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RSALOP

Radionuclide Soil Action Levels Oversight Panel

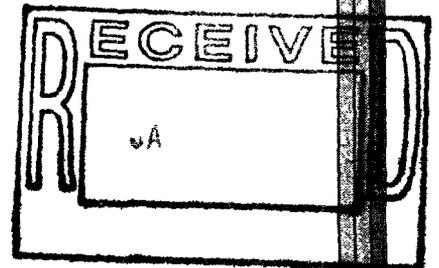
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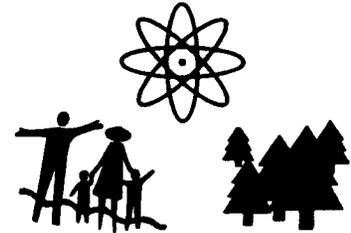
Advanced Integrated Management Services Inc
5460 Ward Road Suite 370
Arvada CO 80002
(303) 456 0884 fax (303) 456 0858

1998/1999





Radionuclide Soil Action Level Oversight Panel



AGENDA

**Public Meeting –September 8, 1999 - 7:00 - 9:00 P.M.
Broomfield City Building - City Council Chambers**

7 00 - 7 10	Welcome	Councilman Hank Stovall, Co-Chair
7 10 - 7 15	Agenda Review	Laura Till, Facilitator
7 15 - 7 30	Project Introduction/Background	Mary Harlow, Co-Chair
7 30 - 7 45	Project Challenges - Scenario Development - Hot Spots - Timeframe	Hank Stovall, Co-Chair
7 45 - 8 45	Project Overview/Update	Dr. John Till, President <i>Risk Assessment Corporation (RAC)</i>
8 45 - 9 00	Public Comments/Questions	Facilitator
	Wrap-Up/Thank you	Co-Chairs

UPCOMING MEETINGS



September 9	RSALOP Monthly Meeting	4-8 P M Broomfield City Building*
October 14	RSALOP Monthly Meeting	4-8 P M Broomfield City Building*
November 11	RSALOP Monthly Meeting	4-8 P M Broomfield City Building*
December 9	RSALOP Monthly Meeting	4-8 P M Broomfield City Building*
January 13, 2000	RSALOP Monthly Meeting	4-8 P M Broomfield City Building*

IMPORTANT NOTE: TECHNICAL DISCUSSIONS ARE SCHEDULED FROM 2:30 - 3:30 IN THE BAL SWAN CONFERENCE ROOM - ADJACENT TO ZANG'S SPUR - PRIOR TO ALL MEETINGS

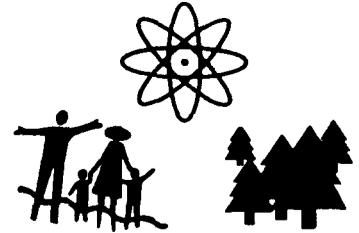
*Broomfield City Building One Descornes Dr - Zang's Spur/Bal Swan Conference Rooms (lower level)

CHECK OUT THE RSALOP WEB SITE: www.rfcab.org/SALOP.html

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Radionuclide Soil Action Level Oversight Panel



NEWS RELEASE

For Immediate Release

Contact Carla Sanda, AIMS
(303) 277-0753

REVIEW OF PLUTONIUM IN ROCKY FLATS SOILS NEARS COMPLETION

Westminster, Colo , September 2, 1999 – Several key decision points have been made in a study currently underway to determine how much plutonium can legally remain in the soil following cleanup at Rocky Flats. These key issues will be discussed at a public meeting scheduled from 7:00 – 9:00 p.m. on Wednesday, September 8, 1999 at the Broomfield City Building Council Chambers, One Descobes Dr , Broomfield, CO. Representatives from both the citizens panel formed to oversee the study and the technical contractor will provide background information and updates on the project.

This is the second public meeting held since formation of the Radionuclide Soil Action Level Oversight Panel, which was funded by the Department of Energy to oversee a technical review of interim radionuclide soil action levels established for Rocky Flats, the former nuclear weapons production plant located in Jefferson County. In October 1998, the Panel selected Risk Assessment Corporation (RAC) to conduct the technical review, which is scheduled for completion in November 1999. Panel members and RAC scientists have worked together to select a computer program that will be used to review the soil action levels and have developed scenarios that will be used in the program to arrive at a recommended soil action level.

This public meeting is the second of three to be scheduled throughout the course of the project. Briefings will explain why the community is concerned about plutonium in the soil at Rocky Flats, why the study is being conducted, what has been learned so far, and what will be accomplished by November. For additional information regarding the meeting or the study, please contact Carla Sanda, Advanced Integrated Management Services, Inc , at 303-277-0753.

NEWS RELEASE

For Immediate Release

Contact Carla Sanda, AIMS
(303) 277-0753

HOW MUCH IS "TOO MUCH" PLUTONIUM IN ROCKY FLATS SOILS?

WESTMINSTER, Colo , March 5, 1999 --National attention is focusing on a study currently underway regarding soil cleanup levels for Rocky Flats, the former nuclear weapons production plant located in Jefferson County. A public meeting is scheduled from 6:30 - 9:00 p.m. on Wednesday, March 10 at the Westminster City Hall, 4800 W. 92nd Ave., Westminster, CO. The evening will begin with a 30-minute open house designed to provide background information, followed by briefings regarding the progress to date and future goals for the study.

As Rocky Flats moves closer to final remediation goals, one of the primary challenges facing site officials and residents is determination of the amount of radionuclides, such as plutonium, that may legally remain in the soil following remediation. These levels are known as "radionuclide soil action levels" because remediation is triggered when the amount of radioactive material in the soil exceeds established levels. A cleanup agreement negotiated in 1996 between site officials and its regulators set interim levels for plutonium and other contaminants that could remain in the soil at the site. Some members of the community, however, believed that those interim levels were too high. As a result, the Department of Energy agreed to fund a citizen-directed, independent review of the calculation of the soil action levels. To provide oversight of the study, the Radionuclide Soil Action Levels Oversight Panel (Panel) - comprised of scientists, local government representatives and citizens - was formed in 1998. After a formal bidding process, the Panel selected *Risk Assessment Corporation (RAC)* to conduct the technical review. Work has been proceeding since last fall and is scheduled for completion in November 1999.

This public meeting is the first of three to be scheduled throughout the course of the project. Briefings will explain why the community should be concerned about plutonium in the soil at Rocky Flats, why the study is being done, what has been learned so far, and what is planned for the future. Panel members and RAC representatives will be on-hand to answer questions and further explain the ongoing work. There will also be time for public comments and questions. For additional information regarding the meeting or the study, please contact Carla Sanda, Advanced Integrated Management Services, Inc., at 303-277-0753.

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NEWS RELEASE

For Immediate Release

Contacts: Erin Rogers, Rocky Flats Citizens Advisory Board, (303) 420-7855
Anna Corbett, AIMS, (303) 456-0884

ROCKY FLATS SOIL ACTION LEVEL REVIEW PANEL INVITES MEDIA TO HEAR PROJECT UPDATE

WESTMINSTER, Colo , December 8, 1998 -- The Rocky Flats Soil Action Level Oversight Panel is inviting interested members of the public and media to a project update on Thursday, December 10. The Panel is overseeing a project to evaluate the calculation of radioactive soil cleanup levels for Rocky Flats. The Panel's technical contractor began work on this project in October and will be presenting some of the preliminary data it has collected. Topics will include cleanup levels at other sites and computer models used for calculating these numbers.

This meeting will be a useful opportunity for people not involved in the study to keep up with the progress of the project and to develop an understanding of the overall study methodology and goals.

This meeting will take place on Thursday, December 10, 4 – 7 p m at the Broomfield City Building, One Descobes Drive, Zang's Spur Conference Room (lower level). Please call (303) 456-0884 for directions.

The Rocky Flats Soil Action Level Oversight Panel has been awarded funding from the Department of Energy to pay for an independent assessment of controversial cleanup levels applicable to radioactive materials in soils at Rocky Flats. The project is expected to conclude in the fall of 1999. Monthly meetings of the Oversight Panel are open to the public. In addition, three broader public information and input meetings will be scheduled during the project. For an update on meeting times and locations, please contact Anna Corbett at (303) 456-0884.

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NEWS RELEASE

For Immediate Release

Contacts Mary Harlow, Co-Chair, (303) 430-2400, ext 2174
Hank Stovall, Co-Chair, (303) 466-5986

**UNPRECEDENTED STUDY UNDERWAY AT ROCKY FLATS
Community Group Selects Contractor to Study Cleanup Levels**

WESTMINSTER, Colo , October 8, 1998 -- The Rocky Flats Soil Action Level Oversight Panel announces the commencement of a unique scientific review project at Rocky Flats This community oversight panel has been awarded funding from the Department of Energy to pay for an independent assessment of controversial cleanup levels applicable to radioactive materials in soils at Rocky Flats The oversight panel has also selected a technical contractor, Risk Assessment Corporation, who will perform the assessment

In 1996, the Department of Energy, the State of Colorado and the Environmental Protection Agency established numerical standards for the cleanup of radioactively contaminated soil at Rocky Flats Almost immediately after these Soil Action Levels were established, members of the community became concerned because the numbers were much higher than expected Based on additional review, the levels were also shown to be higher than the cleanup levels established for radioactively contaminated soil cleanups in other parts of the world

The end result of ensuing discussions was an unprecedented agreement by the Department of Energy to fund a community-directed, independent scientific assessment of the calculations used to set the soil action levels Thirteen individuals sit on the oversight panel, including representatives from six local governments, two from public interest groups, three technical/scientific experts, and two citizen members

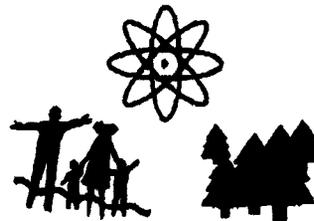
The Panel also announces the selection of Risk Assessment Corporation (RAC) from South Carolina to conduct the assessment RAC has previous experience at Rocky Flats leading an investigation into possible health effects caused by emissions from the site during production years This company has over 20 years of experience working on dose

(more)

reconstruction, environmental dosimetry, chemical risk analysis and related disciplines
RAC has assembled a team of 15 experts, each with a particular area of expertise necessary to complete this assessment

Work is commencing on this project immediately. The project is expected to take approximately one year to complete. Monthly meetings of the Oversight Panel are open to the public. In addition, three broader public information and input meetings will be scheduled during the project. For an update on meeting times and locations, please contact Anna Corbett at (303) 456-0884

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RSALOP**Radionuclide Soil Action Level Oversight Panel**

MEDIA ALERT

SCIENTISTS TO PRESENT RESULTS FROM STUDY OF SOIL CLEANUP STANDARDS FOR ROCKY FLATS

WHAT: Scientists commissioned by a local citizens group to conduct an independent review of standards for cleanup of plutonium and other radionuclides in the soil at Rocky Flats will present results from their study. They are expected to show that current official standards for soil cleanup at Rocky Flats are not sufficiently protective of public health for the long-term future.

WHO: Dr John Till, President of Risk Assessment Corporation (RAC), which performed the study, will present findings from the 15-month study Thursday, February 10, at a public meeting of the Radionuclide Soil Action Level Oversight Panel.

WHEN: Thursday, February 10, 2000 – 4-8 P.M. (Dr. Till's presentation scheduled at 5 p.m.)

WHERE: Broomfield City Center – Zang's Spur Conference Room (Lower Level)
One Descombes Dr.
Broomfield, CO 80030

CONTACT: Carla Sanda, 303-277-0753

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ROCKY FLATS CITIZENS ADVISORY BOARD MEDIA DISTRIBUTION LIST

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**ROCKY FLATS
SOIL ACTION LEVEL OVERSIGHT PANEL**

NEWS RELEASE

For Immediate Release

Contacts: Mary Harlow, Co-Chair, (303) 430-2400, ext. 2174
Hank Stovall, Co-Chair, (303) 466-5986

**UNPRECEDENTED STUDY UNDERWAY AT ROCKY FLATS
Community Group Selects Contractor to Study Cleanup Levels**

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In 1996, the Department of Energy, the State of Colorado and the Environmental Protection Agency established numerical standards for the cleanup of radioactively contaminated soil at Rocky Flats. Almost immediately after these Soil Action Levels were established, members of the community became concerned because the numbers were much higher than expected. Based on additional review, the levels were also shown to be *higher than the cleanup levels established for radioactively contaminated soil cleanups in other parts of the world*

The end result of ensuing discussions was an unprecedented agreement by the Department of Energy to fund a community-directed, independent scientific assessment of the calculations used to set the soil action levels. Thirteen individuals sit on the oversight panel, including representatives from six local governments, two from public interest groups, three technical/scientific experts, and two citizen members

The Panel also announces the selection of Risk Assessment Corporation (RAC) from South Carolina to conduct the assessment. RAC has previous experience at Rocky Flats leading an investigation into possible health effects caused by emissions from the site during production years. This company has over 20 years of experience working on dose

(more)

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RAC has assembled a team of 15 experts, each with a particular area of expertise necessary
to complete this assessment.

Work is commencing on this project immediately. The project is expected to take
approximately one year to complete. Monthly meetings of the Oversight Panel are open to
the public. In addition, three broader public information and input meetings will be
scheduled during the project. For an update on meeting times and locations, please contact
Anna Corbett at (303) 456-0884

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RAC concludes that using its methodology and assumptions "indicates a technically based RSAL for 239 & 240 Pu in soil at Rocky Flats of 35 pCi/gram. For uranium, a technically derived RSAL...would be 10 pCi/gram."

(See back page for full statement.)

February 2000

RADIONUCLIDE SOIL ACTION LEVEL OVERSIGHT PANEL

PROJECT UPDATE

PROJECT COMPRISED OF EIGHT TASKS

Work on review of the interim radionuclide soil action levels at Rocky Flats is nearing its scheduled completion date of March 31 2000. As noted in the fact sheet entitled *Planning for Tomorrow Radionuclide Soil Action Levels at Rocky Flats* the Radionuclide Soil Action Level Oversight Panel (RSALOP) was formed in response to concern voiced by members of the community at interim radionuclide soil action levels (RSALs) set for the Rocky Flats site. After receiving funding from the Department of Energy the Panel contracted with *Risk Assessment Corporation (RAC)* to conduct an independent scientific assessment of the RSALs for Rocky Flats.

The project is organized into eight tasks. In addition a final summary report will be published to recap the study's findings and propose recommendations for a radionuclide soil action level (RSAL) at the Rocky Flats Site.

- 1. Cleanup Levels at Other Sites**
- 2. Computer Models to Determine RSALS**
- 3. Key Project Inputs & Assumptions**
- 4. Methodology**
- 5. Independent Calculation of RSALs for Rocky Flats**
- 6. Sampling Protocol**
- 7. Interaction with the Actinide Migration Panel**
- 8. Public Involvement**

Task 1: Cleanup Levels at Other Sites

Completed in April 1999 this report provided the Panel with a clear unbiased evaluation and comparison of previously developed soil action levels for Rocky Flats and other sites around the world. The evaluation found that the soil action levels established for Rocky Flats are significantly higher than action or cleanup levels at other facilities even when normalized to dose. However the report provided a better understanding and clarification for the elevated levels and found that the calculation is strongly controlled by three basic parameters:

- Dose conversion factor (solubility class of plutonium)
- Mass loading (resuspension) and to a lesser degree
- Breathing rate

In nearly every case differences in soil action levels between sites could be explained by the different assumptions made for one or more of the basic parameters. The Task 1 report identified the input model parameters that are of primary importance in determining soil action levels so that this information can be used as the study evolves.

Task 2: Computer Models

The goal of this report which was finalized in July 1999 was to discuss and compare environmental assessment programs that might be used for developing soil action levels for Rocky Flats. RAC scientists evaluated the following five computer programs for use in the project: **RESRAD**, **MEPAS**, **GENII**, **MMSOILS**, and **DandD**. The report discusses the pros and cons of each program and provides information on the four key elements that must be considered when developing soil action levels. Based upon extensive evaluation of the available computer codes, RAC representatives concluded that either the **RESRAD** or **GENII** program could be used. After further discussion with Panel members, it was decided to proceed with the use of the **RESRAD** program.

"Soil Action Levels Depend on Four Key Elements:

1. How radioactive material is transported in the environment to people,
2. How people might be exposed to the radioactive materials (exposure scenarios),
3. How radiation dose to a person is assessed (radiation dosimetry), and
4. How radiation protection guidelines fit in (annual dose limits)."

Task 3: Inputs & Assumptions

After months of discussions and input from Panel members, RAC representatives conducted a sensitivity analysis on the inputs and assumptions required for the use of RESRAD. Site specific values were derived or uncertainty distributions were created for critical parameters emerging from the sensitivity analysis. The sensitivity of each parameter was then assessed using the built-in Monte Carlo based sensitivity analysis packaged with the latest version of RESRAD. This report also in-

cludes a careful evaluation of scenarios for their applicability to potential future land uses. The report describes the process of scenario evaluation and discusses the scenarios chosen for the independent analysis of the Rocky Flats soil action levels. To develop meaningful and appropriate calculations for soil action levels at Rocky Flats, site specific data were collected and will be used for all parameters that were revealed as sensitive to change and parameters that warranted adaptation.

Primary efforts were directed toward the most important parameters for soil action level calculations with RESRAD: mass loading, soil to plant transfer factors, distribution coefficients, area of contamination, and mean annual wind speed. Values and distributions presented in this report will be used in the calibrated version of RESRAD and values for soil action level and dose will be presented as distributions of possible values for each individual scenario.

Task 4: Methodology

Methodology is a topic that encompasses the project as a whole through ongoing dialogue with the Panel and Community regarding proposed methodologies employed in the study. Methodologies that may be considered and/or decided upon are discussed within reports specific to project tasks. Therefore, no separate report is being published on this task.

Task 5: Independent Calculation of RSALs

Although this report has been identified as Task 5 it is actually the final step in the study to be completed after running the RESRAD program using the Inputs & Assumptions decided upon from Task 3. The Draft Final Task 5 Independent Calculation presents the results of RAC's independent assessment and describes the calculations and results of the soil action levels for the seven exposure scenarios identified in the Task 3 report.

Task 6: Soil Sampling Protocols

RAC released the draft final report for Task 6 at the December 1999 Panel meeting. The document reviewed the current site sampling program and procedures as well as individual site sampling and analysis plans. It also went on to provide recommendations to the Panel for consideration in developing a sampling protocol for the site and discussed ten key elements that should be a part of any sampling protocol. The report concluded that the MARS/SIM guidance provides the most comprehensive approach currently available for the development of radiological surveys and recommended that the final status surveys conducted at Rocky Flats follow the general principles contained therein.

TEN KEY ELEMENTS TO SAMPLING PROTOCOL

1. Data Quality Objectives
2. Multiple Radionuclide Consideration
3. Classification of Survey Units
4. Soil Sampling Depth
5. Sample Spacing & Methods
6. Small Areas of Elevated Activity
7. Surrogate Measurements
8. Number of Samples Based on Statistical Methods
9. Independent Confirmatory Investigations
10. Soil Sampling Quality Assurance

Task 7: Interaction with the Actinide Migration Panel

The Actinide Migration Panel is overseeing an effort begun by contractors at the Rocky Flats site in 1996. Comprised of a national task force, the group is drawing upon state-of-the-art knowledge throughout the scientific community on behavior and mobility of actinides in the environment. It is hoped that this group's efforts will help to provide information necessary to develop the best possible approach for the successful closure of the Rocky Flats site. RAC representatives as well as numerous RSALOP members attend regular Actinide Migration Panel meetings and are attempting to extrapolate any information gathered to assist in the independent review of the soil action levels for the Rocky Flats site. No separate formal report will be generated for this Task.



Task 8: Public Involvement

A public involvement strategy was developed and implemented to provide regular updates to the community on the progress of this study. Panel members meet the second Thursday of each month with RAC representatives to review project findings and work with the contractor to set and determine criteria for key components of the study. You are invited to attend the monthly meetings which are held from 7 p.m. at the Broomfield City Building, One Descombes Drive, Broomfield, CO. Three public meetings were scheduled at key points to receive input from the community throughout all phases of the technical review. In addition, with some up front planning, Panel members can provide briefings to community groups or interested parties. Please contact Mary Harlow, Panel Co-Chair, at 303 430 2400 Ext 2174 for additional details.



