



Use of Health Impact Assessment to Help Inform Decision Making Regarding Natural Gas Drilling Permits In Colorado

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**Garfield County
Board of County Commissioners
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Well pads 500 feet or more from residences

Structures

- Church
- Hospital
- Other Public Building
- Residential
- School

Garfield County
IT Department
109 8th Street Suite 205
Silverton, CO 81061
970.465.1377 x1590

Miles
0 0.4

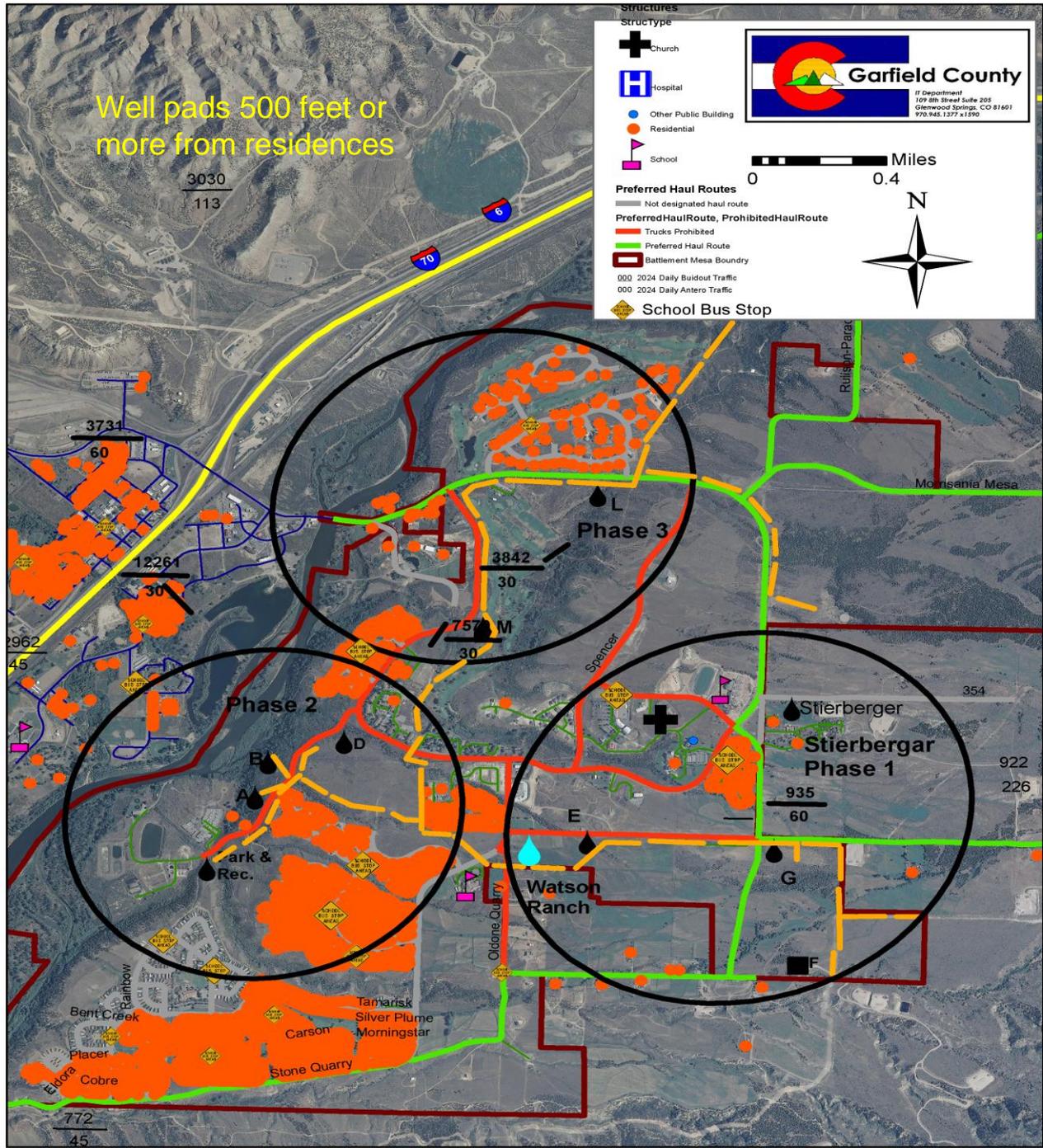
N

Preferred Haul Routes

- Not designated haul route
- Preferred Haul Route, Prohibited Haul Route
- Trucks Prohibited
- Preferred Haul Route
- Battlement Mesa Boundary

