be treated as a Visitor Destination area for air criteria limits and monitoring.
- < Air quality sampling frequency should be heightened during the startup period for a new remediation activity and in response to unexpected field conditions. Expedited evaluation and response protocols should be defined. The MMAG also recommended using preliminary air data in the evaluation of air quality status for greater responsiveness.
- < The MMAG recommended that the RVO and CDPHE use innovative ways of making the measured data available to interested communities members, including the enhanced computerized data management system.

The RVO's approach for monitoring odors during the soil cleanup is described in a Site-wide Odor Monitoring Plan. In light of the communities' experience with past remedial activities, the MMAG advised several key additions to the plan in its *Odor Monitoring Program* recommendation.

- < Amend the Site-Wide Odor Monitoring Plan to adopt a goal of no RMA-related nuisance

odors in the communities. The MMAG concluded that the odor goals and corresponding response criteria proposed in the draft Plan were inadequate.

- < A contingency plan for a community odor reporting plan should be included as a supplement to a regular and rigorous odor monitoring program. Program design elements and implementation triggers were detailed in the *Odor Monitoring Program* recommendations.
- < Improve response to RMA-related odor complaints that originate in Denver County. The MMAG recommended that Montbello residents be informed of TCHD's RMA odor hotline and that TCHD and Denver Department of Environmental Health enhance their communications.

Health status indicator data will be collected through Medical Monitoring Program individual and community contacts and through the Medical *Referral, Birth Defects* and *Cancer Surveillance Systems*.

The *Medical Referral System & Health Professional Education* recommendation was developed recognizing the importance of having informational resources available to both health professionals and lay citizens. The recommendation calls on the Medical Monitoring Program and the Rocky Mountain Poison and Drug Center (RMPDC) to collaborate in providing these resources for the duration of the RMA soil remediation. These services will be available to anyone who believes his, her or a patient's health has been affected by RMA-related contaminants.

- < The *Referral System* is not intended as a substitute for existing doctor-patient relationships. Although residents living in communities surrounding the RMA who believe his or her health had been affected by RMA-related contaminants are encouraged to seek advice and care from their personal physician, this may not always be possible. Therefore, individual lay citizen may also access information and advice from the RMPDC.
- < Any health-related information collected about an individual will be treated confidentially and will only be released as directed by the patient, such as to his or her personal physician. Information will otherwise only be released in a summary form without personal identifiers or information which might lead to the identification of any patient.
- < The RMPDC will communicate their observations of potential exposure and other health concerns to Program staff who will track this information as described in the *Decision Tree* and *Guidelines* recommendations.
- < To increase the awareness and understanding of the RMA soil remediation among health professionals, the MMAG recommended that existing health professional education resources at the CDPHE be supplemented and focused on health professionals serving the communities

surrounding the RMA. Health professionals will be provided useful information about RMA-related health issues addressing such topics as the RMA remediation plan, exposure and health risks of site chemicals, and emergency preparedness. They will also receive information about professional resources and referrals available through the RMPDC.

The MMAG has recommended that the Medical Monitoring Program track rates of both birth defects and cancer.

- < The *Surveillance for Birth Defects* recommendation advises the Program to rely on Colorado Responds to Children with Special Needs (CRCSN), the State Health Department's existing birth defects registry, to pursue birth defects surveillance in the communities surrounding the RMA. The principal goals for this surveillance system are identified as: 1) Establish baseline rates of birth defects; 2) Monitor rates for temporal or spatial changes from the baseline; 3) Provide early intervention and support service referrals to families of children with birth defects; and 4) Investigate increased rates of birth defects.
- < Similarly, the MMAG recommends in *Monitoring for Cancer Incidence* that the Program use the CDPHE cancer registry, the Colorado Central Cancer Registry (CCCR), to satisfy the following goals for the communities surrounding the RMA: 1) Establish baseline rates of cancer incidence; 2) Analyze cancer incidence rates for significant temporal or spatial changes during and after the RMA soil remediation; and 3) Investigate increased rates of cancer.
- < As with the *Referral System*, the confidentiality of personal identifying information of persons and families contained in both the CRCSN and Cancer Registry will be strictly protected.

Although the RVO and the CDPHE will use environmental monitoring data to engage in collaborative analysis and decision making, responsibility and authority for the identification of appropriate public health actions and subsequent oversight is assigned by the *Guidelines* recommendation to the Health Response Review Panel (HRRP). The HRRP will rely on its independent analysis of all available environmental and health-related data as well as technical input from the RVO to accomplish its assigned task. Actions might include collection and analysis of additional health or environmental data, determination of the appropriate response, implementation of the response and evaluation of the effectiveness of the action taken. The membership of the HRRP includes representatives from all involved public health and environmental protection agencies (CDPHE, EPA, TCHD, and Denver).

The MMAG also prepared recommendations for a communication plan which will keep the communities surrounding the Rocky Mountain Arsenal informed of the Program components, including air, odor, birth defects, cancer and other health monitoring data.