PEER REVIEW TEAM COMPLETES ITS WORK

To enhance the quality and credibility of this effort, the Panel formed a Peer Review Team comprised of five nationally recognized experts with backgrounds related to this effort. Team members were tasked with reviewing and commenting on each draft final report produced for this project. Comments were then forwarded to Risk Assessment Corporation who reviewed and provided feedback on the peer review input at the Panel meetings. Members of the Panel then looked at the Peer Review input coupled with the feedback from RAC to assure that Panel members concurred with RAC's comment resolution.

RAC'S CONCLUSIONS REGARDING RSALS FOR ROCKY FLATS

RAC's task was to evaluate the RSALs adopted for Rocky Flats in 1996, to develop a methodology for independently determining RSALs, and to calculate RSALs for Rocky Flats by applying this methodology. We conclude that applying our method to the exposure scenarios approved by the Oversight Panel, using 15 millirem as a dose limit and assuming a probability level of 10%, indicates a technically based RSAL for 239 and 240 Pu in soil at Rocky Flats of 35 pCi/g. For uranium, a technically derived RSAL using our methodology and assumptions would be 10 pCi/g.

(Quoted from the Conclusions Section of RAC's Final Project Summary)

FINAL PUBLIC MEETING

Complete project recommendations will be presented to the community at large at the final public meeting scheduled for March 23, 2000, from 7:00-9:00 p.m. at the Broomfield City Center, Council Chambers, One Descombes Dr., Broomfield, CO. Please join the Panel and representatives from the Department of Energy, the Colorado Department of Public Health and Environment, and the Environmental Protection Agency to learn more about this important issue and help pave the way to a future that will be protective of the communities surrounding the Rocky Flats site.

Project Passes Mid-Point:

- **Computer Model Chosen**
- **Key Inputs & Assumptions Identified**
- **Soil Sampling Protocols Reviewed**
- **Peer Review Team Mobilized**

September 1999

RADIONUCLIDE SOIL ACTION LEVEL OVERSIGHT PANEL

PROJECT UPDATE

PROJECT COMPRISED OF EIGHT TASKS

Work on review of the interim radionuclide soil action levels at Rocky Flats continues to move forward. As noted in the fact sheet entitled *Planning for Tomorrow Radionuclide Soil Action Levels at Rocky Flats*, the Radionuclide Soil Action Level Oversight Panel (RSALOP) was formed in response to concern voiced by members of the community at interim radionuclide soil action levels (RSALs) set for the Rocky Flats site. After receiving funding from the Department of Energy, the Panel contracted with *Risk Assessment Corporation (RAC)* to conduct an independent scientific assessment of the RSALs for Rocky Flats.

The project is organized into eight tasks. A final report will be published that will recap the study's findings and propose recommendations for a radionuclide soil action level (RSAL) at the Rocky Flats Site.

1. **Cleanup Levels at Other Sites**
2. **Computer Models to Determine RSALS**
3. **Key Project Inputs & Assumptions**
4. **Methodology**
5. **Independent Calculation of RSALS for Rocky Flats**
6. **Sampling Protocol**
7. **Interaction with the Actinide Migration Panel**
8. **Public Involvement**

Task 1: Cleanup Levels at Other Sites

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- Mass loading (resuspension) and to a lesser degree
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In nearly every case, differences in soil action levels between sites could be explained by the different assumptions made for one or more of the basic parameters. The Task 1 report identified the input model parameters that are of primary importance in determining soil action levels so that this information can be used as the study evolves.

Task 2: Computer Models

The goal of this report which was finalized in July 1999 was to discuss and compare environmental assessment programs that might be used for developing soil action levels for Rocky Flats. RAC scientists evaluated the following five computer programs for use in the project: **RESRAD**, **MEPAS**, **GENII**, **MMSOILS**, and **DandD**. The report discusses the pros and cons of each program and provides information on the four key elements that must be considered when developing soil action levels. Based upon extensive evaluation of the available computer codes, RAC representatives concluded that either the **RESRAD** or **GENII** program could be used. After further discussion with Panel members, it was decided to proceed with the use of the **RESRAD** program.

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Task 3: Inputs & Assumptions

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includes a careful evaluation of scenarios for their applicability to potential future land uses. The report describes the process of scenario evaluation and discusses the scenarios chosen for the independent analysis of the Rocky Flats soil action levels. To develop meaningful and appropriate calculations for soil action levels at Rocky Flats, site specific data were collected and will be used for all parameters that were revealed as sensitive to change and parameters that warranted adaptation.

Primary efforts were directed toward the most important parameters for soil action level calculations with RESRAD: mass loading, soil to plant transfer factors, distribution coefficients, area of contamination, and mean annual wind speed. Values and distributions presented in this report will be used in the calibrated version of RESRAD and values for soil action level and dose will be presented as distributions of possible values for each individual scenario.

Task 4: Methodology

Methodology is a topic that encompasses the project as a whole through ongoing dialogue with the Panel and Community regarding proposed methodologies employed in the study. Methodologies that may be considered and/or decided upon are discussed within reports specific to project tasks. Therefore, no separate report is being published on this task.

Task 5: Independent Calculation of RSALs

Although this has been identified as Task 5, this will be the final step in the study completed after running the RESRAD program using the inputs & Assumptions decided upon from Task 3.

Task 6: Soil Sampling Protocols

RAC released the draft final report for Task 6 at the May 1999 Panel meeting. The document reviewed the current site sampling program and procedures as well as individual site sampling and analysis plans. It also went on to provide recommendations to the Panel for consideration in developing a sampling protocol for the site and discussed ten key elements that should be a part of any sampling protocol. Ultimately, RAC plans to recommend a specific soil sampling protocol to the Panel to determine the amount of contamination in soil following remediation. Task 6 is currently under revision with an anticipated draft final report due in the fall of 1999.

TEN KEY ELEMENTS TO SAMPLING PROTOCOL

1. Data Quality Objectives
2. Multiple Radionuclide Consideration
3. Classification of Survey Units
4. Soil Sampling Depth
5. Sample Spacing & Methods
6. Small Areas of Elevated Activity
7. Surrogate Measurements
8. Number of Samples Based on Statistical Methods
9. Independent Confirmatory Investigations
10. Soil Sampling Quality Assurance

Task 7: Interaction with the Actinide Migration Panel

The Actinide Migration Panel is overseeing an effort begun by contractors at the Rocky Flats site in 1996. Comprised of a national task force, the group is drawing upon state-of-the-art knowledge throughout the scientific community on behavior and mobility of actinides in the environment. It is hoped that this group's efforts will help to provide information necessary to develop the best possible approach for the successful closure of the Rocky Flats site. RAC representatives, as well as numerous RSALOP members, attend regular Actinide Migration Panel meetings and are attempting to extrapolate any information gathered to assist in the independent review of the soil action levels for the Rocky Flats site. No separate formal report will be generated on this Task.



Task 8: Public Involvement

A public involvement strategy has been developed to provide regular updates to the community on the progress of this study. Panel members meet the second Thursday of each month with *RAC* representatives to review project findings and work with the contractor to set and determine criteria for key components of the study. You are invited to attend the monthly meetings which are held from 4-7 p.m. at the Broomfield City Building, One Descombes Drive, Broomfield, CO. Three public meetings are scheduled to receive input from the community throughout all phases of the technical review. In addition, with some up front planning, Panel members can provide briefings to community groups or interested parties. Please contact Carla Sanda at 303.277.0753 for information regarding public meetings, project updates, or speakers for your group.



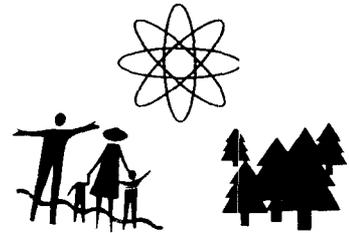
PEER REVIEW TEAM MOBILIZED

To enhance the quality and credibility of this effort, the Panel has formed a Peer Review Team comprised of five nationally recognized experts with backgrounds related to this effort. Team members are tasked with reviewing and commenting on each draft final report produced for this project. Comments are then forwarded to *Risk Assessment Corporation*, who reviews and provides feedback on the peer review input. Members of the Panel then look at the Peer Review input coupled with the feedback from *RAC* to assure that Panel members concur with comment resolution.

**We're on the Web:
www.rfcab.org/SALOP.html**



Radionuclide Soil Action Level Oversight Panel



Planning for Tomorrow... Radionuclide Soil Action Levels at Rocky Flats

BACKGROUND

Rocky Flats operated from 1952-1992 as a manufacturing facility for the production of component parts for nuclear weapons including plutonium pits, the fissionable core of such weapons. Since cessation of production activities, the site has been involved in waste management and environmental remediation activities. One of the primary challenges facing site officials and residents from surrounding communities is determination of the amount of radionuclides, such as plutonium, that may legally remain in the soil following remediation. These levels are known as radionuclide soil action levels (RSALs) because remediation action is triggered when the amount of radioactive material in the soil exceeds the established levels.

Using a computer modeling program known as RESRAD (Residual Radiation) that was developed at Argonne National Laboratory, interim radionuclide soil action levels were incorporated into the Rocky Flats Cleanup

Agreement (RFCA) on October 18, 1996. The RFCA serves as the legally binding agreement for site remediation between the Department of Energy and its regulators, the Environmental Protection Agency and the Colorado Department of Public Health and Environment. Intended to be protective of people using the site after closure, the RSALs set the upper limits for the radionuclides (primarily plutonium and americium) allowed in the soil at Rocky Flats after remediation. The RSALs are measured in picocuries (a measure of radiation) per gram of soil.

Almost immediately after the RSALs were established, members of the community became concerned. Not only were the numbers much higher than anticipated, but upon further investigation, the levels were found to be higher than levels established for radiation at sites elsewhere, as shown below:

<i>Rocky Flats Environmental Technology Site</i>	1 429
<i>Nevada Test Site</i>	200
<i>Enewetak Atoll (South Pacific bomb test site)</i>	40
<i>Hanford Nuclear Reservation (Washington State)</i>	34
<i>Johnston Atoll</i>	15

PUBLIC REACTION

After looking at the above numbers, it became apparent that more information was needed to better understand the criteria used for the soil action levels. As a result, several entities, including the Rocky Flats Citizens Advisory Board, the cities of Westminster and Broomfield, public interest groups, and Congressman David Skaggs called for an independent assessment of the RSALs as well as the process used to establish those levels. The end result of ensuing discussions was an unprecedented agreement by the Department of Energy to fund a community directed, independent scientific assessment of the RSALs for Rocky Flats. To provide

oversight of the study, a panel of thirteen community representatives was formed, known officially as the Radionuclide Soil Action Levels Oversight Panel (RSALOP).

After drafting and issuing a formal Request for Proposal, the Panel selected Risk Assessment Corporation (RAC) to conduct the assessment. RAC has previous experience with the Rocky Flats site, studying the potential health effects caused by site emissions during production years. In addition, RAC has more than twenty years experience working on dose

reconstruction environmental dosimetry chemical risk analysis and related disciplines RAC has assembled a team of technical experts each with a particular area of expertise necessary to complete the RSAL assessment Work began in October 1998 and is scheduled for completion in November 1999

PROJECT SUMMARY

Several project tasks have been defined for the contractor The first of these is to research RSALs used at other plutonium contaminated sites around the world Second RAC is tasked with exploring existing computer models that could be used to determine RSALs and recommending the one best suited for use at Rocky Flats Third RAC will investigate and then recommend pertinent input and assumptions for use in computer calculations Fourth with the preceding information RAC's major task will be to conduct an independent calculation of the RSALs for Rocky Flats which can then be compared with the originally recommended RSALs The final two tasks involve recommending appropriate soil sampling procedures to determine the amount of contamination in soil both before and after remediation activity Finally RAC will analyze results from the

ongoing Actinide Migration Studies to determine whether any findings from these studies are applicable to the soil action levels

PUBLIC INVOLVEMENT

Although public involvement began when community representatives approached the Department of Energy with concerns that resulted in formation of the RSALOP the Panel has developed a public involvement and information strategy to ensure ongoing communication Monthly working meetings of the Panel are open to the public and are conducted the second Thursday of each month from 4-7 p.m. at the Broomfield Center One Descombes Dr Broomfield CO In addition three public information workshop meetings will be scheduled during the project With some upfront planning a member of the Panel can provide briefings to community groups or interested parties For a project status update information packet or further information on meeting times and locations please contact either Carla Sando Advanced Integrated Management Services Inc at (303) 277-0753 or Ken Korkia Rocky Flats Citizens Advisory Board at (303) 490-785

Introducing the RSALOP Team

Panel Co Chairs

Mary Harlow serves as the Rocky Flats Coordinator for the City of Westminster acts as the City liaison to both state and Federal organizations relative to Rocky Flats activities and keeps the City Council and staff apprised of pertinent site issues She represents the City staff on the Rocky Flats Coalition of Local Governments Board of Directors and is currently Secretary of the Rocky Flats Citizens Advisory Board Additionally she serves on the Board of Directors of the Energy Communities Alliance a national organization of local communities that are located in the shadow of Department of Energy facilities Ms Harlow has a BS in Health Care Management an AAS in Environmental Technology and an AS in Water/Wastewater Technology

Henry A Stovall earned a BS in Industrial Education and a BS in Physics Prior to retirement he was an Engineering Manager with 33 years experience in the engineering arena including environmental health and safety engineering Mr Stovall serves as a member of the Rocky Flats Health Advisory Panel and has been actively involved in related Rocky Flats issues A a twenty nine year resident of Broomfield Colorado Mr Stovall has been active in various community activities including serving on the Broomfield City Council from 1977-1993 and again from 1995-present

Panel Members

Tom Davidson received his BS in Electronic Engineering and has thirty years of engineering experience including 16 years in the nuclear field He is a member of the Rocky Flats Citizens Advisory Board and has participated in numerous issues related to the cleanup and future use of the site Mr Davidson is also an active participant in the University of Colorado at Boulder Chancellor's Community Advisory Council He currently serves as the Mayor of Louisville Colorado and represents his community on the Panel

Joe Coldfield earned his BS in Chemical Engineering and achieved professional affiliation with the American Academy of Environmental Engineers as a Diplomate His professional career with Manville Corporation spanned thirty one years of which 20 years was spent as manager of Environmental Engineering He holds a Professional Engineers License in New Jersey Colorado Massachusetts and Mississippi and

owns several patents on pollution control He has been an active stakeholder in the cleanup of the Rocky Flats site

Dean Heil is currently Assistant Professor in the Department of Soil and Crop Sciences at Colorado State University He completed his PhD in Soil Science at the University of California at Berkeley His past research includes remediation of Pb (lead) pollution

Robert Kanick earned a BS in Nuclear Engineering with an emphasis in reactor power operations His experience as a reactor engineer and core designer has provided valuable experience ranging from the development of advanced reactor testing and control of special cladding materials to the use and valuation of computer modeling systems used for core design safety and criticality analysis As a member of the

Rocky Flats Citizens Advisory Board. Mr. Kanick has been actively involved in numerous projects related to the cleanup and future use of the Rocky Flats site.

Carol E. Lyons serves as the Rocky Flats Coordinator for the City of Arvada, Colorado.

Todd Margulies earned his MS in Environmental Sciences/Geochemistry as well as a Bachelor's in Geology. After spending more than ten years working for major environmental firms, he began work as an independent environmental consultant in 1991. He has dealt with numerous Rocky Flats issues and was a staff member of the Colorado Council on Rocky Flats. In addition, Mr. Margulies has conducted ground water, surface water, soil, and sediment investigations at sites around the world to assess organic and inorganic contaminant transport and fate.

LeRoy Moore, Ph.D. serves as a consultant to the Rocky Mountain Peare and Justice Center in Boulder, Colorado. Author of the Citizens Guide to Rocky Flats (1992), Dr. Moore is a member of the Rocky Flats Citizens Advisory Board. Involved with the Rocky Flats issue since 1979, he has played a key role in numerous projects, including the Rocky Flats Future Site Use Working Group. He co-chairs the recently created Rocky Flats Actinide Migration Studies Technical Review Group. He is currently working with a photographer on a book which will tell the Rocky Flats story in images and words of workers who made bombs inside the facility and activists who opposed such production from the outside.

Lisa Morgan Morzel serves on the Boulder City Council, having been elected in 1995. As a council member, she represents Boulder issues related to Rocky Flats, including the Rocky Flats Local Impacts Initiative and its successor group, the Rocky Flats Coalition of Local Governments. Dr. Morzel is a research geologist for the U.S. Geological Survey and holds a Ph.D. in Geology and Geophysics.

Technical Support Contractor

Since its formation in 1977, Risk Assessment Corporation (RAC) has significantly contributed to the development and application of methods for estimating exposures from radionuclides and chemicals to the public and workers and quantifying the health risks and their uncertainties. RAC has also encouraged public participation in dose reconstruction studies and has developed innovations in the communication of exposure and risk information to the public. The following team of professionals, headed by RAC's president, Dr. John E. Till, has been assembled to conduct this study:

John F. Till holds a Ph.D. in Nuclear Engineering and M.S. in Health Physics, and a BS in Engineering. In addition, he is a graduate of the U.S. Naval Academy and the U.S. Naval Nuclear Propulsion Program. Following his naval career, Dr. Till worked as a staff scientist at the Oak Ridge National Laboratory and in 1977 formed Risk Assessment Corporation (RAC). Dr. Till's scientific achievements include more than 150 publications, including editing the first textbook on radiation dose analysis, Radiological Assessment, and other documents that stress new approaches to apply and simplify risk analysis. Dr. Till's current work focuses on the assessment of risks from past releases of radionuclides and chemicals

George G. Killough earned an MA degree in mathematics from the University of Tennessee at Knoxville and did further study under a grant from the National Aeronautics and Space Administration. His more than 30 years of professional experience include university teaching (mathematics and computer

Niels Schonbeck is a professor in the Department of Chemistry at Metropolitan State College of Denver, Colorado, where he has taught since 1978. He has also been a visiting scientist at the National Center for Atmospheric Research in Boulder, Colorado. He earned his Ph.D. in Biological Chemistry and his BA in Chemistry in 1967; he became involved in the health and safety issues of the Rocky Flats site and was appointed to the Rocky Flats Environmental Monitoring Council. Since then, he has also served as a member of the Rocky Flats Health Advisory Panel.

Joel Selbin received his Ph.D. in Inorganic Chemistry. He joined the faculty at Louisiana State University (Baton Rouge) in 1957, where he served until 1997. During his 34 years at LSU, he directed the research of graduate and postdoctoral students, authored and collaborated on numerous books and articles, and obtained two U.S. patents. He has written, lectured, and debated widely on nuclear power and nuclear arms issues, as well as energy alternative issues, and has served as a technical consultant to numerous academic and governmental entities. Upon his retirement from LSU, Dr. Selbin relocated to Boulder, Colorado, where he taught for seven years at the University of Colorado at Denver. He now teaches at the University of Colorado Boulder campus.

Ken Starr has more than 13 years experience in the fields of civil and environmental engineering, including numerous CERCLA/Superfund remediation and investigation tasks, environmental assessments, environmental health and safety assessments, as well as health and safety training. He currently serves as the Director of the Environmental Compliance Division for the Jefferson County Department of Health and Environment. He holds an MS in Environmental Engineering and a BS in Agricultural/Civil Engineering. He is a Registered Professional Engineer for both the State of Colorado and Arizona.

science) and serving as a member of the research staff at Oak Ridge National Laboratory, where he designed and implemented mathematical models and applied them to environmental problems. He developed internal dosimetry computer software, which was subsequently the basis for the Environmental Protection Agency's RADRISK program. Under sponsorship of the National Science Foundation and the Department of Energy, he constructed models of the global cycling of carbon and tritium, which were applied to estimating levels of carbon dioxide as a greenhouse gas and to predicting exposure of the world population to releases of ¹⁴C and ³H from nuclear fuel cycles. As a consultant to Risk Assessment Corporation, he participated in a dose reconstruction project for the Fernald nuclear facility sponsored by the Office of Dose Assessment and Prevention. For the Fernald study, he developed new methods for confirming estimates of airborne uranium releases from soil measurements and modeling the atmospheric diffusion of radon decay products using radon monitoring data. Mr.