600 2024 Daily Buildout Traffic
000 2024 Daily Antero Traffic

School Bus Stop



Today's Presentation

- Why do a Health Impact Assessment
- What went into the HIA
- Eight “stressors”
- Findings, Recommendations, Assessments for 3 stressors
- Draft report, public comment, final report
- (Battlement Mesa Baseline Health Profile)
- (HIA Methodology)
- (Next Steps)

What went into this HIA

➤ Stakeholder meetings

- General Stakeholder meetings
- State agencies
 - COGCC
 - CDPHE
- Local agencies
 - Board of Commissioners
 - Garfield County Public Health
 - Battlement Mesa Metropolitan District
- Antero

➤ Antero Community Meetings

- Minutes, power points
- MLUIR/CDP not available

➤ Consultant

- Habitat Health Partners
 - HIA framework
 - Standardized assessment strategy

What went into this HIA

➤ Health

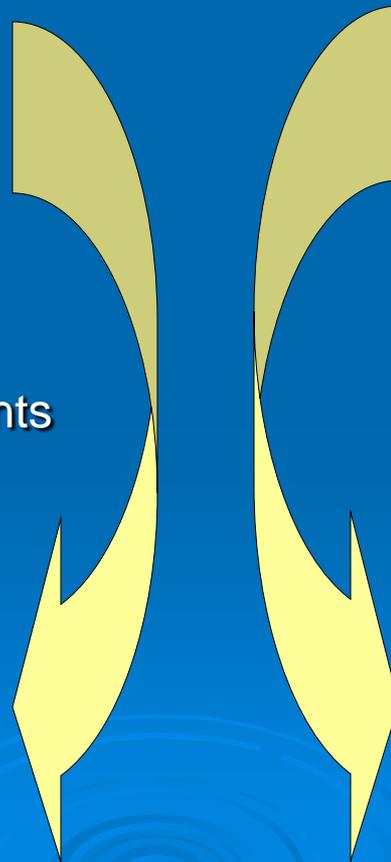
- Physical Health
 - Hospital discharge
 - Cancer Registry
 - Deaths
 - Births
- Community Health
 - Substance abuse
 - Crime
 - Motor vehicle accidents
 - Sexually transmitted infection
 - Education

**Battlement
Mesa Baseline
Health Profile**

➤ Environment

- Air
 - 5 years of Garfield County air monitoring and studies
- Water
 - USGS (COGCC)
 - GC studies
 - BM metro district
- Traffic
 - Antero traffic analysis report

**Health
Risk Assessment**



Why do a HIA?

Health Impact Assessments:

- Identify health implications of proposed project (policy /program)
- Inform and advance decisions that support health
- Proactive: offer recommendations and alternatives before final decisions are made
- Generate good health and cost savings
- Decrease costs of remediation and retrofitting
- Outlines ways to maximize health gains and minimize adverse effects.
- Acknowledges trade-offs