- < The *RMA Medical Monitoring Program Communication Plan* focuses on strategies to promote public awareness and opportunities for community involvement in the Medical Monitoring Program. This recommendation incorporates many different opportunities for the communities to learn about the Medical Monitoring Program and related data. This recommendation will be periodically revisited by community representatives and public health professionals to ensure that the information generated by the Program is reaching the communities in an understandable language and form.

- < Other MMAG recommendations were made to ensure many avenues of communication will take place. The *Medical Referral System & Health Professional Education* recommendation reaches the public health professional and medical communities along with the general communities.

- < In *Environmental Monitoring Community Outreach*, the MMAG recommended a tiered approach to air quality data availability to ensure community awareness and increase public confidence. The entire data set will be made available to interested persons through the Army's Joint Administrative Record Document Facility. A second level of data availability is the Medical Monitoring Program Web Page, transmitting detailed summaries of the environmental data. Finally, a periodic Medical Monitoring Program community bulletin will contain a top-level synopsis of the previous quarter's or year's air monitoring data. The *Environmental Monitoring Data Presentation Techniques* presents a general approach for simple but technically correct air quality data presentation.

- < Exploring partnerships with local schools and developing educational opportunities by providing resources and tools was advised by the MMAG in the *Environmental Monitoring Community Outreach* recommendation. This can be accomplished by using the Air and Waste Management Association environmental education program for interested school districts near the Arsenal and by enhancing the existing RMA environmental education program led by USF&WS.

- < Air monitors, as described in the *Environmental Monitoring Air Quality Monitoring Program Recommendation*, and previously in this summary, should be placed in the communities to allow active participation of students and or community members to view and learn about the air monitoring equipment. The community members also should be able to electronically access the measured data.

The MMAG also prepared a recommendation based on an evaluation of current emergency contingency plans of federal, state, city, and local governments and entities. This evaluation was performed to assure efficient and effective emergency response capabilities for the surrounding communities during the remediation of the RMA, in the event an emergency occurs.

- < The *Emergency Preparedness Recommendations* are based upon an evaluation of various emergency response and contingency plans and interviews of key responders to potential emergency response situations related to the RMA. Processes are described by which agencies coordinate with one another in the event of an emergency at the Rocky Mountain Arsenal.
- < The recommendation identifies plausible emergency scenarios at the RMA, such as: fire, on or off-post chemical spills, transportation-related spills, unexploded ordnance, release of chemical warfare materials and or airplane crashes on the Arsenal.
- < A variety of improvements in communication systems, equipment, and mutual aid agreements are recommended. Enhancements to periodic testing, training and exercises are also advised.

To ensure the communities have an advisory role in the implementation of the Medical Monitoring Program, the MMAG recommended that a *Citizen Advisory Board* (CAB) be created. Establishing the CAB creates a forum in which representatives from the communities surrounding the RMA, the parties, local health departments and the SSAB or Restoration Advisory Board interact with the CDPHE's Medical Monitoring Program staff. The responsibilities of the CAB are consistent with those of the MMAG which were defined by the ROD. The CAB is responsible for monitoring the progress and success of Program implementation as well as evaluating Program generated information concerning exposure pathways and for identifying and recommending appropriate public health actions.

The Bin

Throughout the MMAG process, unresolved issues were set aside for further consideration. This issues were said to reside in The Bin. At the completion of the MMAG's work, two documents related to Bin issues had been prepared, *Bin items to consider*, and *Bin Report Update*. These documents are include as an appendix to this final report.

Acknowledgments

The individuals and agencies listed below have contributed to the work of the MMAG and the development of the Medical Monitoring Program recommendations. For all those individuals who have given their time and effort, thank you.

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Mary Seawell
Sallie Thoreson
Michael Wilson
Heather Younger

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Bruce Cooper
Don Davis - Montbello
Michael Francis - Green Valley Ranch
Sandy Jaquith
Shirley Jentsch
Lee Kaley - Montbello
Dianna Kremheller - Henderson
Elizabeth Montgomery - Commerce City

Dan Mulqueen
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Susan Ulrich

US Fish & Wildlife Service
Ronel Finley
Casey McCutcheon

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The people listed below are community members who assisted the MMAG in identifying community concerns and what methods would ensure public health protection and a successful program.

Dot Colagiovanni - Citizen SSAB Member
Mary Davis - Montbello Community Member
Beth Gallegos - Commerce City Community Member
Bennie Milliner - Montbello Community Member, MMAG Chair
Betty Pepin - Commerce City Community Member
Roland Russell - Commerce City Community Member, MMAG Co-chair

Appendices

Recommendations, Minority Reports and The Bin

Appendix A

Remediation Monitoring - Medical Referral & Biomonitoring Decision Tree

Appendix B

*Guidelines for Public Health Responses to RMA Related Exposure
and Observations of Health Concerns Among Communities and Visitors*

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***Public Involvement and Education
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The Bin