Although she is author or co-author of many refereed publications. In his current work, he makes innovative use of probabilistic methods and Monte Carlo bootstrap sampling to assess uncertainties in model predictions and to calibrate environmental models to site specific data.

Kathleen R Meyer holds an MS degree in health physics and a Ph.D. in radiological health sciences. She has served as a research assistant at Oak Ridge National Laboratory where she assessed the radiation damage and subsequent recovery capabilities of normal tissue both in cell culture and in animal models. Her career has also included independent work in radiological dose assessments, technical abstracting and chemical and radiological risk evaluation for site containing hazardous materials. Dr Meyer has more than 20 years experience in the fields of biological research and teaching radiation protection and public communication.

Arthur Rood received his Bachelor's degree in geology and an MS in health physics. His experience includes environmental and laboratory measurements of uranium related byproducts. He later joined a team of environmental scientists at the Idaho National Engineering and Environmental Laboratory and worked primarily in the field of environmental contaminant transport modeling and dose assessment. Mr Rood has now formed his own corporation and projects currently focus on the use of atmospheric dispersion models to study past releases of chemicals and radionuclides to support dose reconstruction studies at the Rocky Flat Plant and

Savannah River Site. Mr Rood also teaches an Environmental Modeling class for the University of Idaho.

David J Thorne received his Bachelor's degree in geology and his MS degree in health physics. His career has included surveillance of the Fort St. Vrain Nuclear Power Station and conducting studies on concentrations of ¹³⁷Cs in dairy milk. He has also been involved in providing air quality modeling support, preparing radiological health risk assessments, conducting studies on groundwater transport of radionuclides and development of an atmospheric dispersion modeling study as well as computer models to simulate the transport of radionuclides. Mr Thorne is currently responsible for extensive experience with computer systems capabilities including programming languages and contaminant transport models. He has developed models to assess residual contamination of the site by model of accidental releases, developed risk based standards for model potential groundwater impacts.

Jill M Weber received her undergraduate degree in 1983 in physics with minors in chemistry and mathematics and her MS degree in radiological health sciences with a specialty in health physics. Ms Weber joined RAC in 1995 and has been involved in a number of radiological dose reconstruction projects. Her research has included model development for releases of plutonium from the 903 Pad Area at Rocky Flats, an area of the site that was exposed to high wind and resulted in significant releases. She also has experience in environmental monitoring, uncertainty estimation and public involvement.

Administrative Support Contractor

Advanced Integrated Management Services, Inc (AIMSI) is a small, privately owned Tennessee corporation founded in 1984 with a staff of over 100 full and part time professional. Headquarters are in Oak Ridge Tennessee with field offices in Colorado, Nashville Tennessee and Paducah Kentucky. AIMSI provides professional engineering, management, technical and administrative support services and has formed the following team to provide both day to day project administrative support and public involvement and information.

Anna Corbett has more than 15 years experience in technical support and customer service including extensive support to programs in the nuclear and chemical waste environment. Her career with AIMSI has included support to Rocky Flats programs including the Mixed Waste Focus Area Technology Management program and the Rocky Flats Site Technology Coordination Group.

Carla Sanda brings more than 15 years experience in developing and executing stakeholder involvement strategies. Prior to joining AIMSI as a technical staff member, she worked for 15 years as a member of the Community Relations group at Rocky Flats. She served as a stakeholder management stakeholder in the environmental project management of the Rocky Flats Western Community Association and the Rocky Flats Western Community Association. She was a member of the Rocky Flats Western Community Association of the Federal Facility Compliance Act stakeholder involvement and was a member of the team tasked with developing our national public involvement policy.

**For the latest project information on the web go to
www.rfcab.org/SALOP.html**

**Or contact AIMSI
5460 Ward Road Suite 370
Arvada CO 80002
(303) 456 0884 Fax (303) 456 0858**

What Is the RSALOP?

Formed in 1998, the Radionuclide Soil Action Levels Oversight Panel (RSALOP)

- Is a Citizen Oversight Group comprised of a cross-section of thirteen community representatives
- Is funded by the Department of Energy to review calculations used in setting the radionuclide soil action levels for Rocky Flats
- Seeks to assure ongoing community understanding
- Holds monthly public meetings to review the study's progress and to make recommendations
- Invites community input

RSALOP

Radionuclide Soil Action Levels Oversight Panel

What is a

"Radionuclide Soil Action Level"?

One of the primary concerns of site officials, regulators, and residents of surrounding communities is determining the amount of radionuclides that may legally remain in the soil at Rocky Flats following site remediation. These levels are known as "**radionuclide soil action levels**" (**RSALs**) because remediation is triggered if radiation levels in the soil exceed the established level.



Radionuclide Soil Action Levels Oversight Panel

Why Be Concerned About Plutonium?

Plutonium, the material of principal concern at Rocky Flats

- Has a half-life of 24,000 years (remains radioactive for a quarter of a million years)
- Has been released into the environment around Rocky Flats in particle form
- Emits alpha radiation which cannot penetrate skin but which can cause harm if taken into the body
- Can be inhaled, ingested, or admitted into the body through a wound
- Is subject to movement with water or resuspension in the air if present in the soil



What's the Issue?

- Interim levels for radionuclides in soils -- or "radionuclide soil action levels" (RSALs) -- for Rocky Flats were established in 1996
- The Rocky Flats RSALs appeared to be considerably higher than those set for sites elsewhere in the world
- This prompted concerned citizens to ask
 - How and why were the current Rocky Flats RSALs established?
 - Should interim levels adopted for Rocky Flats be revised?

In response to these concerns, the U S Department of Energy agreed to the creation of the RSALOP



What's Being Done?

- The Radionuclide Soil Action Levels Oversight Panel was convened in January 1998
- The Panel contracted with *Risk Assessment Corporation (RAC)* to review and assess the process used to determine interim radionuclide soil action levels
- The Panel organized a peer review team to review draft reports provided by RAC
- All study results and recommendations including public comments will be provided to the Department of Energy and its regulators for use in determining radionuclide soil action levels for the Rocky Flats site



Project Overview

- Risk Assessment Corporation began work in October 1998 -
 - with completion scheduled for November 1999
- Study consists of five primary tasks
 - Assessing radionuclide soil action levels established for other sites
 - Analyzing the computer modeling program used to set interim levels and assessing other relevant computer programs
 - Analyzing inputs and assumptions for the soil action levels
 - Making independent calculations for the soil action levels
 - Recommending an appropriate soil sampling program



You're Invited . . .

The Oversight Panel meets regularly to represent you and your community in this important effort. Your input and participation is important to the process. You can

- Participate in monthly work sessions 4-7 p.m. - second Thursday of each month through November 1999 at the Broomfield City Building, One Descombes Drive, Broomfield, CO
- Attend public meetings
- Share your comments and/or concerns with panel members



Radionuclide Soil Action Levels Oversight Panel

NEWS RELEASE

For Immediate Release

Contacts: Erin Rogers, Rocky Flats Citizens Advisory Board (303) 426-0885
Anna Corbett, AIMS (303) 456-0884

ROCKY FLATS SOIL ACTION LEVEL REVIEW PANEL INVITES MEDIA TO HEAR PROJECT UPDATE

WESTMINSTER, Colo., December 8, 1998 -- The Rocky Flats Soil Action Level Oversight Panel is inviting interested members of the public and media to a project update on Thursday, December 10. The Panel is overseeing a project to evaluate the calculation of radioactive soil cleanup levels for Rocky Flats. The Panel's technical contractor began work on this project in October and will be presenting some of the preliminary data it has collected. Topics will include cleanup levels at other sites, computer models used for calculating cleanup levels.

This meeting will be a useful opportunity for people not involved in the study to keep up with the progress of the project and to develop a better understanding of the study methodology and goals.

This meeting will take place on Thursday, December 10, 4:30 p.m. at the Broomfield City Building, One Descobes Drive, Broomfield, Colorado, Conference Room (lower level). Please call (303) 456-0884 for directions.

The Rocky Flats Soil Action Level Oversight Panel has been awarded funding from the Department of Energy to pay for an independent assessment of controversial cleanup levels applicable to radioactive materials in soils at Rocky Flats. The project is expected to conclude in the fall of 1999. Monthly meetings of the Oversight Panel are open to the public. In addition, three broader public information and input meetings will be scheduled during the project. For more details on meeting times and location, please contact Anna Corbett at (303) 456-0884.

NEWS RELEASE

For Immediate Release

Contact: Carla Sanda, AIMS
(303) 277-0753

HOW MUCH IS *TOO MUCH* PLUTONIUM IN ROCKY FLATS SOILS?

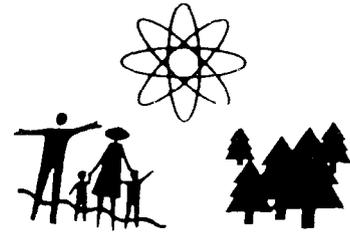
WESTMINSTER, Colo., March 5, 1999 - National attention is focusing on a still ongoing controversy regarding soil cleanup levels for Rocky Flats, the former nuclear weapons production plant located in Jefferson County. A public meeting is scheduled from 6:30 - 9:00 p.m. on Thursday, March 11, at the Westminister City Hall, 4800 W. 92nd Ave., Westminister, CO. The evening will begin with a 7:00 p.m. open house designed to provide background information, followed by hearings regarding the progress to date and future goals for the facility.

Rocky Flats moves closer to final remediation goals, but a primary challenge remains. The primary challenge to the residents is determination of the amount of radionuclides, such as plutonium, that may finally remain in the soil following remediation. These levels are known as radionuclide soil action levels. The final remediation is triggered when the amount of radionuclide material in the soil exceeds established levels. A cleanup agreement negotiated in 1996 between the officials and the regulators set interim levels for plutonium and other contaminants that could remain in the soil at the site. Some members of the community, however, believed that those interim levels were too high. As a result, the Department of Energy agreed to fund a citizen directed, independent review of the calculation of the soil action levels. To provide oversight of the study, the Radionuclide Soil Action Levels Oversight Panel (Panel) comprised of scientists, local government representatives, and citizens, was formed in 1998. After a formal hearing process, the Panel selected *Risk Assessment Corporation (RAC)* to conduct the technical review. Work has been proceeding since last fall and is scheduled for completion in November 1999.

The public meeting is the first of three to be scheduled throughout the course of the project. It will explain why the community should be concerned about plutonium in the soil at Rocky Flats, what is being done, what has been learned so far, and what is planned for the future. Panel members and RAC representatives will be on hand to answer questions and further explain the ongoing work. There will also be time for public comments and questions. For additional information regarding the meeting, please contact Carla Sanda, Advanced Integrated Management Services, Inc., at 303-277-0753.



Radionuclide Soil Action Level Oversight Panel



NEWS RELEASE

For Immediate Release

Contact Carla Sanda AIMS
(303) 277 0753

REVIEW OF PLUTONIUM IN ROCKY FLATS SOILS NEARS COMPLETION

Westminster Colo September 2 1999 – Several key decision points have been made in a study currently underway to determine how much plutonium can legally remain in the soil following cleanup at Rocky Flats. These key issues will be discussed at a public meeting scheduled from 7:00-9:00 p.m. on Wednesday September 8 1999 at the Broomfield City Building Council Chambers One Descobes Dr Broomfield CO. Representatives from both the citizens panel formed to oversee the study and the technical contractor will provide background information and updates on the project.

This is the second public meeting held since formation of the Radionuclide Soil Action Level Oversight Panel which was funded by the Department of Energy to oversee a technical review of interim radionuclide soil action levels established for Rocky Flats the former nuclear weapons production plant located in Jefferson County. In October 1998 the Panel selected Risk Assessment Corporation (RAC) to conduct the technical review which is scheduled for completion in November 1999. Panel members and RAC scientists have worked together to select a computer program that will be used to review the soil action levels and have developed scenarios that will be used in the program to arrive at a recommended soil action level.

This public meeting is the second of three to be scheduled throughout the course of the project. Briefings will explain why the community is concerned about plutonium in the soil at Rocky Flats why the study is being conducted what has been learned so far and what will be accomplished by November. For additional information regarding the meeting or the study please contact Carla Sanda Advanced Integrated Management Services Inc. at 303 277 0753.

Project Passes Mid-Point:

Computer Model Chosen
Key Inputs & Assumptions Identified
Soil Sampling Protocols Reviewed
Peer Review Team Mobilized

September 1999

RADIONUCLIDE SOIL ACTION LEVEL OVERSIGHT PANEL

PROJECT UPDATE

PROJECT COMPRISED OF EIGHT TASKS

Work on review of the interim radionuclide soil action levels at Rocky Flats continues to move forward. As noted in the fact sheet entitled *Planning for Tomorrow: Radionuclide Soil Action Levels at Rocky Flats*, the Radionuclide Soil Action Level Oversight Panel (RSALOP) was formed in response to concern voiced by members of the community at interim radionuclide soil action levels (RSALs) set for the Rocky Flats site. After receiving funding from the Department of Energy, the Panel contracted with Risk Assessment Corporation (RAC) to conduct an independent scientific assessment of the RSALs for Rocky Flats.

The project is organized into eight tasks. A final report will be published that will recap the study's findings and propose recommendations for a radionuclide soil action level (RSAL) at the Rocky Flats Site.

1. Cleanup Levels at Other Sites
2. Computer Models to Determine RSALS
3. Key Project Inputs & Assumptions
4. Methodology
5. Independent Calculation of RSALS for Rocky Flats
6. Sampling Protocol
7. Interaction with the Actinide Migration Panel
8. Public Involvement

Task 1: Cleanup Levels at Other Sites

Completed in April 1999, this report provided the Panel with a clear, unbiased evaluation and comparison of previously developed soil action levels for Rocky Flats and other sites around the world. The evaluation found that the soil action levels established for Rocky Flats are significantly higher than action or cleanup levels at other facilities, even when normalized to dose. However, the report provided a better understanding and clarification for the elevated levels and found that the calculation is strongly controlled by three basic parameters:

- Dose conversion factor (solubility class of plutonium)
- Mass loading (resuspension) and to a lesser degree
- Breathing rate

In nearly every case, differences in soil action levels between sites could be explained by the different assumptions made for one or more of the basic parameters. The Task 1 report identified the input model parameters that are of primary importance in determining soil action levels so that this information can be used as the study evolves.

Task 2: Computer Models

The goal of this report which was finalized in July 1999 was to discuss and compare environmental assessment programs that might be used for developing soil action levels for Rocky Flats. RAC scientists evaluated the following five computer programs for use in the project: **RESRAD**, **MEPAS**, **GENII**, **MMSOILS**, and **DandD**. The report discusses the pros and cons of each program and provides information on the four key elements that must be considered when developing soil action levels. Based upon extensive evaluation of the available computer codes, RAC representatives concluded that either the **RESRAD** or **GENII** program could be used. After further discussion with Panel members, it was decided to proceed with the use of the **RESRAD** program.

"Soil Action Levels Depend on Four Key Elements:

1. How radioactive material is transported in the environment to people,
2. How people might be exposed to the radioactive materials (exposure scenarios,
3. How radiation dose to a person is assessed (radiation dosimetry), and
4. How radiation protection guidelines fit in (annual dose limits)."

Task 3: Inputs & Assumptions

After months of discussions and input from Panel members, RAC representatives conducted a sensitivity analysis on the inputs and assumptions required for the use of RESRAD. Site specific values were derived or uncertainty distributions were created for critical parameters emerging from the sensitivity analysis. The sensitivity of each parameter was then assessed using the built-in Monte Carlo based sensitivity analysis packaged with the latest version of RESRAD. This report also

includes a careful evaluation of scenarios for their applicability to potential future land uses. The report describes the process of scenario evaluation and discusses the scenarios chosen for the independent analysis of the Rocky Flats soil action levels. To develop meaningful and appropriate calculations for soil action levels at Rocky Flats, site specific data were collected and will be used for all parameters that were revealed as sensitive to change and parameters that warranted adaptation.

Primary efforts were directed toward the most important parameters for soil action level calculations with RESRAD: mass loading, soil to plant transfer factors, distribution coefficients, area of contamination, and mean annual wind speed. Values and distributions presented in this report will be used in the calibrated version of RESRAD and values for soil action level and dose will be presented as distributions of possible values for each individual scenario.

Task 4: Methodology

Methodology is a topic that encompasses the project as a whole through ongoing dialogue with the Panel and Community regarding proposed methodologies employed in the study. Methodologies that may be considered and/or decided upon are discussed within reports specific to project tasks. Therefore, no separate reports are being published on this task.

Task 5: Independent Calculation of RSALs

Although this has been identified as Task 5, this will be the final step in the study completed after running the RESRAD program using the Inputs & Assumptions decided upon from Task 3.

Task 6: Soil Sampling Protocols

RAC released the draft final report for Task 6 at the May 1999 Panel meeting. The document reviewed the current site sampling program and procedures as well as individual site sampling and analysis plans. It also went on to provide recommendations to the Panel for consideration in developing a sampling protocol for the site and discussed ten key elements that should be a part of any sampling protocol. Ultimately, RAC plans to recommend a specific soil sampling protocol to the Panel to determine the amount of contamination in soil following remediation. Task 6 is currently under revision, with an anticipated draft final report due in the fall of 1999.

TEN KEY ELEMENTS TO SAMPLING PROTOCOL

1. Data Quality Objectives
2. Multiple Radionuclide Consideration
3. Classification of Survey Units
4. Soil Sampling Depth
5. Sample Spacing & Methods
6. Small Areas of Elevated Activity
7. Surrogate Measurements
8. Number of Samples Based on Statistical Methods
9. Independent Confirmatory Investigations
10. Soil Sampling Quality Assurance

Task 7: Interaction with the Actinide Migration Panel

The Actinide Migration Panel is overseeing an effort begun by contractors at the Rocky Flats site in 1996. Comprised of a national task force, the group is drawing upon state-of-the-art knowledge throughout the scientific community on behavior and mobility of actinides in the environment. It is hoped that this group's efforts will help to provide information necessary to develop the best possible approach for the successful closure of the Rocky Flats site. RAC representatives, as well as numerous RSALOP members, attend regular Actinide Migration Panel meetings and are attempting to extrapolate any information gathered to assist in the independent review of the soil action levels for the Rocky Flats site. No separate formal report will be generated on this Task.



Task 8: Public Involvement

A public involvement strategy has been developed to provide regular updates to the community on the progress of this study. Panel members meet the second Thursday of each month with *RAC* representatives to review project findings and work with the contractor to set and determine criteria for key components of the study. You are invited to attend the monthly meetings which are held from 4-7 p.m. at the Broomfield City Building, One Descombes Drive, Broomfield, CO. Three public meetings are scheduled to receive input from the community throughout all phases of the technical review. In addition, with some up front planning, Panel members can provide briefings to community groups or interested parties. Please contact Carla Sanda at 303.277.0753 for information regarding public meetings, project updates, or speaker for your group.



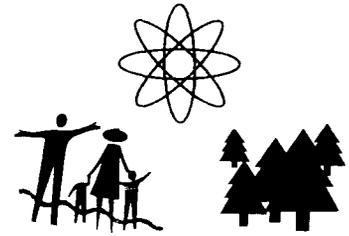
PEER REVIEW TEAM MOBILIZED

To enhance the quality and credibility of this effort, the Panel has formed a Peer Review Team comprised of five nationally recognized experts with backgrounds related to this effort. Team members are tasked with reviewing and commenting on each draft final report produced for this project. Comments are then forwarded to *Risk Assessment Corporation*, who reviews and provides feedback on the peer review input. Members of the Panel then look at the Peer Review input coupled with the feedback from *RAC* to assure that Panel members concur with comment resolution.

**We're on the Web:
www.rfcab.org/SALOP.html**



Radionuclide Soil Action Level Oversight Panel



Planning for Tomorrow... Radionuclide Soil Action Levels at Rocky Flats

BACKGROUND

Rocky Flats operated from 1952 - 1992 as a manufacturing facility for the production of component parts for nuclear weapons including plutonium pits, the fissionable core of such weapons. Since cessation of production activities, the site has been involved in waste management and environmental remediation activities. One of the primary challenges facing site officials and residents from surrounding communities is determination of the amount of radionuclides, such as plutonium, that may legally remain in the soil following remediation. These levels are known as radionuclide soil action levels (RSALs) because remediation action is triggered when the amount of radioactive material in the soil exceeds the established levels.