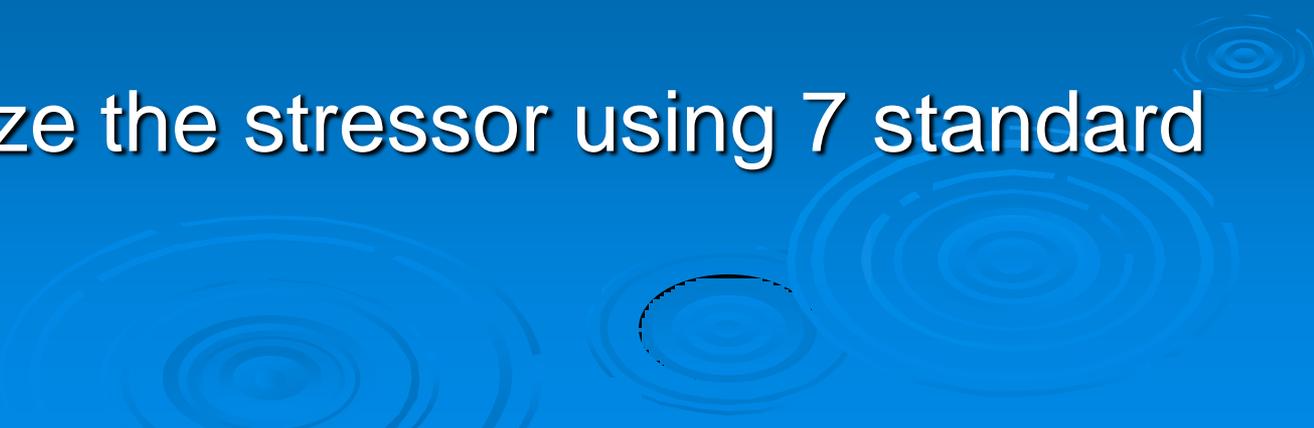
Eight Stressors

(things that can affect health)

- Air quality
- Water quality
- Traffic
- Noise
- Economic conditions
- Social conditions
- Health infrastructure
- Accidents/malfunctions

Assessments

Describe each stressor

- How does the stressor affect health?
 - What are the current conditions with regard to the stressor?
 - How can the natural gas development affect the stressor?
 - How can the changes to the stressor affect health?
 - Characterize the stressor using 7 standard traits.
- 

Findings from Air Quality Assessment

Know

- Many kinds of air pollution are hazardous to public health
- GCPH and CDPHE studies document diminished air quality resulting from natural gas development and production
- GCPH studies indicate odor events are associated with VOC/BTEX emissions
- GCPH studies indicate intermittent high level emissions during completion activities

Don't know

- Levels of emissions have not been fully characterized for a variety of scenarios of well development and production
- Levels of emissions are unknown for “green completion” procedures
- Other sources of air pollution associated with gas development have not been assessed
- Risk associated with PAH, fracking chemicals, PM and ozone has not been assessed
- Emission levels at residential setback distances are unknown

Characterization of Stressor

Stressor	Direction of health effects	Geo graphical extent of exposure	Vulnerable population	Duration of exposure	Frequency of exposure	Likelihood of health effects as result of project	Magnitude of health effects	Rank
ie Air, Traffic, etc)	Positive Negative Mixed	Local Community wide	No Yes	Weeks Months Years	Infrequent Frequent	Unlikely Possible Likely	Low Medium High	Sum
	+ - +/-	1 2	1 2	1 2 3	1 2	1 2 3	1 2 3	- + -/+ range 6-15

Air Assessment

Stressor	Direction of health effects	Geo graphical extent of exposure	Vulnerable population	Duration of exposure	Frequency of exposure	Likelihood of health effects as result of project	Magnitude of health effects	Rank
AIR	Negative	Community wide	Yes	Years	Frequent	Likely	Medium-High	Sum
	-	2	2	3	2	3	2-3 (2.5)	- 14.5

Battlement Mesa Health Impact Assessment

Review existing
information

(Identify gaps in
information)

Determine potential
health impacts

**Provide
recommendations**

- **reduce negative
health impacts**
- **support positive
health impacts**

Recommendations

- How can the potential negative health impacts be mitigated?
- How can the potential positive health impacts be supported?

Promote pollution prevention

Protect public safety

Address boomtown effects

Recommendations to Protect Air Quality

- Require submission of a quality assurance project plan (also known as a QAPP) to GCPH for review and approval for all monitoring specified in these recommendations to assure monitoring information will be adequate for informing public health decisions.
- Require Antero monitoring results conducted in response to CDPHE consultation (dated 4/12/2010) be made available to the public in a timely manner to provide accessible information and transparency.
- **Require corrective action when odor events occur, including notification of the GCPH and residents to reduce impacts.**
- Require adherence to COGCC 805b green completion practices, with no variances, and EPA natural gas STAR program to reduce VOC emissions to the lowest level technically possible.
- Require use of electrically powered generators in place of diesel powered generators for well drilling and fracking operations to reduce VOC, PAH, and PM emissions.
- Require a valid emissions permit from the CDPHE for each well pad, per COGCC rule 805b to establish inspection and monitoring requirements.
- To reduce VOC emission, require pilot lights on production tank combustors remain lit through use of appropriate technology, such as spark igniters.
- Require adherence to dust control measures and traffic measures specified in the Surface Use Agreement.
- Require that Antero establish and implement a plan that ensures all trucks used for its plan within the PUD meet emission standards specified in the Clean Fuel Vehicles (heavy trucks) for the Clean Fuel Fleet Program (CFR Part 88.105-94) to reduce VOC, PAH, and PM emissions.
- Require truck loads of dirt, sand, aggregate materials, drilling cuttings, and similar materials be covered to reduce dust and PM emissions.
- Require pits at the water storage facility to be covered to reduce VOC emissions.
- Require air monitoring of water storage facility for VOC/BTEX and report results to GCPH.

Findings from Traffic Assessment

Know

- Increased traffic increases risk for motor vehicle accidents
- Risk of severe injury increases with speed of vehicle
- Traffic also contributes to air pollution and noise

Don't know

- Battlement Mesa's traffic "hot spots"
- Battlement Mesa's normal pedestrian and bicycle patterns

Characterization of Traffic Impacts on Safety

Stressor	Direction of health effects	Geo graphical extent of exposure	Vulnerable population	Duration of exposure	Frequency of exposure	Likelihood of health effects as result of project	Magnitude of health effects	Rank
TRAFFIC	Negative	Community wide	Yes	Years	Frequent	Possible	Low -High	Sum
	-	2	2	3	2	2	1-3 (2)	- 13.0

Recommendations to reduce safety risks associated with increased traffic

- **Require Antero to build water treatment facility and associated pipelines in advance of well development, to immediately remove water hauling traffic from PUD.**
- Require Antero to communicate and coordinate with local school district to develop plan for transportation and safety needs of all children going to and from school by car, bus, bicycle and walking during and outside of school zone hours to prevent injury to school children.
- Reduce truck speed limits to 20 mph in areas where there is existing pedestrian traffic that is not buffered from haul routes to prevent accidents and to reduce the severity of injury should an accident occur.
- Consider speed control measures on worker ingress and egress routes (ie decreased speed limits, signage, real time speed measurement signs, photo speed ticket vans, speed bumps or other measures) to prevent workers from speeding.
- Mark pedestrian/bike high use routes and establish safe crossing zones where they intersect Battlement Mesa Parkway or other haul routes to alert drivers of potential pedestrians and bicyclers.
- Install safety measures (ie, signaled cross walks, elevated side walks, green space buffers) for pedestrians/bikes where established walking/biking routes overlap/run along haul routes to prevent accidents.
- Request that the Garfield County Sheriff's Department or other qualified entity to review Antero's Traffic Impact Analysis and request feedback on possible safety mitigations and traffic hot spots to ensure the plan has is protective of public health.
- Require safe driver training for workers and implement penalty system for unsafe drivers, to encourage safe driving.
- Require Antero to have a system to identify and remove unsafe drivers to prevent accidents and injuries.
- Provide Sheriff's Auxiliary Unit with authority to log speeding and unsafe driving incidents and complaints within the PUD, which can be provided to Antero, subcontractors and the Sheriff's department so that problems can be resolved, to identify unsafe conditions.

Findings from Economic Assessment

Know

- Natural gas industry provides jobs
- Locals may lack specific skills for industry jobs
- Natural gas industry prone to boom and bust cycles
- Impacts to local business may be mixed
- Antero project likely too small to initiate boom/bust cycle

Don't know

- Impact Antero project will have on Battlement Mesa housing market
- Detailed economic impact to individual citizens during boom/ bust

Characterization of Economic Changes on Health

Stressor	Direction of health effects	Geo graphical extent of exposure	Vulnerable population	Duration of exposure	Frequency of exposure	Likelihood of health effects as result of project	Magnitude of health effects	Rank
Economic	Mixed	Community wide	Yes	Years	Infrequent or Frequent	Unlikely	Low	Sum
	+/-	2	2	3	1-2 (1.5)	1	1	-/+ 10.5