Using a computer modeling program known as RESRAD (Residual Radiation) that was developed at Argonne National Laboratory, interim radionuclide soil action levels were incorporated into the Rocky Flats Cleanup

Agreement (RFCA) on October 18, 1996. The RFCA serves as the legally binding agreement for site remediation between the Department of Energy and its regulators, the Environmental Protection Agency and the Colorado Department of Public Health and Environment. Intended to be protective of people using the site after closure, the RSALs set the upper limits for the radionuclides (primarily plutonium and americium) allowed in the soil at Rocky Flats after remediation. The RSALs are measured in picocuries (a measure of radiation) per gram of soil.

Almost immediately after the RSALs were established, members of the community became concerned. Not only were the numbers much higher than anticipated, but upon further investigation, the levels were found to be higher than levels established for remediation at sites elsewhere, as shown below:

<i>Rocky Flats Environmental Technology Site</i>	1 429
<i>Nevada Test Site</i>	200
<i>Enewetak Atoll (South Pacific bomb test site)</i>	40
<i>Hanford Nuclear Reservation (Washington State)</i>	34
<i>Johnston Atoll</i>	15

PUBLIC REACTION

After looking at the above numbers, it became apparent that more information was needed to better understand the criteria used for the soil action levels. As a result, several entities, including the Rocky Flats Citizens Advisory Board, the cities of Westminster and Broomfield, public interest groups, and Congressman David Skaggs, called for an independent assessment of the RSALs as well as the process used to establish these levels. The end result of ensuing discussions was an unprecedented agreement by the Department of Energy to fund a community directed, independent scientific assessment of the RSALs for Rocky Flats. To provide

oversight of the study, a panel of thirteen community representatives was formed, known officially as the Radionuclide Soil Action Levels Oversight Panel (RSALOP).

After drafting and issuing a formal Request for Proposal, the Panel selected Risk Assessment Corporation (RAC) to conduct the assessment. RAC has previous experience with the Rocky Flats site studying the potential health effects caused by site emissions during production years. In addition, RAC has more than twenty years experience working on dose

reconstruction environmental dosimetry chemical risk analysis and related disciplines RAC has assembled a team of technical experts each with a particular area of expertise necessary to complete the RSAL assessment Work began in October 1998 and is scheduled for completion in November 1999

PROJECT SUMMARY

Several project tasks have been defined for the contractor The first of these is to research RSALs used at other plutonium contaminated sites around the world Second RAC is tasked with exploring existing computer models that could be used to determine RSALs and recommending the one best suited for use at Rocky Flats Third RAC will investigate and then recommend pertinent input and assumptions for use in computer calculations Fourth with the preceding information RAC's major task will be to conduct an independent calculation of the RSALs for Rocky Flats which can then be compared with the originally recommended RSALs The final two tasks involve recommending appropriate soil sampling procedures to determine the amount of contamination in soil both before and after remediation activity Finally RAC will analyze results from the

ongoing Actinide Migration Studies to determine whether any findings from these studies are applicable to the soil action levels

PUBLIC INVOLVEMENT

Although public involvement began when community representatives approached the Department of Energy with concerns that resulted in formation of the RSALOP the Panel has developed a public involvement and information strategy to ensure ongoing communication Monthly working meetings of the Panel are open to the public and are conducted the second Thursday of each month from 4 to 6 p.m. at the Broomfield City Center One Descombe Dr Broomfield CO In addition three public information workshop meetings will be scheduled during the project With some up front planning a member of the Panel can provide briefings to community groups or interested parties For a project status update information packet or further information on meeting times and locations please contact either Carla Sanda Advanced Integrated Management Service Inc at (303) 277-0753 or Ken Korkia Rocky Flats Citizens Advisory Board at (303) 420-8855

Introducing the RSALOP Team

Panel Co Chairs

Mary Harlow serves as the Rocky Flats Coordinator for the City of Westminster acts as the City liaison to the City of Westminster and Federal organizations relative to Rocky Flats activities and keeps the City Council and staff apprised of pertinent issues She represents the City staff on the Rocky Flats Coalition of Local Government Board of Directors and is currently Secretary for the Rocky Flats Citizens Advisory Board Additionally she serves on the Board of Directors of the Energy Communities Alliance a national organization of local communities that are located in the shadow of Department of Energy facilities Ms Harlow has a BS in Health Care Management an MAS in Environmental Technology and an MAS in Water/Wastewater Technology

Henry A Stovall earned a BS in Industrial Education and a BS in Physics Prior to retirement he was an Engineering Manager with 33 years experience in the engineering arena including environmental health and safety engineering Mr Stovall was a member of the Rocky Flats Health Advisory Panel and has been actively involved in related Rocky Flats issues As a twenty nine year resident of Broomfield Colorado Mr Stovall has been active in various community activities including serving on the Broomfield City Council from 1977-1983 and again from 1995-present

Panel Members

Tom Davidson received his BS in Electronic Engineering and has thirty years of engineering experience including 16 years in the nuclear field He is a member of the Rocky Flats Citizens Advisory Board and has participated in numerous issues related to the cleanup and future use of the site Mr Davidson is also an active participant in the University of Colorado at Boulder Chancellor's Community Advisory Council He currently serves as the Mayor of Louisville Colorado and represents his community on the Panel

Joe Goldfield earned his BS in Chemical Engineering and a chief professional affiliation with the American Academy of Environmental Engineers as a Diplomate His professional career with Mobil Oil Corporation spanned thirty one years of which 20 years was spent as manager of Environmental Engineering He holds a Professional Engineers license in New Jersey Colorado Massachusetts and Mississippi and

owns several patents on pollution control equipment Mr Goldfield has been an active stakeholder in numerous issues at the Rocky Flats site

Dean Heil is currently Assistant Professor of Soil Science in the Department of Soil and Crop Sciences at Colorado State University He completed his PhD in Soil Science at the University of California at Berkeley His research has included remediation of Pb (lead) pollutants

Robert Kanick earned a BS in Nuclear Engineering with an emphasis in reactor power operations He has worked as a nuclear reactor engineer and control engineer for several years His experience ranges from the development of diversification reactor testing and control of special nuclear materials to the use and evaluation of computer modeling systems used for core design safety and criticality analysis As a member of the

Rocky Flats Citizens Advisory Board. Mr. Kanick has been actively involved in numerous projects related to the cleanup and future use of the Rocky Flats site.

Carol E. Lyons serves as the Rocky Flats Coordinator for the City of Arvada, Colorado.

Todd Margulies earned his MS in Environmental Sciences/Geochemistry as well as a Bachelor's in Geology. After spending more than ten years working for major environmental firms, he began work as an independent environmental consultant in 1991. He has dealt with numerous Rocky Flats issues and was a staff member of the Colorado Council on Rocky Flats. In addition, Mr. Margulies has conducted ground water, surface water, soil, and sediment investigations at sites around the world to assess organic and inorganic contaminant transport and fate.

LeRoy Moore, Ph.D. serves as a consultant to the Rocky Mountain Peace and Justice Center in Boulder, Colorado. Author of the Citizens Guide to Rocky Flats (1992), Dr. Moore is a member of the Rocky Flats Citizens Advisory Board. Involved with the Rocky Flats issue since 1979, he has played a key role in numerous projects, including the Rocky Flats Future Site Use Working Group. He co-chairs the recently created Rocky Flats Actinide Migration Studies Technical Review Group. He is currently working with a photographer on a book which will tell the Rocky Flats story in images and words of workers who made bombs inside the facility and activists who opposed such production from the outside.

Lisa Morgan Morzel serves on the Boulder City Council, having been elected in 1995. As a council member, she represents Boulder on issues related to Rocky Flats, including the Rocky Flats Local Impacts Initiative and its successor group, the Rocky Flats Coalition of Local Governments. Dr. Morzel is a research geologist for the U.S. Geological Survey and holds a Ph.D. in Geology and Geophysics.

Technical Support Contractor

Since its formation in 1977, Risk Assessment Corporation (RAC) has significantly contributed to the development and application of methods for estimating exposures from radionuclides and chemicals to the public and workers and quantifying the health risks and the uncertainties. RAC has also encouraged public participation in dose reconstruction studies and has developed innovations in the communication of exposure and risk information to the public. The following team of professionals, headed by RAC's president, Dr. John E. Till, has been assembled to conduct this study:

John E. Till holds a Ph.D. in Nuclear Engineering, an MS in Health Physics, and a BS in Engineering. In addition, he is a graduate of the U.S. Naval Academy and the U.S. Navy Nuclear Propulsion Program. Following his naval career, Dr. Till worked as a staff scientist at the Oak Ridge National Laboratory and in 1977 formed Risk Assessment Corporation (RAC). Dr. Till's scientific achievements include more than 150 publications, including editing the first textbook on radiation dose analysis, Radiological Assessment, and other documents that stress new approaches to apply and simplify risk analysis. Dr. Till's current work focuses on the assessment of risks from past releases of radionuclides and chemicals.

George G. Millough earned an MA degree in mathematics from the University of Tennessee at Knoxville and did further study under a grant from the National Aeronautics and Space Administration. His more than 30 years of professional experience include university teaching (mathematics and computer

Niels Schonbeck is a professor in the Department of Chemistry at Metropolitan State College of Denver, Colorado, where he has taught since 1978. He has also been a visiting scientist at the National Center for Atmospheric Research in Boulder, Colorado. He earned his Ph.D. in Biological Chemistry and his BA in Chemistry. In 1987, he became involved in the health and safety issues of the Rocky Flats site and was appointed to the Rocky Flats Environmental Monitoring Council. Since then, he has also served as a member of the Rocky Flats Health Advisory Panel.

Joel Selbin received his B.S. in Chemistry and Ph.D. in Inorganic Chemistry. He joined the faculty at Louisiana State University (Baton Rouge) in 1957, where he served until 1991. During his 34 years at LSU, he directed the research of graduate and postdoctoral students, authored and collaborated on numerous books and articles, and obtained two U.S. patents. He has written, lectured, and debated widely on nuclear power and nuclear arms issues, as well as energy alternative issues, and has served as a technical consultant to numerous academic and governmental entities. Upon his retirement from LSU, Dr. Selbin relocated to Boulder, Colorado, where he taught for seven years at the University of Colorado at Denver. He now teaches at the University of Colorado Boulder campus.

Ken Starr has more than 13 years experience in the fields of civil and environmental engineering, including numerous CERCLA Superfund remediation and investigation tasks, environmental assessments, environmental health and safety assessments, as well as health and safety training. He currently serves as the Director of the Environmental Compliance Division for the Jefferson County Department of Health and Environment. He holds an MS in Environmental Engineering, BS in Agricultural/Civil Engineering, and is a Registered Professional Engineer for both the State of Colorado and Arizona.

science) and serving as a member of the research staff at Oak Ridge National Laboratory, where he designed and implemented mathematical models and applied them to environmental problems. He developed internal dosimetry computer software, which was subsequently the basis for the Environmental Protection Agency's RADRISK program. Under sponsorship of the National Science Foundation and the Department of Energy, he constructed models of the global cycling of carbon and tritium, which were applied to estimating levels of carbon dioxide as a greenhouse gas and to predicting exposure of the world population to releases of ^{14}C and ^3H from nuclear fuel cycles. As a consultant to Risk Assessment Corporation, he participated in a dose reconstruction project for the Fernald nuclear facility, sponsored by the Centers for Disease Control and Prevention. For the Fernald study, he developed new methods for confirming estimates of airborne annual releases from soil measurements and modeling the atmospheric diffusion of radon decay products using radon monitoring data. Mr.

Killough is author or co author of many refereed publications. In his current work, he makes innovative use of probabilistic methods and Monte Carlo bootstrap sampling to assess uncertainties in model predictions and to calibrate environmental models to site specific data.

Kathleen R Meyer holds an MS degree in health physics and a PhD in radiological health sciences. She has served as a research assistant at Oak Ridge National Laboratory where she assessed the radiation damage and subsequent recovery capabilities of normal tissue, both in cell culture and in animal models. Her career has also included independent work in radiological dose assessments, technical abstracting and chemical and radiological risk evaluation for sites containing hazardous materials. Dr Meyer has more than 20 years experience in the fields of biological research and teaching, radiation protection, and public communication.

Arthur Rood received his Bachelor's degree in geology and an MS in health physics. His experience includes environmental and laboratory measurements of uranium related byproducts. He later joined a team of environmental scientists at the Idaho National Engineering and Environmental Laboratory and worked primarily in the field of environmental contaminant transport modeling and dose assessment. Mr Rood has now formed his own corporation and projects currently focus on the use of atmospheric dispersion models to study past releases of chemicals and radionuclides to support dose reconstruction studies at the Rocky Flats Plant and

Savannah River Site. Mr Rood also teaches an Environmental Modeling class for the University of Idaho.

David J Thorne received his Bachelor's degree in geology and his MS degree in health physics. His career has included surveillance of the Fort St. Vrain Nuclear Power Station and conducting studies on concentrations of ^{131}I in dairy milk. He has also been involved in providing air quality modeling support, preparing radiological health risk assessments, conducting studies on groundwater transport of contaminants, and development of an atmospheric dispersion modeling study as well as computer models to simulate the transport of radionuclides. Mr Thorne is currently using his extensive experience with computer systems, computer programming, and air and contaminant transport models to test computer models, assess residual contamination of buildings, model accidental releases, develop risk based statistics, and model potential groundwater impacts.

Jill M Weber received her undergraduate degree in 1993 in physics with minors in chemistry and mathematics and her MS degree in radiological health sciences with a specialty in health physics. Ms. Weber joined RAC in 1995 and has been involved in a number of radiological dose reconstruction projects. Her research has included model development for releases of plutonium from the 903 Pad Area at Rocky Flats, a contaminated soil area that was exposed to high winds and resulted in significant releases. She also has experience in estimating onto-ing uncertainty estimation and probability estimation.

Administrative Support Contractor

Advanced Integrated Management Services Inc (AIMSI) is a small minority owned Tennessee corporation founded in 1994 with a staff of over 100 full and part time professionals. Headquarters in Oak Ridge Tennessee with field offices in Colorado, Nashville Tennessee and Paducah Kentucky. AIMSI provides professional engineering, management, technical and administrative support services and has formed the following team to provide both day to day project administrative support and public involvement and information.

Anna Corbett has more than 15 years experience in technical support and customer service including extensive support of programs in the nuclear and chemical waste environment. Her career with AIMSI has included support to Rocky Flats programs including the Mixed Waste Occurrence Technology Management program and the Rocky Flats Site Technology Coordination Group.

Carla Sanda brings more than 10 years of experience in developing and executing stakeholder involvement activities prior to joining AIMSI as a subcontractor on the project. Ms. Sanda was a member of the Community Relations group at Rocky Flats. She served as team lead for waste management stakeholder involvement project manager for the Rocky Flats Western Coalition Association, Demonstration of Innovative Technologies program manager for the Federal Facility Compliance Act stakeholder involvement and was a member of the team tasked with drafting our national public involvement policy.

**For the latest project information on the web go to
www.rfcab.org/SALOP.html**

**Or contact AIMSI
5460 Ward Road Suite 370
Arvada CO 80002
(303) 456 0884 Fax (303) 456 0858**

What Is the RSALOP?

Formed in 1998, the Radionuclide Soil Action Levels Oversight Panel (RSALOP):

- Is a Citizen Oversight Group comprised of a cross-section of thirteen community representatives
- Is funded by the Department of Energy to review calculations used in setting the radionuclide soil action levels for Rocky Flats
- Seeks to assure ongoing community understanding
- Holds monthly public meetings to review the study's progress and to make recommendations
- Invites community input



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What is a

"Radionuclide Soil Action Level"?

One of the primary concerns of site officials, regulators, and residents of surrounding communities is determining the amount of radionuclides that may legally remain in the soil at Rocky Flats following site remediation. These levels are known as "**radionuclide soil action levels**" (**RSALs**) because remediation is triggered if radiation levels in the soil exceed the established level.



What's the Issue?

- Interim levels for radionuclides in soils -- or "radionuclide soil action levels" (RSALs) -- for Rocky Flats were established in 1996.
- The Rocky Flats RSALs appeared to be considerably higher than those set for sites elsewhere in the world.
- This prompted concerned citizens to ask:
 - How and why were the current Rocky Flats RSALs established?
 - Should interim levels adopted for Rocky Flats be revised?

In response to these concerns, the U.S. Department of Energy agreed to the creation of the RSALOP.



What's Being Done?

- The Radionuclide Soil Action Levels Oversight Panel was convened in January 1998.
- The Panel contracted with *Risk Assessment Corporation (RAC)* to review and assess the process used to determine interim radionuclide soil action levels.
- The Panel organized a peer review team to review draft reports provided by RAC.
- All study results and recommendations, including public comments, will be provided to the Department of Energy and its regulators for use in determining radionuclide soil action levels for the Rocky Flats site.



Project Overview

- *Risk Assessment Corporation* began work in October 1998 -
 - with completion scheduled for November 1999.
- Study consists of five primary tasks:
 - Assessing radionuclide soil action levels established for other sites
 - Analyzing the computer modeling program used to set interim levels and assessing other relevant computer programs
 - Analyzing inputs and assumptions for the soil action levels
 - Making independent calculations for the soil action levels
 - Recommending an appropriate soil sampling program



You're Invited . . .

The Oversight Panel meets regularly to represent you and your community in this important effort. Your input and participation is important to the process. You can:

- Participate in monthly work sessions: 4-7 p.m. - second Thursday of each month through November 1999 at the Broomfield City Building, One Descombes Drive, Broomfield, CO
- Attend public meetings
- Share your comments and/or concerns with panel members



Radionuclide Soil Action Levels Oversight Panel

Why Be Concerned About Plutonium?

Plutonium, the material of principal concern at Rocky Flats:

- Has a half-life of 24,000 years (remains radioactive for a quarter of a million years)
- Has been released into the environment around Rocky Flats in particle form
- Emits alpha radiation which cannot penetrate skin but which can cause harm if taken into the body
- Can be inhaled, ingested, or admitted into the body through a wound
- Is subject to movement with water or resuspension in the air if present in the soil



DRAFT

STORYBOARDS

NOTE:

STORYBOARDS WILL BE ENLARGED TO ~2' X 3'

*MAJOR HEADINGS, BOTTOM LOGO & BULLET
SYMBOLS WILL BE PRINTED IN BLACK*

LETTERS WILL BE PRINTED IN BLUE

What is a "Soil Action Level"?

One of the primary concerns of site officials, regulators, and surrounding communities is determination of safe levels for the amount of radionuclides that may remain in the soil following cleanup. These levels are known as "soil action leve/s" because cleanup is triggered if radiation levels in the soil exceeds the set recommendation.



What's the Issue?

Interim levels for radionuclides in soils -- or "soil action levels" -- at Rocky Flats were established in 1996 that appear to be considerably higher than those elsewhere in the world. That prompted the Panel to further explore the issue to better understand:

- How and why were the current levels established?
- How are safe levels determined?
- Should the interim levels be revised?



What Is the RFSALOP?

The Rocky Flats Soil Action Levels Oversight Panel (RFSALOP) was formed in 1998

- Citizen Oversight Group comprised of a cross-section of 13 community representatives
- Funded by the Department of Energy to review previously established soil action levels
- Developed public involvement plan to assure ongoing community understanding and input
- Meets monthly to review the study, make recommendations, invite community input



What's Being Done?

- The Rocky Flats Soil Action Levels Oversight Panel was convened
- The Panel has contracted with *Risk Assessment Corporation* to review and assess the process used to determine interim soil action levels
- Organized peer review team to review recommendations and final reports provided by *Risk Assessment Corporation*
- Final study results and recommendations, including public comments, will be provided to the Department of Energy and its regulators for use in determining radionuclide soil action levels for the Rocky Flats site



Project Overview

- *Risk Assessment Corporation (RAC)* began work in October 1998 -- with completion scheduled for November 1999
- Study consists of 5 primary tasks:
 - Reviewing/assessing radionuclide soil action levels
 - Analyzing the computer modeling program used to set interim levels; reviewing other relevant computer programs
 - Analyzing inputs and assumptions for the soil action levels
 - Assessing independent calculations for the soil action levels
 - Analyzing soil sampling protocols



You're Invited . . .