Recommendations to reduce impacts of boom and bust cycles

- Review local tax structure to ensure that revenue from natural gas development and production are used to mitigate impacts in areas most affected by the industry development in order for the community to realize the economic benefits.
- Continue to consider public health as a high level priority when judging uses of local government revenues derived from the natural gas development and production to maximize protection of public health.
- Engage in long term planning to maintain affordable housing, education, and public services to protect residents from sudden industry downturns (e.g. the bust).
- Consider mechanisms for providing property tax relief for residents on fixed income should home values rise rapidly to reduce negative economic impacts.
- **Engage local educational institutions to provide industry related training so that local residents can be employed by the industry.**
- Engage local educational institutions to provide retraining for residents employed by the industry so that they can find future employment when industry development is complete and development jobs are no long available locally to reduce impacts from sudden industry downturns.

Characterization Summary

Assessment	Direction of health effects	Geographical Extent of exposure	Vulnerable populations	Duration of exposure	Frequency of exposure	Likelihood of health effects as a result of Project	Magnitude of health effects	Rank
Air Quality	Negative (-)	Community-wide	Yes	Long	Frequent	Likely	Moderate to High	-14.5 1
Water and Soil Quality	Negative (-)	Community-wide	Yes	Long	Infrequent	Unlikely	Moderate to High	-11.5 3
Traffic	Negative (-)	Community-wide	Yes	Long	Frequent	Possible	Low to high	-13 2
Noise, Vibration, Light	Negative (-)	Local	No	Long	Frequent	Possible	Low-Medium	-10.5 5
Community Wellness	Mixed ()	Community-wide	Yes	Long	Infrequent	Possible	Low to Medium	11.5 4
Employment and economy	Mixed ()	Community-wide	Yes	Long	Frequent	Unlikely	Low	10.5 5
Health Infrastructure	Mixed ()	Community-wide	Yes	Long	Infrequent	Unlikely	Low	-10 7
Accidents and malfunctions	Negative (-)	Local or Community-wide	Yes	Short	Infrequent	Possible	Low to high	-10 6

Report

➤ Draft

- September 20
 - Released on Garfield County Public Health Website
 - Announcement and solicitation of comments
 - Presentation to BOCC October 4
 - **Public Comment Period until Oct 20**

➤ Final

- November 15
 - Public presentation November 18

Conclusions

- Battlement Mesa HIA is specific to that project at that place
- Principles of HIA could be used to look at other locals, projects
- HIA is a tool for understanding potential health impacts before a project starts
- Goal of HIA is to provide useful data for informed decisions
- Allow decision makers to include health in their processes

Colorado School of Public Health Team

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- Lee Newman, MD, MA
 - Professor, Director MAP ERC
- Courtney Hanlon

- Battlement Mesa Baseline Health Profile
- Health Risk Assessment
- HIA Methodology



Battlement Mesa Baseline Health Profile

- Baseline demographics
 - Baseline physical health summary
 - Baseline community health summary
 - Health risk assessment using multiple years of ambient air quality monitoring
 - Or summary slide of more of the process
- 
- The background of the slide features several concentric, light blue circular ripples that resemble water droplets hitting a surface, scattered across the lower half of the frame.

Battlement Mesa/Parachute 81635, 81636 Zip Code

2000 census data

➤ Population information

- Total population: 5,041
- >65: 19.8%
 - (Colorado 9.7%)
- < 18, > 65: 45.8%
 - Vulnerable population

Physical Health

Hospital Discharge Diagnoses

- Colorado Hospital Association (CDPHE)

Deaths

- Vital Records (CDPHE)

Cancer

- Colorado Central Cancer Registry (CDPHE)

Births

- Vital Records (CDPHE)

➤ Battlement Mesa citizens are healthy

- When compared to other people in Colorado of the same age and race, the people in Battlement Mesa had the same or lower rates of disease, deaths, cancers*, and poor birth outcomes.