The Panel meets regularly to represent you and your community in this important effort. Your input and participation is important to the process:

- Monthly work sessions: 4-7 p.m. - second Thursday of each month at the Broomfield City Building
- Attend public meetings
- Review and comment on draft documents throughout the study
- Share your comments and/or concerns with panel members





Radionuclide Soil Action Levels Oversight Panel



PUBLIC MEETING

"Planning for Tomorrow
Radionuclide Soil Action Levels at Rocky Flats"

Where Broomfield City Center - Council Chambers
One Descornbes Dr
Broomfield, CO 80030

When Wednesday, September 8, 1999
7:00 - 9:00 PM

- What's been learned to date and how does that affect me?
- What factors determine a radionuclide soil action level?
- How might future land use affect a radionuclide soil action level?
- How can we work together to protect today's and tomorrow's communities?

A community-directed, independent study to review and assess the Recommended levels for plutonium that may legally remain in the soil at Rocky Flats is nearing its completion. Your input is needed as we work together towards a decision that could affect your future. To learn more about these questions and the on-going study, please join us for this important discussion. For further information, please contact either Carla Sando, Advanced Integrated Management Services, Inc (303-277-0753), or Ken Korkia, Rocky Flats Citizens Advisory Board (303-420-7855)



Radionuclide Soil Action Levels Oversight Panel



PUBLIC MEETING

"Planning for Tomorrow . Radionuclide Soil Action Levels at Rocky Flats"

Where Westminster City Hall
4800 W 92nd Avenue (East of Sheridan Blvd On 92nd Ave)
Westminster, CO 80030

When Wednesday, March 10, 1999
6:30 - 7:00 PM Open House --- 7:00 - 9:00 PM Discussion

- What is a "Radionuclide Soil Action Level"?
- What's the issue?
- Why Be Concerned About Plutonium in the Soil at Rocky Flats?
- What's Being Done to Protect the Community?

Get the answers to these questions and more. Your input is needed as we work together to determine the amount of radioactive materials that may remain in the soil. Please join us for this important discussion. For more information, please contact either Carla Sando, Advanced Integrated Management Services, Inc (303-277-0753), or Ken Korkia, Rocky Flats Citizens Advisory Board (303-420-7855)

ROCKY FLATS CLEANUP



Denver Post by photo
Workers at Rocky
Flats practice
what they will do
with the barrels
and how they will
move them during
a visit by then-Ener-
gy Secretary
Federico Pena in
June 1998.

Standards for soil cleanup at site unacceptable

The Dec. 3 editorial ("Dirty work: cleaning Flats") is an uncritical presentation of the propaganda from Rocky Flats to justify unacceptable cleanup standards for soil that will jeopardize the lives and safety of present and future generations of Coloradans living and working on that soil. Over the course of many years the site can be a focal point of infection for a much greater area because the plutonium in the soil moves and spreads.

The proposed cleanup standard of 1,429 pCi/g (picocuries per gram of soil) compares to 10 pCi/g recommended by a contractor with excellent credentials hired by a citizens group with funds supplied by the Department of Energy to review the cleanup standard.

Do you know that 1,429 pCi/g is 34,000 times as high as the background level of plutonium in Colorado soil? Do you know that the soil cleanup standard proposed by the Colorado Department of Health in 1975 was less than 1 pCi/g? Do you know that the Defense Nuclear Agency cleaned the soil of the Enewetak Atoll in the late '70s us-

ing a cleanup standard of 40 pCi/g? Do you know that scientists at the Oak Ridge National Laboratory (a DOE facility) wrote a paper to justify the use of 13.5 pCi/g as a standard for the Johnston Atoll cleanup? Where on Earth is there evidence of people living, working or playing on soil contaminated with 1,429 pCi of plutonium per gram of soil?

Would we be condemning present and future residents and workers and recreational users of the Rocky Flats site to join the border of American citizens who have been injured as downwinders exposed to fallout of nuclear-bomb testing, as the workers in our atomic plants like Rocky Flats, and as the soldiers unfeelingly exposed to the fallout and radiation following nuclear weapons tests? Heaven help those who were injured. To a person they have been exposed to disability and a denial of liability. Only recently has our government recognized the legitimacy of some of their claims.

JOE GOLDFIELD
Denver

THE DENVER POST

12-19-99

LETTERS, FAXES & E-MAIL

12/23

Flats cleanup is narrowly defined

By Hank Stovall, Mary Harlow and LeRoy Moore

Parts of the Rocky Flats site, 16 miles northwest of central Denver, where for nearly 40 years nuclear weapons were manufactured, are badly contaminated with plutonium. Plutonium remains radioactive for 240,000 years. A tiny speck taken in the body may, for an unknown portion of the population, cause cancer or genetic defects. Thus any amount in the environment presents a long term potential danger. People downstream and windward from Rocky Flats are concerned that particles of plutonium could get up in drinking water or in bits of dust that can be readily inhaled.

Everyone thus wants Rocky Flats cleaned up but not all agree on the meaning of "clean." There are at least three definitions of clean. The first definition came in June 1985 when the Rocky Flats Future Site Use Working Group issued a consensus recommendation that Rocky Flats be cleaned to average background radiation level when it becomes fiscally and technologically possible to do this in an environmentally responsible manner. This very stringent definition of clean is more a goal to move toward than a present possibility. Still, it is the closest we have to an expression of the wishes of the public at general.

A second, very different definition of clean was provided in October 1986 when the Department of Energy, the environmental Protection Agency and the Colorado Department of Public Health and Environment adopted interim standards for "cleanup" of the Rocky Flats site. These standards are called "radionuclide soil action levels"

(ISALs), because cleanup action is triggered if radiation in the soil exceeds the established standard. The ISALs specify how much radioactive material is officially allowed to remain in the soil in picocuries (a measure of radiation) per gram of soil. Assuming the presence also of other radioactive materials in the soil, the interim Rocky Flats ISALs allow 651 picocuries of plutonium per gram of soil. This number represents the present official definition of clean for Rocky Flats, in response to which a third definition, discussed below, has emerged. The interim ISALs were problematic for several reasons. They were developed behind closed doors. They were adopted against near universal public opposition. At 651 picocuries per gram for plutonium in soil, they far exceed the amount in other plutonium contaminated sites — 40 at Schwetkey, 15 at Johnston Atoll, 34 at Hanford, 200 at the Nevada Test Site, 10 for the Livermore Lab.

In response to ongoing public opposition, DOE agreed to fund an independent scientific review of the calculations behind the Rocky Flats ISALs. An oversight panel of technical specialists and representatives of local government and of public interest groups was formed. To perform the study, the panel hired Risk Assessment Corporation, a team of scientists well-respected locally for its "Historical Public Exposure Studies on Rocky Flats."

All parties knew that the year-long study could produce a recommendation that the ISALs be revised to allow less plutonium in the soil.

Searching for ultimate cleanup goal

By Jessie Roberson

It has been a tremendous progress that has been made in the last few years in the cleanup of Rocky Flats. It raises significant questions about the ultimate goal of the cleanup. Flow clean is clean enough to safely close Rocky Flats? What are the likely future uses of the site? Flow safe should it be? Safe enough for whom? A draft of a recent independent scientific report on cleanup levels at Rocky Flats may help clarify some of these questions and advance other larger policy issues associated with finishing the Rocky Flats cleanup on schedule and in a manner consistent with the values of the community.

The draft study, conducted by the Risk Assessment Corporation and overseen by an independent community panel, shows that the interim cleanup levels set in 1986 by the Department of Energy and its regulators were about right. The RAC study essentially agrees that the cleanup levels set by the agencies will protect the most likely future uses of the site — open space and light industrial use. The RAC also validated the cleanup levels identified by the agencies to protect hypothetical future residential use. An important point even though we use for this site is proposed residential use. However, the RAC report diverges from the current cleanup levels by recommending against housing the Rocky Flats cleanup, and protecting the most likely future uses. Instead, RAC suggests that DOE clean the site to the safe level for hypothetical future residential use. In other words, the RAC is recommending a cleanup level that is more stringent than the current ISALs.

Second, the RAC report has identified numerous areas where more research and data gathering are needed. Most significantly, RAC indicated the possibility of a brush fire as a key variable in determining the safe level for residential contamination. The RAC report also identifies some areas where more research and data gathering are needed. Most significantly, RAC indicated the possibility of a brush fire as a key variable in determining the safe level for residential contamination. The RAC report also identifies some areas where more research and data gathering are needed.

Some of the areas where more research and data gathering are needed include: the possibility of a brush fire as a key variable in determining the safe level for residential contamination; the RAC report also identifies some areas where more research and data gathering are needed. Most significantly, RAC indicated the possibility of a brush fire as a key variable in determining the safe level for residential contamination. The RAC report also identifies some areas where more research and data gathering are needed.

Searching for ultimate cleanup goal

Proposed cleanup levels for the future cleanup of Rocky Flats are being set by DOE and its regulators. On this basis, DOE is planning to set cleanup levels for future residential use. DOE is planning to set cleanup levels for future residential use. DOE is planning to set cleanup levels for future residential use.

At this point, DOE can draw several preliminary conclusions. First, the RAC report generally validates the interim cleanup levels set by DOE and its regulators for the anticipated future uses of the Rocky Flats. DOE feels some level of vindication that to this extent, the RAC report has stood up to independent scientific scrutiny.

Second, the RAC report has identified numerous areas where more research and data gathering are needed. Most significantly, RAC indicated the possibility of a brush fire as a key variable in determining the safe level for residential contamination. The RAC report also identifies some areas where more research and data gathering are needed.

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Roberson

KEEP FROM GETTING SHUT DOWN

DO NOT DUMP ROCKY FLATS ON SOUTH CAROLINA SHUT IT DOWN!

GREENPAC (303) 442-5107 (303) 470-6226

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KEEP FROM GETTING SHUT DOWN

DO NOT DUMP ROCKY FLATS ON SOUTH CAROLINA SHUT IT DOWN!

GREENPAC (303) 442-5107 (303) 470-6226

For 75 years, demonstrators have wanted Rocky Flats closed or a better process for cleaning up contaminants.

Best Available Copy

Just how far do we want the Flats cleaned up?

The Department of Energy would like to correct some statements we believe are incorrect in Mr. Joe Goldfield's letter of Dec. 19, 1996.

First, the current cleanup standard for plutonium in the Rocky Flats Buffer Zone is approximately 851 picocuries per gram of soil, a figure less than half the one Mr. Goldfield quotes.

Second, the study Mr. Goldfield cites that recommends 10 picocuries per gram reaches this conclusion only by assuming that Rocky Flats will in the future be used by a resident rancher who will reside on the Rocky Flats Environmental Site 24 hours a day, seven days a week and continue to live and ranch on the site after a spontaneous brush fire denudes the entire of vegetation for a full year. The projected land use of Rocky Flats after closure is open space.

Third, the same report cited by Mr. Goldfield confirms that the cleanup levels set by the DOE and its regulators in 1996 for the more likely future use options of open space and light industrial use are sufficiently protective.

Fourth, the scientific that initially recommended the cleanup level cited by Mr.

Goldfield has indicated more recently that it may have to amend this recommendation in light of peer review and further consideration by the authors.

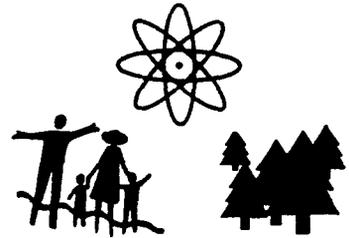
It's easy to play numbers games and take cheap shots at DOE. The communities that have been working on the cleanup of Rocky Flats for years are sophisticated and pragmatic enough to delve into the real issues facing the cleanup without demagoguery and misinformation. The community, DOE, and the regulators need to confront the real issues. Does the community want to divert scarce cleanup dollars to clean up prime open space to make it safe enough for one resident rancher? What are the ecological impacts of such a cleanup on sensitive habitats? How much additional nuclear waste will be created? What are the risks to the workers and to the community of excavating so many acres of soil? If the "crown jewel" of Front Range open space is cleaned to be safe for residential use, will the developers be far behind?

JEREMY KARPATKIN
Rocky Flats Field Office
Department of Energy
Golden

Denver Post
12/26



Radionuclide Soil Action Level Oversight Panel



Memo

Date: March 23, 1999
To: Bernie Morson, Rocky Mountain News
From: Carla Sanda
RE: Radionuclide Soil Action Level Oversight Panel

As a follow-up to their meeting with you last week, Mary Harlow and Hank Stovall have asked me to provide you with some additional information regarding the Radionuclide Soil Action Level Oversight Panel (RSALOP) project

As you are aware, *Risk Assessment Corporation* has been selected as the contractor to perform the technical review of the interim radionuclide soil action levels. Dr. John Till, President, can be reached at 803-536-4883 (Phone), 803-534-1995 (Fax), johnntill@mindspring.com (email)

After an extensive selection process, the Panel has appointed a 5-member Peer Review Team comprised of the following individuals

- Dr. Steven L. Simon, National Academy of Sciences,
- Dr. Paula Labieniec, independent consultant in hazardous waste and contaminated soil risk assessment,
- Dr. Ward Whicker, Dept. of Radiological Health Sciences, Colorado State University;
- Allan C. B. Richardson, consultant on radiation protection and former member of EPA staff involved in developing much of the EPA radiation standards,
- Dr. Glenn Paulson, President of Paulson & Cooper (Jackson, WY & Chicago, IL), hazardous & radioactive waste management.

Members of the Peer Review Team are tasked with providing technical review and comments of four formal reports to be issued by *Risk Assessment Corporation* over the life of the project

I am also enclosing several pieces of project background information, including a) Letter dated May 16, 1997 from the City of Westminster to the Department of Energy and the Environmental Protection Agency from the City of Westminster, and b) Letter dated June 10, 1997 from then Congressman David Skaggs to the Department of Energy and the Environmental Protection Agency

We appreciate your interest in this project. Please don't hesitate to contact me at 303-277-0753 at any time for additional details or project updates

DAVID E SKAGGS

2ND DISTRICT (COLORADO)

1124 LONG WORTH BUILDING
WASHINGTON, DC 20515
(202) 225-2101

701 MARLAN STREET SUITE 120
WESTMINSTER, COLORADO 80530
(303) 630-7886

INTERNET EMAIL: SKAGGS@HOU.Senate.gov



UNITED STATES
HOUSE OF REPRESENTATIVES

COMMITTEE ON APPROPRIATIONS

SUBCOMMITTEE ON INTERIOR

SUBCOMMITTEE ON COMMERCE, JUSTICE
STATE AND THE JUDICIARY

PERMANENT SELECT COMMITTEE
ON INTELLIGENCE

CHAIRMAN DEMOCRATIC STUDY GROUP

June 10, 1997

The Honorable Federico F. Pena
Secretary
Department of Energy
1000 Independence Avenue, SW
Washington, D.C. 20585

Administrator Carol M. Browner
Environmental Protection Agency
401 M Street, SW
Washington, D.C. 20460

Mr. Alvin L. Alm
Assistant Secretary for Environmental Management
Department of Energy
1000 Independence Avenue, SW
Washington, D.C. 20585

Dear Secretary Pena, Administrator Browner, and Mr. Alm:

I received a copy of the letter dated May 1, 1997, the Rocky Flats Citizens Advisory Board (CAB) sent to you regarding review of the Rocky Flats soil action levels. I support national review of the 15/85 standard as established for the Department of Energy's Rocky Flats site, including review of the RESRAD model.

As you know, Rocky Flats is very close to a major metropolitan area, and as cleanup proceeds, it's important to ensure that down-stream water supplies are protected. I've been advised that the 15/85 standard adopted by Rocky Flats protects these interests. I supported the interim standard based on that advice, with the understanding that these standards will be reviewed, as needed, including an annual review as provided in the Rocky Flats Cleanup Agreement.

Since the adoption of the soil action levels last October, the Environmental Protection Agency decided against publishing a proposed regulation, thereby undermining the opportunity to subject these standards to independent national review. As you know, the Rocky Flats soil action levels are based on that draft regulation.

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WESTMINSTER

May 16, 1997

The Honorable Federico Pena
Secretary of Energy
United States Department of Energy
1000 Independence Avenue SW
Washington, D C 20585

City of Westminster
Office of the
Mayor

4800 West 92nd Avenue
Westminster, Colorado
80030

303 430 2400
FAX 303 430-1809
TDD 303-428-0648

The Honorable Carol Browner
United States Environmental Protection Agency
Waterside Mall
401 M Street SW
Washington, D C 20460

Alvin L. Alm
Assistant Secretary for Environmental Management
United States Department of Energy
Forrestal Building
1000 Independence Avenue SW
Washington, D C 20585

Dear Secretary Pena, Administrator Browner, and Mr Alm

The City of Westminster is writing to support the request of the Rocky Flats Citizens Advisory Board (CAB) that both the United States Department of Energy (DOE) and the United States Environmental Protection Agency (EPA) initiate and fund a contract with the National Academy of Sciences to provide a review and set a national standard for radionuclides in soil. The EPA was in the process of promulgating such a national soil standard in 1996, but has since dropped its proposal. It is very important not only for our local community and adjacent communities, but the nation as a whole that a national standard that is protective of human health and the environment be studied and determined.

The DOE ruled on October 19, 1996, that a 15 millirem for industrial use and 85 millirem (651 Picocuries/gram) for residential was an appropriate cleanup standard for the Rocky Flats Environmental Technology Site (RFETS). This standard was subsequently adopted as an interim soil action level for the Rocky Flats Cleanup Agreement by the local Rocky Flats Field Office, the Colorado Department of Public Health and Environment, and the EPA. This interim standard is awaiting a final national determination of an appropriate protective dose level.

Local governments as well as stakeholders are not comfortable with the 85 millirem dose standard set in the buffer zone of the RFETS for residential use. The area where our City is located already has a higher background exposure from naturally occurring radiation and nuclear fallout. Additionally, the RESRAD model that was used to determine the soil action levels for Rocky Flats used breathing rates set for low altitude residents, rather than for a high altitude area such as ours in Colorado.



May 16, 1997
Page 2

Dollars spent for this review by both the DOE and EPA will result in renewed confidence in the ability of both agencies to protect the health and welfare of citizens who live in the shadow of the former nuclear production facilities. We believe that it is important that this review be undertaken as soon as possible.

Your support in this endeavor will be greatly appreciated.

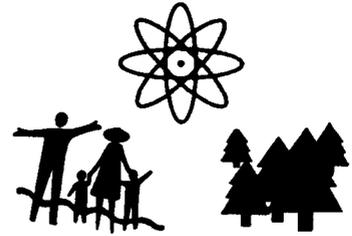
Sincerely,

Nancy Heil
Nancy M. Heil
Mayor

cc United States Senator Wayne Allard
United States Senator Ben Nighthorse Campbell
United States Representative David Skaggs
United States Representative Diana DeGette
United States Representative Dan Schaefer



Radionuclide Soil Action Level Oversight Panel



March 25, 1999

Ms Nancy Lane
Risk Excellence Notes
PO Box 925
Richland, WA 99352

TELEPHONE: 509-942-9053

Dear Nancy

I appreciate the opportunity to talk to you about the radionuclide soil action level review project being conducted for the Rocky Flats Environmental Technology Site. The first of three public meetings was held on Wednesday, March 10, 1999 from 6:30 - 9:00 p.m. at the Westminster City Hall. The meeting was designed to introduce the project to local residents and invite their participation as we work through the remainder of the technical study. As we discussed this morning, I am enclosing an information packet consisting of

- Three project press releases
- Fact sheet entitled **"Planning for Tomorrow...Radionuclide Soil Action Levels at Rocky Flats"**
- Meeting agenda
- Copy of seven 24" x 36" storyboards designed to provide project basics

Overall, the project is right on schedule and within budget – but with considerable work remaining. I look forward to seeing a copy of your publication and will share it with the Panel Co-Chairs, Hank Stovall and Mary Harlow. We will also add your name to our media contacts list to assure that you are kept updated. In addition, we would welcome the opportunity of providing a project update for an upcoming issue of your publication. Please don't hesitate to contact either myself or the co-chairs if we can be of further assistance.

Sincerely,

Original Signed By _____
Carla Sanda, RSALOP Project Administrator
(303) 277-0753

Enclosures As Stated

66



At DOE Operations Office/Facilities

AT ROCKY FLATS RISK ASSESSMENT TO ASSESS SOIL ACTION LEVELS

The Rocky Flats Soil Action Level Oversight Panel selected South Carolina-based Risk Assessment Corporation (RAC) to conduct the independent scientific assessment of the Department of Energy's methodology to set residual radioactivity standards at Rocky Flats (*WC Monitor*, Vol 9 No. 31). A 15-member panel of experts, chosen by RAC, have already begun assessment work, which is expected to be completed in one year.

RAC had previously conducted a Rocky Flats health effects study covering operation of the facility when it was in a production mode. The company also led a similar study at Hanford. The independent assessment is being funded by the Department of Energy.



On WIPP

DOE, NEW MEXICO AT WAR OVER WIPP OPENING DATE

The possible opening of the Waste Isolation Pilot Plant in early 1999 for non-mixed transuranic waste from Los Alamos National Laboratory with the acquiescence of the State of New Mexico is now in serious jeopardy given actions taken by the New Mexico Environmental Department (NMED) over the past two weeks. The war of words began Oct 5 when Susan McMichael, WIPP

Project Manager and Lead Counsel for the State of New Mexico, in testimony before the New Mexico Radioactive and Hazardous Materials Committee, revealed the state had reversed its position on whether DOE should be allowed to ship non-mixed transuranic waste to WIPP in the absence of a RCRA Part B permit, which covers only waste with hazardous components. "DOE's decision

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LOCAL NEWS SINCE 1892

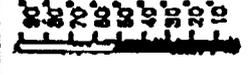
HTTP://WWW.CODAILY.COM

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Today's Weather
Cooler
Highs low 50-60s



Tomorrow's Weather
Chance of rain
Highs low 50-60s



Volume 106, No. 167

Colorado Daily

By **TERJE LANGELAND**
Colorado Daily Staff Writer

Sometime in the next 100, 500 or 1,000 years, people may build houses on what used to be the Rocky Flats nuclear weapons plant south of Boulder.

They may not even know that thousands of workers were once employed on the site making

plutonium triggers for Uncle Sam's nuclear arsenal. They may grow vegetables in the soil and eat them, and they may breathe in dust particles from the soil as they sleep at night.

That soil will still be contaminated with plutonium, one of the most toxic substances known to humans, a substance that has leaked into the ground over decades of operations at Rocky

Flats and will remain radioactive for tens of thousands of years.

The question being debated by government officials, scientists and citizen activists is, just how much plutonium will future visitors and residents in the area ingest, and with what health effects?

The question is central to the continuing controversy over "soil action levels" — a technical term

for soil cleanup standards — at Rocky Flats.

Two years ago, the state and federal agencies involved with cleanup efforts at the plant set a proposed standard for how much plutonium could be left in the soil once cleanup is completed, which is estimated to happen no later than the year 2010.

SEE PLAYS PAGE 2

How clean is clean?

Activist, DOE disagree on Rocky Flats soil cleanup

...Final contamination levels of Flats soil at issue in debate

FLATS FROM PAGE 1

But a coalition of local governments, activists and scientists who criticize the proposed plutonium level as too high have persuaded the U.S. Department of Energy, which owns the plant, to allow and fund an independent review of the cleanup standard.

"We were not happy about the soil action levels, so we all banded together and pressured Washington," said Mary Harlow, the city of Westminster's coordinator for Rocky Flats issues and the co-chairwoman of the independent oversight panel in charge of the study. "It's the first time the DOE has ever funded a citizens panel to do something like this."

The process of getting DOE's cooperation wasn't entirely smooth. At one point in the process, the DOE told the oversight panel it would receive only \$398,000 to carry out the study. The panel had requested \$517,000.

"I was pretty upset," said LeRoy Moore, one of the panel members and an associate of the Rocky Mountain Peace and Justice Center in Boulder. "It's typical of how difficult it is sometimes."

However, panel members met with Jessie Roberson, the manager of the DOE's Rocky Flats office, and negotiated the level back up to \$475,000.

The panel is using the money to pay a contractor, Risk Assessment Corp. of South Carolina, to review the calculations that resulted in the government's proposed cleanup standard.

The review, along with other emerging scientific findings, could result in a lower standard — and possibly higher cleanup costs for the DOE.

How clean is clean?

The 1996 standard was proposed at 1,429 picocuries of plutonium per gram of soil, which means that soil contaminated beyond that level would need to be removed. A picocurie is a measure of the number of disintegrations per second from radioactive materials.

Area governments and activists reacted strongly to the proposed standard, saying it was the highest anywhere in the United States.

"They can't clean it all up," Moore conceded. "But the numbers they've come up with looks like a way to get away without cleaning it up properly."

No nationwide standard exists for plutonium cleanup, but levels established at other nuclear sites are much lower than the level at Rocky Flats, critics say.

For example, the cleanup standard for inhabited islands in the Eniwetok Atoll, a former U.S. nuclear testing area in the South Pacific, was set at 40 picocuries per gram — 36 times

lower than the Rocky Flats standard. Cleanup levels have been set at 200 picocuries per gram at the Nevada nuclear test site.

The state of Washington, home to the giant Hanford nuclear complex site, has set a plutonium cleanup guideline of 34 picocuries per gram for areas where residential use is a future possibility.

Rocky Flats officials wouldn't confirm that the plant's cleanup standard is the highest in the nation, but they did not deny it, nor could they cite any examples of places with higher standards.

"I don't know if this is the highest," said Pat Enchart, a spokesman for the DOE's Rocky Flats Field Office.

At any rate, government officials argue that levels have to be set on an individual basis because nuclear sites are all different in respect to geography, geology, use, nature of contamination and myriad other factors.

To calculate the amount of plutonium that can be left in the soil, the government first determines a limit of acceptable human radiation exposure, also known as a "dose," which is measured in millirems. The current recommended maximum dose for a theoretical visitor or resident at Rocky Flats is 15 to 85 millirems per year, depending on different scenarios of how the area is used over the next several centuries.

Most people receive an estimated 300 millirem to 700 millirem per year from natural radioactive sources, according to Michelle Barry, a CU health physicist. In terms of risk, an additional 15-85 millirems is "extremely small," Barry said.

Future human exposure to plutonium at Rocky Flats would depend on many different factors, such as how much time a person spends in proximity to contaminated matter, how much plutonium is present in dust that might be inhaled or water that might be consumed, how much dust might be created as a result of wind speeds and soil texture, and so on.

Data on dust and breathing rates are important because one of the main ways in which humans are exposed to plutonium is through inhalation. Radiation from plutonium doesn't reach very far, but can be deadly when the plutonium is lodged in a person's lungs.

The government uses a computer model developed by the DOE to convert the recommended maximum dose into a recommended maximum plutonium level. The computer makes its calculation based on approximately 70 site-specific values input by government scientists.

The rate of dust suspension in the air, the breathing rate of hypothetical visitors, the rate at which plutonium is absorbed into produce growing in the soil and the solubility of the plutonium are just a few of these values.

SEE FLATS PAGE 2

...New facts arise in Rocky Flats soil debate

FLATS FROM PAGE 2

Calculations questioned

The computer model, known as RESRAD, is widely used in the nuclear scientific community. Nonetheless, critics question its reliability.

In many cases, the data requested by the model is unavailable, causing scientists to use a "default" value.

"The RESRAD program requires a heck of a lot of figures," said Joe Goldfield, a member of the independent oversight panel who says he has studied the issue for several years. "Those figures aren't very well-known. There's a lot of guesswork."

With about 70 variables, there is a huge potential for many small or big errors which can skew the total income by enormous factors, Goldfield said.

At best, a calculation with so many uncertain variables should produce a result given in a wide range; yet the government somehow managed to come up with the curiously specific number of 1,429, Goldfield said.

"To any qualified technical person, that number is an abomination," Goldfield said.

Goldfield said he analyzed just five of the values input into the computer model and found that each was subject to questioning.

For example, he said the value input for dust concentration in the air was about one-quarter of the default value used in the state of Washington, which used the same computer model to arrive at its standard.

Goldfield also said healthy young men have a breathing rate three times as high as the estimate used in the Rocky Flats calculation.

"This is not a scientific process," Goldfield said.

Government officials, meanwhile, defended the cleanup standards.

"It's based on the best scientific data," Etchart said, adding that the levels have been deemed protective of health and environment by the Colorado health department and the Environmental Protection Agency, which oversee the Rocky Flats cleanup efforts.

Neither the funds nor the technology is available to clean up the soil to a level of absolute zero plutonium, but science shows the proposed levels are safe, Etchart said.

"Is it zero?" Etchart said. "No. But does it pose a risk? No."

Timothy Rehder, the Rocky Flats project manager for the EPA, said comparisons with standards for some other sites such as the Eniwetok Atoll may not be valid because those standards were set decades ago, when scientists knew much less about risk assessment.

"We don't believe that those are really

scientifically valid," Rehder said.

Etchart also emphasized that the government will review the standards annually to decide whether newly available data, technology or other circumstances warrant revisions of the standards.

New facts emerging

Rehder said some data is already emerging that could change the standards. The EPA recently shipped soil samples from Rocky Flats to a laboratory at Stanford University, which will measure the solubility of the plutonium in the soil.

The state of Washington's plutonium standard assumes a much higher solubility than does the Rocky Flats standard, Rehder said. The Stanford laboratory analysis may show whether the Rocky Flats estimate of solubility was too low.

"If in fact we made a wrong assumption on that, we're going to have to change the soil action level, and it would be a fairly dramatic change," downward by a factor of five to 10, Rehder said.

The most recent annual review of the cleanup standards also found that future recreational use of open space at Rocky Flats may have been underestimated, Rehder said.

"I think there's a bit of new info on the other parameters that might cause (the standard) to go down, but not drastically," Rehder said. "That's just my gut opinion."

Rehder said the EPA is working on its own computer model to determine soil cleanup standards, but that the RESRAD is "probably the best model for doing this kind of thing right now."

Risk Assessment Corp., the company hired by the independent oversight panel, will review not only the data input into the computer model but also the model itself. The process is expected to take approximately one year.

If Risk Assessment Corp. ends up recommending a cleanup standard that differs greatly from the government's proposed standard, the oversight panel would pass on that recommendation to the government, which has said it would take it into consideration.

"My hunch is that they'll probably come back with a recommendation that the standards be reduced a great deal," Moore said.

Moore acknowledged that a lower standard may make cleanup more complicated and costly, which could delay the completion of the cleanup effort.

Harlow, meanwhile, cautioned against predicting the outcome of the study. If the study should indicate that the current proposed standards are reasonable, the oversight panel will have to accept that, she said.

"We don't know for sure what's going to happen," Harlow said.

Urge candidates to support recommended cleanup standards at Rocky Flats

The closest we have come to an official definition of "clean" for the highly contaminated Rocky Flats site are the "soil action levels" set by government agencies in October 1996. These action levels specify how much plutonium may remain in the soil at Rocky Flats after "cleanup." Because inhaling a speck of plutonium may harm one's health, any amount left in the soil presents a permanent danger.

The current Rocky Flats action levels allow seven to 70 times as much plutonium to remain in the soil as is legally permitted at other cleanup sites. Recently, the

Department of Energy agreed to fund an independent scientific review of the adequacy of the Rocky Flats action levels. Results from this study will be available in late 1999.

No one knows whether this independent study will recommend lowering the Rocky Flats soil action levels to better protect public health, but this is at least a possibility. Therefore, the four candidates running on Nov. 3 for governor and for Congress from the 2nd Congressional District that includes Rocky Flats were asked whether they would support immediate lowering of these key

cleanup standards if this is recommended by the independent study.

Congressional candidate Democrat Mark Udall replied in the affirmative. His opponent, Republican Bob Greenlee, did not respond. Neither did either of the two candidates for governor, Republican Bill Owens or Democrat Gail Schoettler. Let them hear from you. Tell them to support more stringent cleanup standards if recommended by the independent study.

LeRoy Moore
*Rocky Mountain Peace
and Justice Center*
Boulder

TO THE EDITOR

mium may remain in the soil at Rocky Flats after "cleanup." Because inhaling a speck of plutonium, which remains radioactive for 240 000 years, may harm one's health, any amount left in the soil presents a permanent danger.

The current Rocky Flats action levels allow seven to 70 times as much plutonium to remain in the Rocky Flats soil as is legally permitted at other cleanup sites. Recently, the Department of Energy agreed to fund an independent scientific review of the adequacy of the Rocky Flats action levels. Results from this study will be available in late 1999.

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Congressional candidate Democrat Mark Udall replied in the affirmative. His opponent, Republican Bob Greenlee, did not respond. Neither did either of the two candidates for governor, Republican Bill Owens or Democrat Gail Schoettler. Let them hear from you. Tell them to support more stringent cleanup standards if recommended by the independent study.

LEROY MOORE, Ph.D.
Rocky Mtn. Peace and Justice Center
Via Internet

New study on Rocky Flats to be conducted

The closest we now come to an official definition of "clean" for the highly contaminated Rocky Flats site are the "soil-action levels" set by government agencies in October 1996. These "action levels" specify how much pluto-

SUNDAY CAMELIDIA

September 27, 1998

GUEST OPINION CLEANUP OF ROCKY FLATS

Post-It® Fax Note	7671	Date	9-29-98
To	Carla Sanda	From	LeRoy
Co./Dept.		Co	
Phone #		Phone #	444-6981
Fax #	303-456-0858	Fax #	

A key issue in the November elections

By LeRoy Moore

On Nov 3 Colorado voters will make two choices that could prove crucial in efforts to clean up the contaminated Rocky Flats site. First, who will be governor? And second, who will occupy the congressional seat being vacated by David Skaggs, whose district includes Rocky Flats? Lieutenant Governor Gail Schoettler, a Democrat, and Republican Bill Owens seek the governorship. Republican Bob Greenlee and Democrat Mark Udall vie for Skaggs' seat.

Voters need to know the stance of these candidates regarding cleanup of the Department of Energy's Rocky Flats facility 16 miles northwest of central Denver, where for four decades the explosive plutonium cores of nuclear bombs were made. More specifically, voters need to know what each candidate will do about the Rocky Flats "soil action levels."

In October 1996, DOE and its regulators - the EPA and the Colorado Department of Public Health and Environment - adopted standards for the amount of plutonium and other radioactive materials that may legally remain in the soil at Rocky Flats after "cleanup" of the site. These standards are called "soil action levels," because cleanup action is triggered if radiation in the soil exceeds the set standard. The "soil action levels" thus are the closest thing we have to an official definition of "clean."

Because inhaling a minuscule speck of plutonium can cause cancer, and because plutonium remains radioactive for 240,000 years, any amount left in the soil presents a permanent danger of exposure to radiation. The action level specifies the quantity of such material allowed in the soil in picocuries (a measure of radiation) per gram of soil. Assuming the presence of no other radioactive material, the level allowed for Rocky Flats is 1429 picocuries of plutonium per gram of soil.

Denver resident Joe Goldfield produced a table comparing the Rocky Flats soil action levels with those adopted for other

sites also contaminated with plutonium. Here are some of his numbers (in picocuries of plutonium per gram of soil)

Rocky Flats: 1429

Eniwetok Atoll (bomb test site in the Pacific) 40

Johnston Atoll. 15

Hanford Nuclear Reservation in Washington State: 34

Nevada Test Site: 200

Goldfield calls the discrepancy between the standards for Rocky Flats and for other sites "striking."

**VOTERS NEED TO
KNOW THE STANCE OF
CANDIDATES
REGARDING CLEANUP
OF THE DEPARTMENT
OF ENERGY'S ROCKY
FLATS FACILITY 16
MILES NORTHWEST OF
CENTRAL DENVER,
WHERE FOR FOUR
DECADES THE
EXPLOSIVE PLUTONIUM
CORES OF NUCLEAR
BOMBS WERE MADE.**

Also striking is the difference between the officially adopted standard and the 1995 recommendation of the Rocky Flats Future Site Use Working Group. This broadly representative citizen body recommended that Rocky Flats be cleaned to average background radiation level when it is technologically possible to do this in a cost-effective, environmentally responsible manner. Global fallout has left an average background level for plutonium along the Front Range of 0.04 picocuries per gram of soil. The 1429 level adopted for Rocky Flats is almost 36,000 times higher

Of the four candidates mentioned above, only Lt. Gov. Schoettler already has a public record on the issue at hand. This is so because Gov. Roy Romer assigned to her the leading role on behalf of the state government in setting soil action levels for Rocky Flats. He should have known better, since she had already betrayed citizens of Colorado in the way she played a similar role for cleanup of the Rocky Mountain Arsenal, a site whose legacy will be permanent adverse health dangers.

In the case of Rocky Flats, relying on Schoettler's judgment, Romer signed on to the soil action levels she helped generate. He reportedly was shocked a few months later when he saw Joe Goldfield's paper comparing the officially adopted Rocky Flats soil action levels with those from other sites.

When the Rocky Flats soil action levels were adopted in October 1996, Schoettler and others from the pertinent government agencies ignored the near-universal public opposition to what they were proposing. The opposition persisted, however, in time adding Rep. Skaggs to its number. As a result last fall DOE agreed to fund a citizen-controlled independent scientific review of the calculations behind the action levels. This review, set for completion by September 1999, may recommend a revision downward of the soil action levels to allow less plutonium in the soil.

In this context, each of the above-mentioned candidates - not least Lt. Gov. Schoettler - needs to provide clear responses to the following questions.

* If, as seems likely, the independent review recommends a downward revision of the Rocky Flats soil action levels, will you support such a recommendation?

* What steps will you take to ensure an immediate adoption of any proposed lower number?

* Will you press the DOE to put resources into development of technology for safe cleanup and neutralization of radioactive materials left in the environment?

(LeRoy Moore, Ph.D. primary author of the "Citizen's Guide to Rocky Flats" is a consultant for the Rocky Mountain Peace and Justice Center of Boulder)

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The Energy Daily

Est 1973

25
Years of Excellence
in Reporting

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Thursday, October 15, 1998

ED Volume 26, Number 196

Rocky Flats Community Group Launches Soil Cleanup Review

In a first for the Energy Department's nuclear cleanup program, a citizen advisory panel at DOE's Rocky Flats plant this week launched an independent scientific review of soil cleanup standards set for the former Colorado plutonium production site.

The Rocky Flats Soil Action Level Oversight Panel said it has hired Risk Assessment Corp. of South Carolina to evaluate whether the cleanup standards would adequately protect public health. The company previously has performed health studies involving plutonium releases from past weapons production operations at Rocky Flats.

The soil cleanup standards, set under a 1996 agreement between DOE, Colorado state officials and the Environmental Protection Agency, require removal of radioactive contamination from soil so that potential doses to humans are no more than 15 millirems for workers at the site and 85 millirems for any residents living near the Denver-area facility over the long term.

Community groups expressed concern over the cleanup standards, saying they would permit higher doses than allowed under radiation cleanup levels set at other sites, including other DOE weapons facilities.

DOE officials generally have defended the standards as fully protective of public health, but ultimately agreed to fund a community-directed review of the cleanup levels.

Officials with the community oversight group said their independent study of the cleanup standards would take one year to complete.



WESTMINSTER

City

Amherst Park construction to begin

Construction on Amherst Park at 13095 Pecos Street begins this summer and is scheduled for completion sometime in the fall

February 23, 1998

www.ci.westminster.co.us

THE CITIZEN'S LINK TO INFORMATION ABOUT THE CITY OF WESTMINSTER

City joins the 'Pepsi generation'

City Council welcomed Pepsi-Cola as the official sponsor of the City of Westminster at a special signing ceremony on Monday Feb 22



The exclusive sponsorship deal is part of a joint agreement which also involves Hyland Hills Park and Recreation District and Adams County School

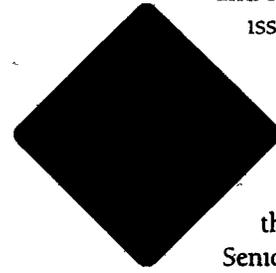
District 50

(see PEPSI, page 2)

Residents invited to U.S. 36/Federal Boulevard meeting

Details on the reconstruction of the Federal Boulevard bridge over U S 36 and other related

issues will be discussed at an open house meeting on March 11, 5-8 p m at the Westminster Senior Center, 3295



W 72nd Ave

Representatives from Colorado Department of Transportation (CDOT) and their consultants will be on hand to provide more details on plans to

- replace the aging Federal Boulevard/U S 36 bridge
- replace existing U S 36 to west of Federal Boulevard
- extend the High Occupancy Vehicle (HOV) lanes to west of Federal Boulevard
- replace timber sound walls with masonry
- improve drainage

For more information, call Skip Hlad, 303-287-8290

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City exploring performing arts center

The City and Front Range Community College are considering a joint venture for building a performing arts facility at the college, located at 3645 W. 112th Ave

City agrees to exclusive sponsorship deal with Pepsi

(continued from page 1)

The agreement calls for the exclusive sale of Pepsi-Cola products various facilities, including the new Promenade Ice Center, where beverage vending machines or fountain services are available

Pepsi-Cola will pay sponsorship fees and commission payments to be made to each of the three entities

There is a growing trend of private sector companies looking to enter into exclusive sponsorship agreements with local governmental entities such as school districts, park and recreation districts and municipalities, according to Westminster City Manager Bill Christopher

The process began as a search for a sponsorship deal for the new three-rink ice arena at the Westminster Promenade located at 104th Avenue and U S 36, and expanded to include Hyland Hill and School District 50, Christopher said

Key provisions of the agreement for the City include

- The term of the Agreement with Pepsi-Cola would be for 15 years, although there are provisions in the Agreement for termination
- The Agreement covers all facilities that have vending machines or fountain service at City of Westminster, Hyland Hills Park and Recreation District and School District 50 facilities. The new Promenade Ice Centre is included in the Agreement and is a "centerpiece" of the Agreement

- The Agreement calls for an exclusive relationship with Pepsi-Cola in beverage products sold or dispensed at the stated facilities. It includes carbonated soft drinks, juice and juice-base products, isotonic, ready-to-drink tea, ready-to-drink coffee, bottled water and other non-alcoholic beverage products distributed by Pepsi

- Pepsi-Cola will pay sponsorship fees on an annual basis to each of the three

This agreement will provide the City of Westminster a projected \$43,000 per year. The Ice Centre will receive \$100,000 per year plus commission payments.

entities based on the terms spelled out in the Agreement. In the case of the City of Westminster, a sponsorship of \$20,000 per year will be paid for various City facilities and a \$100,000 fee will be paid to the Promenade Ice Centre (The sponsorship fees do not involve any naming rights)

- Pepsi-Cola will be designated as an "official sponsor" of Hyland Hills, the School District and the City of Westminster, and Pepsi may use this designation in its advertising, promotional and packaging materials subject to the approval of each of the respective entities

- Pepsi shall have signage at the Promenade Ice Centre on 11 dashboards, five of which will be located in the main ice rink and three

each in the other two ice rinks

- Pepsi shall work with Hyland Hills and the City to develop a first-class concession area at the Ice Centre. Pepsi-Cola is responsible for providing the necessary vending and fountain dispensing equipment for facilities at each of the three entities

- Pepsi-Cola will pay commissions to each of the three entities based on the volume of product sold. Prices of the various products are detailed in the agreement with each of the three entities having the option of setting the vend price on facilities where there is employee access. The commission rate for the Ice Centre shall be 30% and 20% for City facilities with commissions calculated based on gross receipts collected from full-service vending machines installed at facility premises

- Each entity shall be entitled to inspect the accounting records of Pepsi regarding transactions at subject facilities

- Either Party may terminate the Sponsorship Agreement for cause

This Agreement will provide the City of Westminster a projected \$43,000 per year, which does not include the Ice Centre facility. The Ice Centre will receive \$100,000 per year plus commission payments

As additional City facilities are added to the contract, commission sales will be afforded the City by Pepsi-Cola. This will include the City Park Fitness Center, Heritage Golf Course facility and the planned Northwest Recreation Center

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New hours for Kings Mill Library

City**LINK**

Kings Mill Library at 9018 Field St. has new operating hours. Monday-Wednesday, 10 a.m - 8 p.m., Thursday, 10 a.m - 5 p.m., Friday, closed, Saturday, 10 a.m - 5 p.m.

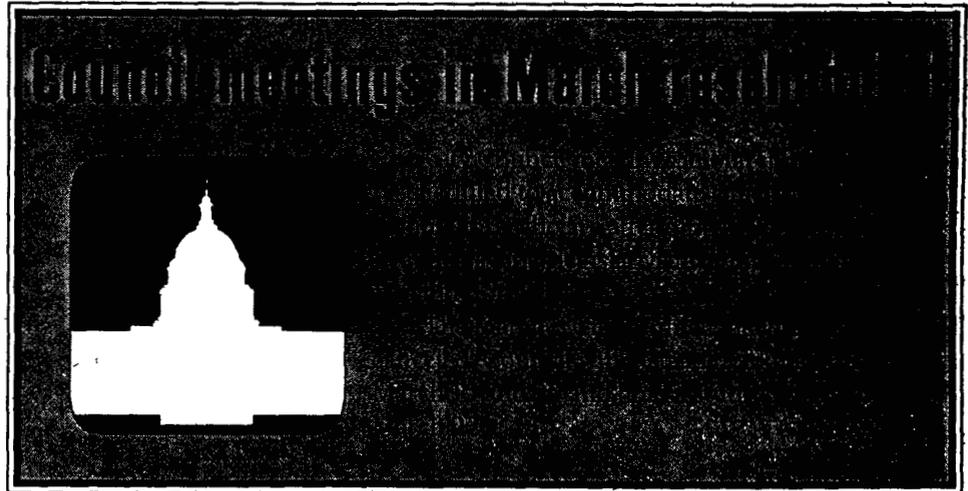
Westminster Boulevard Diverts Weekday Commuter Traffic

The new Westminster Boulevard street connection between 104th Avenue and 112th Avenue has reduced weekday traffic volumes on Sheridan Boulevard between U.S. 36

and 104th Avenue

The daily traffic volume on Sheridan Boulevard before the Westminster Boulevard street connection opened was 34,920 vehicles per day. The weekday traffic volume on Sheridan Boulevard after the Westminster Boulevard street connection was opened decreased to 26,487 vehicles per day, which is approximately a 25% reduction.

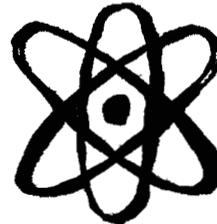
Apparently some of the motorists that reside north and west of the 104th Avenue and Sheridan Boulevard area are using the Westminster Boulevard connection to access the interchange at 104th Avenue and U.S. 36 instead of using the interchange at U.S. 36 and Sheridan Boulevard.



Soil Level Oversight Panel to Hold Public Meeting

The Radionuclide Soil Action Level Oversight Panel will hold its first public meeting on March 10, 6:30-9:00 P.M. in the City Council Chambers at Westminster City Hall.

The meeting will begin with an open house followed by a background presentation and a technical briefing by the Risk Assessment Corporation, the consulting firm that is performing the review of the interim plutonium soil action level set for Rocky Flats by the Regulators in 1996.



The briefing will provide information on a comparison of the Radionuclide cleanup levels that have been set at other sites with those at Rocky Flats.

The Rocky Flats soil action levels are set higher than at any of the other sites.

The City of

Westminster, City of Broomfield and the Rocky Flats Citizens Advisory Board worked together to get the Department of Energy to provide the funding for this review.

City awarded grant to study water quality issues at Standley Lake

The Natural Resources Conservation Service (NRCS) has awarded the City a grant for working with landowners on land management issues related to water quality protection within the immediate drainage area of Standley Lake.

A working group was initiated with representatives from the Cities of Arvada,

Northglenn, Thornton, and Westminster, the NRCS and the local Soil Conservation Board (Jefferson).

The group toured the basin last week to identify key problems to focus on since the grant is limited to \$38,000 in this first phase. It was decided that the first focus would be on keeping livestock

out of streambeds and managing manure around livestock boarding operations.

A community meeting will be put together for residents in the area for the NRCS to lay out the program and seek participants. The monies can be used for educational materials or projects with varying levels of matching funds.

CITY

CALENDAR

March 1 City Council study session
6 p.m. and Special City Council
meeting 7 p.m. at City Hall

March 2 National League of Cities
Conference in Washington, D.C.

March 5 City Council meeting
re-awarded

March 11 City Council meeting 7 p.m. at
Westminster City Hall

March 22 City Council study session
6 p.m. at Westminster City Hall

March 29 City Council meeting 7 p.m. at
Westminster City Hall
Mayor's distribution
to 10 a.m. at City Hall
Recreation Center



City of Westminster
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Westminster CO 80030

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call 430-2400, ext 2008*

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RIGO LEAL, KATIE HARBERG

PRINT PRODUCTION

JEFF BROTZMAN

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DISCOVER

OCTOBER 10 1999

SUNDAY CAMERA

9C



MARTY CARVANO / Daily Camera

Mary Harlow the Rocky Flats coordinator for the city of Westminster looks over the walls inside building 779 at the former nuclear weapons facility during a recent tour. Harlow is a part of a citizen committee that's working to see how much plutonium can be safely left in soils on the site when the cleanup is finished.

Story by
Katy Human

Camera Staff Writer

really?

HOW SAFE IS IT

Citizens safeguard the future as part of Rocky Flats Soil Action Committee

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"We were drinking raw milk back then," said Harlow, who grew up in Butte, Mont., down wind from Nevada. Drinking raw milk in an area contaminated by fallout in the 1950s is a risk factor for thyroid cancer as well as goiter.

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Their goal is simple: Protect future neighbors of the former nuclear bomb plant from radiation-induced disease.

Energy Department officials have the same goal. The federal agency owns Rocky Flats and has

contracted with a private company called Kaiser Hill to clean it up. Plutonium-contaminated buildings must come down before ordinary citizens can safely walk their dogs on the site. Soils polluted by spills and fires must be cleaned before people pick dried weeds there.

It would be impossible to sweep every speck of plutonium from the land at Rocky Flats. The metal remains dangerously radioactive for 240,000 years.

So what's clean enough? The oversight panel will come out with its answer to that question early next year. And that group's answer is likely to be different than the government's.

Last month, panel members listened to their contractor, John Till of the South Carolina-based Risk Assessment Corp., present his initial results. Till, an expert in risk assessment and radioactive contamination, is likely to recommend a more stringent cleanup than the federal government has proposed. The discrepancy has less to do with science than confidence in predicting the future.

Though panel members say they're hopeful the federal government will treat their results seri-

ously, some are dubious.

"I think that it's going to be very tough after we get the (results) to make sure they're accepted by the Department of Energy," Harlow said. "I think we may have to call in our Colorado delegation to get some help."

Soil Action Levels

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An average runner or hiker would spend less than 200 hours on the site per year, minimizing the amount of radioactive dust he or she inhaled. A resident might spend more than 8,000 hours on site.

"I have not studied and analyzed all the assumptions behind those levels," said James Fiore, acting deputy assistant secretary for environmental restoration for the Energy Department. "But we went through a long process to come up with those numbers through the state and the EPA, and I'm confident that when you go through that long a process, you come up with something that makes sense."

Nevertheless, locals argued the number was far too high. In response, Fiore and his colleagues at Energy Department headquarters in Washington, D.C., handed \$500,000 to a group of ordinary citizens — the oversight panel — to redo the agency's work.

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Panel members take their work extremely seriously.

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But the 58-year-old engineer is no more likely to trust the government than activists. Holm called the federal government's report on interim soil action levels "superficial."

"It was done very quickly; there was little communication with other people that had been doing the same kind of work," he said.

Disabled three years ago while working overseas, Holm has spent his retirement so far learning

Please see CITIZENS on 10D



CHRIS RUDKIN
Water Scene

Risks from chemicals should be minimized

The pickup truck hurtled down the road. The dog riding in the back positioned himself and waited. At the final moment he lunged forward turning his ear-splitting bark for the moment of passing closest to the bicyclist. Since the bicyclist was me and I have become inured to this canine version of a drive-by shooting, no damage was done. The dog continued on his way unaware that he was the one in mortal danger. More than one pet has been vaulted onto the street from a speeding truck when its owner suddenly stopped. The laws of physics are inflexible when it comes to moving bodies and conservation of momentum.

A few weeks ago a different kind of accident occurred in North Boulder. An unattended truck belonging to a pesticide application firm rolled down Forest Avenue gathering speed until it crashed into a tree near Sixth Street, instantly spilling 1,000 gallons of mixed pesticide and water onto the street. This mixture moved rapidly down Sixth to Evergreen to Broadway and south toward Farmer's Ditch, which flows to Boulder Reservoir.

Fire and Police response teams arrived in minutes, followed by more resources from city and county agencies and a hazardous materials (HazMat) contractor. The incident response went well with residual contaminated water and soil being removed for appropriate disposal. An on-scene assessment revealed that the pesticide involved had a low level of toxicity for the general human population and pets but high toxicity to aquatic life. Fortunately, the flow in Farmer's Ditch was sufficient to dilute the spill and reduce the potential for environmental impact — this time.

It could have been worse. The problem is that it's not just pesticides but literally hundreds of different chemicals that are used and transported throughout the city on a daily basis. Most of us are at any given time driving around with 10 to 20 gallons of highly flammable gasoline, quarts of oil, antifreeze, hydraulic fluids and other potentially toxic materials in our cars.

Add cleaners, solvents and other chemicals we use in our homes and gardens, and the problems multiply. Industries also contribute to the load of bulk chemicals that are transported and used every day. Finally, there are chemicals just passing through — delivery vehicles on Boulder's roads that are heading for other destinations.

Chemical hazards exist in any urban setting. The challenge is to know the hazards and consciously reduce them whenever possible, balancing our chemical needs with an awareness of the trade-offs involved. The Fire Department inspects industries to assure safe chemical storage. The city restricts chemicals dis-

LIVING & ARTS: SCIENCE • COMMUNITY DISCOVER

OCTOBER 10 1999

SUNDAY CAMERA



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Soil Action Levels
The debate began in 1996, when the Energy Department and its regulators, the state health department and the Environmental Protection Agency, decided to monitor uranium, plutonium and other radioactive materials in the soil.

At the time, the federal government was planning to clean up the site by 2000. But the state health department was concerned that the cleanup would not be sufficient to protect the public. The state health department is now leading the effort to clean up the site, and the federal government is providing funding for the project.

most of the land should be preserved as open space and that no one should be allowed to live there if no one lives on site, then soils don't have to be quite as clean as they might otherwise. An average summer hiker would spend less than 200 hours on the site per year, minimizing the amount of radioactive dust he or she inhaled. A resident might spend more than 2,000 hours on site.

"I have not studied and analyzed all the assumptions behind those levels," said Harlow. "I don't know if they're realistic or not. I don't know if they're protective enough. I don't know if they're based on the best available science. I don't know if they're based on the best available data. I don't know if they're based on the best available information. I don't know if they're based on the best available knowledge. I don't know if they're based on the best available wisdom. I don't know if they're based on the best available common sense. I don't know if they're based on the best available common sense."

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Chemical hazards exist in any urban setting. The challenge is to know the hazards and consciously reduce them whenever possible, balancing our chemical needs with an awareness of the trade-offs involved. The Fire Department inspects industries to assure safe chemical storage. The city restricts chemicals discharged to sewers. HazMat teams maintain a quick response capability. The city and county support a household hazardous waste drop-off station.

Above and beyond the existing programs is a need for frequent, thoughtful consideration. The more frequent the better. Do we use or store chemicals at our job? At our home? Do we know their hazards to people or animals? Do we know how to dispose of them safely? Will something less toxic do the job as well?

The dog in the pickup truck is at the mercy of the laws of physics and chance. We have more control of our fate if we are informed and act on reliable information. When hazardous chemicals are involved, we have a lot at stake — not only our own health but that of our neighbors, our children and the complex ecosystem we inhabit.

For further information on disposal of household hazardous waste, call (303) 441-4800.

Chris Rudkin (rudkin@cibouldev.com) is water quality supervisor for the city of Boulder.

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Please see CITIZENS on 10D

WORLD OF WONDER

BUGLING ELK

In late autumn, elk descend from the high country to meadow for the annual breeding season. Larger males weighing up to 1,000 pounds signal the mating season with eerie, high pitched squeals that rise to a crescendo. Referred to as bugling, this call intimidates rivals as bull elk compete for the right to breed.

This photo was taken in Moraine Meadows in Rocky Mountain National Park.



PHOTO COURTESY OF JUDITH TAYLOR, LONGMONT

1,000 YEARS OF SCIENCE

HEART SURGERY

In the past 40 years, advances to heart surgery have improved dramatically. While open heart surgery and heart transplants were unheard of in the 1950s and 1960s, these surgeries are considered routine in today's world. Dr. Christiaan N. Barnard of South Africa transplanted the first complete heart in 1967.

After the new heart has been transplanted, drugs must be constantly administered to prevent the host's body from rejecting the "foreign" heart. While there continues to be a shortage of human donors, pig valves, metal stents, the pacemaker, and artificial hearts have been able to improve one of the most important organs of the human body.

Artificial hearts are not yet fully functional, but they can still work temporarily until a human donor is found. Doctors are even looking into non-invasive ways to aid diseased hearts with a procedure called bio bypass, where drugs stimulate new blood vessels to form to supply the heart with blood.

Editor's note: As part of the Daily Camera's countdown to the new millennium, we'll take a look at the scientific breakthroughs of the last 1,000 years.

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2000

D A W N
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E R A

Nuclear Accident

At least 22 workers at a South Korean nuclear power plant were exposed to radiation when a major leak of heavy water occurred during repair operations. Authorities said that none of the technicians were seriously irradiated. Heavy water which can be highly toxic is used in nuclear plants as a coolant for the nuclear reaction process. About 12 gallons of the heavy water were released in the accident at the power station in Wolsung, 190 miles south east of the capital city of Seoul. Twenty additional technicians were sent in to clean the area and all were exposed to the radioactive gas emanating from the water.

Lightning Deaths

Five schoolchildren and their teacher were killed in southern India when lightning struck their classroom in the state of Kerala. The children, all 10 years old, were killed instantly when the bolt of lightning hit their schoolroom in the city of Kuttyadi. Twenty-two other students were

injured. Last week, at least 26 people were killed and 39 others seriously injured by lightning strikes over parts of India's northern state of Uttar Pradesh.

Tropical Cyclone

Typhoon Dan battered the northern coast of the Philippines, leaving at least two people dead and leveling vast areas of cropland with torrential rains driven by wind gusts of up to 105 mph. The storm later passed over the South China Sea and was predicted to strike China's north eastern Guangdong province over the weekend.

Earthquakes

At least 100 people were injured when a magnitude 5.2 earthquake followed by 20 aftershocks shook the city of Marmaris in Turkey's Aegean province of Mugla. Many of the injured were tourists who had come to the seaside resort to relax after living through the numerous earthquakes that have recently plagued the country.

struck in the Andes Mountains of central Peru, causing buildings to sway and damaging some homes.

Earth movements were also felt in coastal Peru, northern Chile, Costa Rica, the northern Philippines, eastern Taiwan, north eastern Japan, the Aleutian Islands, the Salton Sea area of Southern California, northwest Iran, Jordan, and the Athens aftershock zone.

Floods

At least 110 people have been killed and 157,000 others forced to evacuate their homes in the raging floods that are the worst to hit southeastern Mexico in 40 years. A subsequent mudslide buried between 40 and 60 people at a temporary shelter where they had taken refuge from the inundations. The storms moved into Mexico after ravaging Central America, where they left 74 people dead.

At least two people in southern Yemen have been killed in floods triggered by the heaviest rains to strike the region since 1982. The

ber of livestock and destroyed cropland in Lahj, south of the capital city of Sanaa.

Champagne Fish Kill

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You can also find more information online at www.ases.org

**NUCLEAR WASTE
Advocacy group maps waste shipment routes**

Public Citizen, a nonprofit advocacy group founded by Ralph Nader, has launched an Internet Web site that shows maps of the proposed routes nuclear waste will take across the country en route to storage in New Mexico, where a facility has recently opened, and Nevada, if the long delayed storage site west of Las Vegas opens.

Public Citizen, like the local anti-nuclear group Rocky Mountain Peace and Justice Center, objects to transporting nuclear waste, emphasizing the probability of accidents and consequent risk to public health. Public Citizen claims that up to 100,000 shipments of waste will travel through 43 states and within half a mile of 50 million Americans. While the Department of Energy has extensively tested the special containers used to transport nuclear waste, anti-shipment activists remain skeptical of their reliability and safety. Shipments of nuclear waste started this summer from Colorado to New Mexico.

Check out Public Citizen's maps at <http://www.citizen.org/cmep/atomicatlas/atlas.htm>

FROM PAGE 9D

Citizens monitor Rocky Flats

Continued from PAGE 9D

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Hearsay pseudo science

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In the end, Till used an updated version of the same computer program the government originally used. He used slightly different parameters, though. Those numbers represent how easily the body absorbs radiation

for example, or how easily plutonium-laden dust flies into the air given particular wind strengths.

For the most part, the numbers Till used were more conservative than the government's assumptions — he's found scientific evidence that suggests it takes bigger gusts to lift plutonium into the air, for example.

Some of his initial results appeared similar to the old ones. The federal number of 651 picocuries of plutonium per gram of soil came from a particular scenario: a person who lived on Rocky Flats, grew his food there, and accidentally ate about 2.5 ounces of soil per year. Still, he shouldn't be exposed to more than 85 additional millirem of radiation per year.

When Till ran the same scenario, he got similar results. But it's the wrong scenario, he contends.

Instead, Till describes the 2-year-old child of a rancher who lives on Rocky Flats. Children are more susceptible than adults to the damaging effects of radiation.

"You guarantee me — and I say this to the state, the EPA, and the DOE — that there isn't going to be a 2-year-old child that lives out there sometime in the future," Till said.

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\$7 billion cleanup

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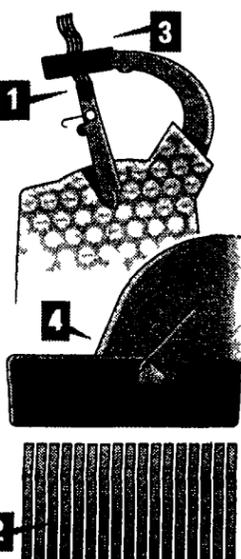
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Electricity from your head

Why believe in a comb's ability to attract bits of paper? How does it work?

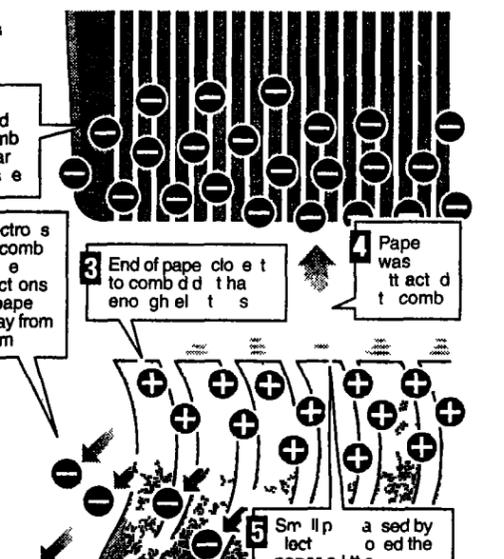
- You'll need:**
- Comb
 - Piece of paper
 - Scissors
 - Ruler
 - Clear tape

- Do this:**
- 1 Make a comb dry.
 - 2 Cut the paper into long thin strips, leaving one end of the paper uncut.
 - 3 Rub the comb through your hair.
 - 4 Hold the comb over the strips of paper, about 1 centimeter above them.



What happened?

The paper strips moved toward the comb. When you ran the comb through your hair, tiny particles called electrons rubbed off and stuck to the comb. Electricity is a kind of energy that happens when electrons move around. The extra electrons you rubbed onto the comb gave it a small charge of static electricity. This is called a positive charge.



**PHYSICS
Local scientists study Bose-Einstein theory**

Local scientists at the University of Colorado and the National Institute of Standards and Technology have created and photographed a vortex in the supercooled gas called Bose-Einstein condensate. The condensate is a tiny spherical ball of rubidium gas atoms chilled to within a millionth of a degree of absolute zero. The atoms are trapped magnetically to form the ball. The tornado-like vortex was found along the axis of the tiny ball, with a calm eye at its center.

This research aims at understanding the fundamental physics of this superfluid, which has no viscosity and therefore no frictional loss. A movement will continue indefinitely. It is hoped that understanding the vortices will further knowledge of electrical resistance in superconductors.

Send your science or environment briefs to Gil Rudawsky, Discover editor, rudawskyg@boulderpublishing.com or Daily Camera, PO Box 591, Boulder, CO 80306-0561.

power of the wind

Name John Halley
Age 29
Home Boulder Halley grew up in Greenville Ohio and earned an undergraduate degree in psychology from the University of Cincinnati in 1993

Job Green marketing coordinator for the Land and Water Fund a nonprofit environmental group in Boulder Halley concentrates on selling wind generated electricity (Windsorce) to Boulder businesses

Windsorce is a Public Service Co program in which residents and businesses pay extra for power produced cleanly by wind turbines in northern Colorado It's one of 50 green pricing programs nationwide that emerged recently in response to deregulation of the electricity industry

How successful are your efforts to sell windpower in Boulder? Boulder residents have purchased two-thirds of the total windpower almost 17 megawatts purchased by 15 000 customers sold by Public Service Co so far Halley said Land and Water Fund staff recruited most (95 percent) of the 350 local commercial customers — businesses governments and nonprofits

Buying windpower is the single most effective action people can take in causing environmental change Halley said Every nickel saves 2 to 4 pounds of coal and prevents the air pollution associated with coal burning

Halley said he has talked with every corporation in town usually following up to firm up a commitment Companies sign a three-year contract to pay the surcharge to support Public Service's Ponnequin windmill farm near the Wyoming border

It's been a nice way to get to know Boulder he said We've signed up 10 hairstylists

Tell me about your energy conservation efforts at Naropa Halley says that there is a nationwide movement to develop green college campuses and he is working with staff and other students to make Naropa a model of sustainability for green campuses

He won a \$7 500 grant from Bob Greenlee's family foundation for Naropa to purchase one year of clean electricity through Windsorce According to the utility company's calculations that's enough to keep 600 000 pounds of carbon dioxide out of the atmosphere Coal burning the source of 97 percent of Colorado's electricity generates carbon dioxide a greenhouse gas

How did you get into sustainability work? I just always wanted to do good work something that makes a difference Halley said There's a lot we need to turn around in this generation

He said that his parents were organic gardeners interested in sustainability long before it was common One of his brothers owns a business selling organic clothing in Iowa

At age 25 Halley ran as a Natural Law Party candidate for a Cincinnati congressional seat receiving 4 percent of the vote

What attracts you to energy issues? I like energy because it's important It's the cornerstone of sustainable development Halley said If people put their energy use in line with their values it can do a lot in this country

What do you do for fun? I really like biking I need a lot more nature than I've had lately Halley said

— John Borstelmann

 At least 22 workers at a South Korean nuclear power plant were exposed to radiation when a major leak of heavy water occurred during repair operations Authorities said that none of the technicians were seriously irradiated Heavy water which can be highly toxic is used in nuclear plants as a coolant for the nuclear reaction process About 12 gallons of the heavy water were released in the accident at the power station in Wolsung 190 miles south east of the capital city of Seoul Twenty additional technicians were sent in to clean the area and all were exposed to the radioactive gas emanating from the water

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Earth movements were also felt in coastal Peru northern Chile Costa Rica the northern Philippines eastern Taiwan north eastern Japan the Aleutian Islands the Salton Sea area of Southern California northwest Iran Jordan and the Athens aftershock zone

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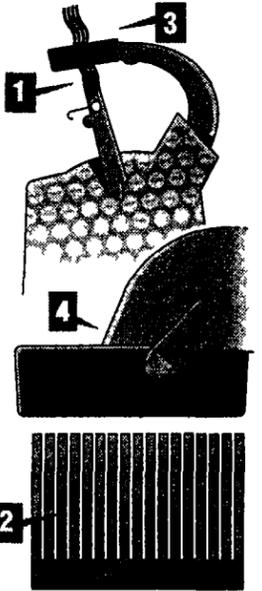
Electricity from your head

Would you believe you can comb electricity from your hair and put it on wheels?

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 - Piece of paper
 - Scissors
 - Ruler
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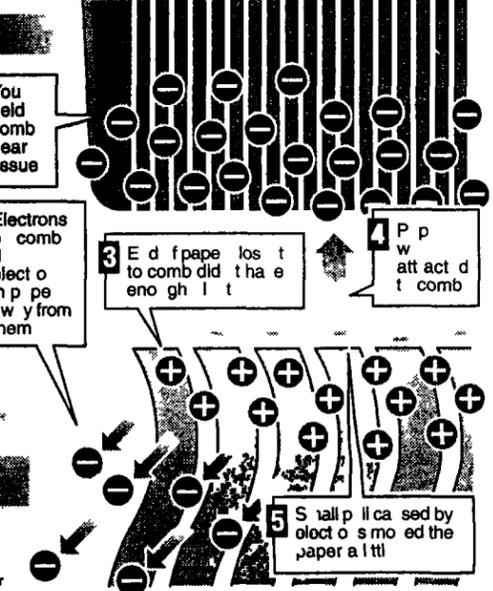
Do this:

- 1 Make sure your hair is clean and dry
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This is called having a "positive charge". SOURCE: Weekly Reader

PHOTO: PAUL RAPP

PROFILE



John Halley

Boulder man intrigued by power of the wind

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Age 29

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How successful are your efforts to sell windpower in Boulder? Boulder residents have purchased two-thirds of the total windpower almost 17 megawatts purchased

EARTH WEEK

Ecuadoran Eruptions



Two of Ecuador's 31 active volcanoes exploded on October 5 after weeks of rumbling and shaking. Guagua Pichincha Volcano sent up a seven-mile-high cloud of volcanic debris closing Quito's airport and schools and forcing residents to wear face masks as ash rained over the capital. Earlier the same day an explosion of gases shot high above Tungurahua Volcano 106 miles from Guagua Pichincha. Three mountain climbers and their guide sustained injuries when they were hit by an eruption of vapor and ash near the mountain's summit. One person died and a number of others were injured as a result of the eruptions when they fell as they were trying to remove ash from their roofs.

Nuclear Accident



At least 22 workers at a South Korean nuclear power plant were exposed to radiation when a major leak of heavy water occurred during repair operations. Authorities said that none of the technicians were seriously irradiated. Heavy water, which can be highly toxic, is used in nuclear plants as a coolant for the nuclear reaction process. About 12 gallons of the heavy water were released in the accident at the power station in Wolsung 190 miles south east of the capital city of Seoul. Twenty additional technicians were sent in to clean the area and all were exposed to the radioactive gas emanating from the water.

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SCIENCE NOTEBOOK

SOIAR ENERGY

Solar home tour next Saturday

A tour of solar homes is scheduled Saturday although Boulder is not participating in the annual event this year.

The annual tour is organized nationwide by the Boulder-based nonprofit the American Solar Energy Society. Tours are offered in 37 states and over 800 homes. The homes feature passive solar design, solar water heating systems and solar electricity.

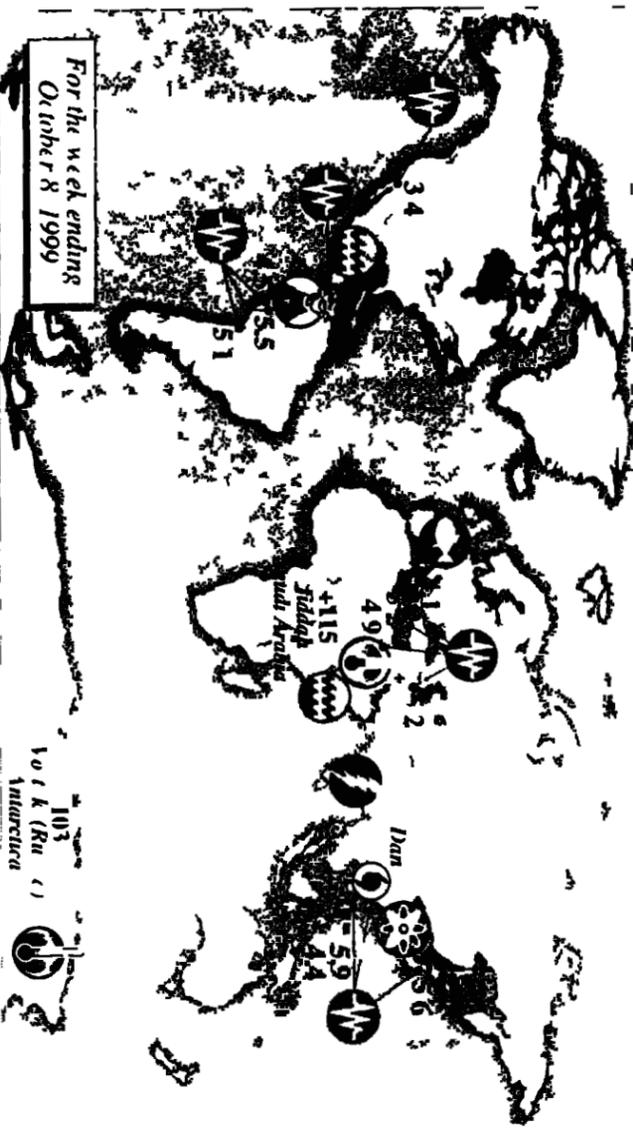
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Citizens fight for safe soils at Rocky Flats

By KATY HUMAN
For the Enterprise

Mary Harlow developed a goiter on her thyroid nine years ago. She blames radiation released during test nuclear explosions in Nevada.

"We were drinking raw milk back then," said Harlow, who grew up in Butte, Mont., upwind of Nevada. "Drinking raw milk in an area contaminated by fallout in the 1950s is a risk factor for thyroid cancer as well as goiter."

Harlow, 58, is now a member of the Rocky Flats Soil Action Level Oversight Panel, a small group of committed citizens who live around Rocky Flats.

Their goal is simple: Protect future neighbors of the former nuclear bomb plant from radiation-induced disease.

Energy Department officials have the same goal. The federal agency owns Rocky Flats and has contracted with a private company called Kaiser Hill to clean it up. Plutonium contaminated buildings must come down before ordinary citizens can safely walk their dogs on the site. Soils polluted by spills and fires must be cleaned before people pick dried weeds there.

It would be impossible to sweep every speck of plutonium from the land at Rocky Flats. The metal remains dangerously radioactive for 240,000 years.

So what's clean enough? The oversight panel will come out with its answer to that question early next year. And that group's answer is likely to be different than the government's.

Last month, panel members listened to their contractor, John Till of the South Carolina-based Risk Assessment Corp., present his initial results. Till, an expert in risk assessment and radioactive contamination, is likely to recommend a more stringent cleanup than the federal government has proposed. The discrepancy has less to do with science than confidence in predicting the future.

Though panel members say they're hopeful the federal government will treat their results seriously, some are dubious.

"I think that it's going to be very tough after we get the (results) to make sure they're accepted by the Department of Energy," Harlow said. "I think we may have to call in our

(See ROCKY Page A9)



MARTY CAIVANO / For the Enterprise

WHAT IS SAFE? Mary Harlow, the Rocky Flats coordinator for the city of Westminster, looks over the walls inside Building 779 at the former nuclear weapons facility during a recent tour. Harlow is part of a citizen committee working to see how much plutonium can be safely left in soils on the site when the cleanup is finished.

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ROCKY from Page A8

Colorado delegation to get some help

Soil action levels

The debate began in 1996 when the Energy Department and its regulators — the state health department and the Environmental Protection Agency — decided on interim cleanup levels called soil action levels. Workers don't have to deal with dirt that registers below the action level.

The interim number 651 picocuries of plutonium per gram of soil astonished activists and even some scientists. On average, untaunted Colorado soils register at 0.04 picocuries per gram.

Energy Department officials insisted the figure made sense. A sophisticated computer program had churned it out, given that open space was the most likely future use of the site.

Rocky Flats' future is still undecided. But local leaders agree that most of the land should be preserved as open space and that no one should be allowed to live there. If no one lives on site, then soils don't have to be quite as clean as they might otherwise.

An average runner or hiker would spend less than 200 hours on the site per year, minimizing the amount of radioactive dust she or he inhaled. A resident might spend more than 8,000 hours on site.

I have not studied and analyzed all the assumptions behind those levels, said James Fiore, acting deputy assistant secretary for environmental restoration for the Energy Department. But we went through a long process to come up with those numbers through the state and the EPA, and I'm confident that when you go through that long a process, you come up with something that makes sense.

Nevertheless, locals argued the number was far too high. In response, Fiore and his colleagues at Energy Department headquarters in Washington, D.C., handed \$500,000 to a group of ordinary citizens — the oversight panel — to redo the agency's work.

Harlow, formerly a water chemist for the city of Westminster and now its Rocky Flats specialist, joined the Soil Action Level Oversight panel. So did Hank Stovall, a Broomfield City Council member; Victor Holme, a Lakewood resident and retired geological engineer; and nine others.

Panel members take their work extremely seriously.

I got involved with Rocky Flats because a lot of what is in the paper and what you hear at public meetings is in many cases hearsay, pseudo science and almost hysteria, Holm said.

But the 58-year-old engineer is no more likely to trust the government than activists. Holm called the federal government's report on interim soil action levels superficial.

"It was done very quickly, there was little communication with other people that had been doing the same kind of work," he said.

Disabled three years ago while working overseas, Holm has spent his retirement so far learning about radioactivity and human health. He downloaded the computer program RESRAD, which researchers used to calculate Rocky Flats' interim soil action levels, for example, and has played with it extensively.

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For the most part, the numbers Till used were more conservative than the government's assumptions — he's found scientific evidence that suggests it takes bigger gusts to lift plutonium into the air, for example.

Some of his initial results appeared similar to the old ones. The federal number of 651 picocuries of plutonium per gram of soil came from a particular sce-

nario: a person who lived on Rocky Flats, grew his food there, accidentally ate about 2.5 ounces of soil per year, and still shouldn't be exposed to more than 85 additional millirem of radiation per year.

When Till ran the same scenario, he got similar results. But it's the wrong scenario, he contends.

Instead, Till describes the 2-year-old child of a rancher who lives on Rocky Flats. Children are more susceptible than adults to the damaging effects of radiation.

You guarantee me — and I say this to the state, the EPA, and the DOE — that there isn't going to be a 2-year-old child that lives out there sometime in the future, Till said.

To protect that hypothetical child from an exposure of 15 millirem or more, workers would have to clean up Rocky Flats soils to less than 100 picocuries of plutonium per gram of soil, a fraction of the Energy Department's interim levels.

Moreover, if a fire were to scorch some of the grasslands at Rocky Flats — a certainty, according to Till — there would be a short period of time when soils would be very unstable.

Winds could lift more plutoni-

um-contaminated dirt into the air where people would breathe it in or ingest it inadvertently.

He's not run that scenario through his computer yet, but it's likely to send appropriate soil contamination levels much lower.

\$7 billion cleanup

Cleaning costs money, though. Dave Shelton, Kaiser Hill vice president for environmental systems and stewardship, pointed to a graph showing estimated cleanup costs based on soil action levels.

According to the current plan of 651 pCi/g, it will cost a total of \$7.27 billion to clean up Rocky Flats. To drop soil action levels to 115 pCi/g, it would cost an additional \$80 million. Dropping to 1 pCi/g would cost more than \$25 billion.

Till said he understands there's a point at which additional cleanup work simply isn't worth the money.

I'd just like to see them (the panel, the Energy Department, and its regulators) agree upon a level that people can live with, and the department can live with, he said.

Federal officials declined to comment about his work. When Till's final report is

issued, we're going to give it a hard technical look, said Jeremy Karpatkin, director of communications for the Energy Department at Rocky Flats.

He and his colleagues have been following Till's work closely. They've attended every oversight panel meeting, and Karpatkin has sent 34 questions about Till's work to oversight panel members since December.

Kaiser Hill's Shelton said he and other Rocky Flats staff have also been meeting monthly after the oversight panel meetings to discuss the group's discussions.

It's just informal chat chats among technical people, he said.

He said he doesn't actually care what the final cleanup levels are, since Kaiser Hill will simply follow the cleanup directions of the Energy Department.

We just want to do it right the first time, Shelton said. We sure don't want to plan a project, execute, and then have the consensus years later say, "You dummies, if you'd just waited, you could have done better."

We may be better off to try to work these things through with the public, he added. Yes, we all want it closed by 2006, but it would be stupid to go do it the wrong way.

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