* prostate cancer slightly higher (variation of small numbers or multiple tests)

Community Health

➤ Motor vehicle accidents

- CO State Patrol

➤ Crime

- CO Bureau of Investigation
- **Violent crime increased 2000-09**

➤ Sexually transmitted disease

- CDPHE
- **Chlamydia doubled 2005-09**

➤ Mental health, substance abuse

- Community Health Initiative

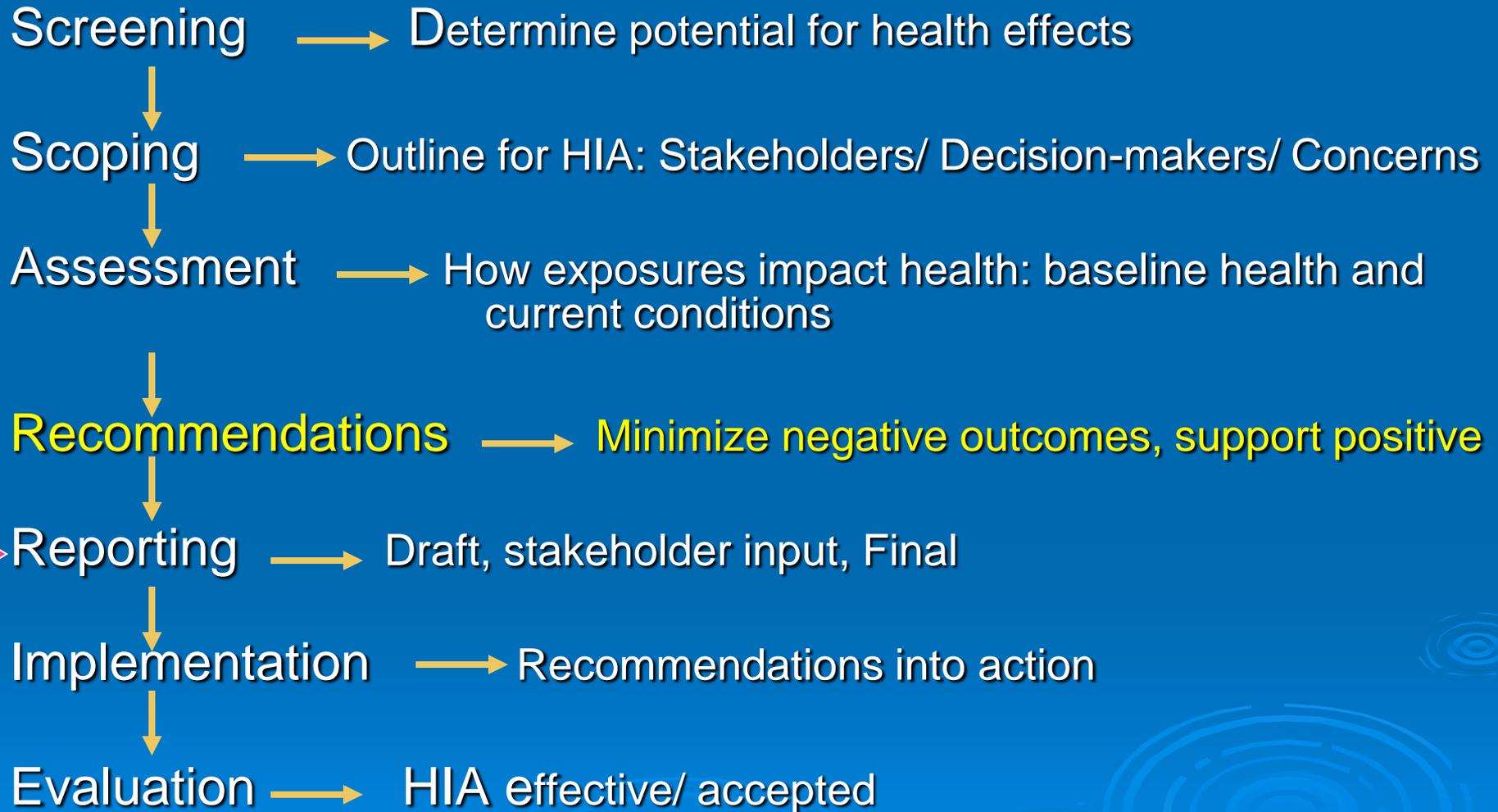
➤ Schools/Education

- CO Department of Education
- **Enrollment increase 35.7% 2000-09**

Health Risk Assessment

- Longitudinal Review of Ambient Air Monitoring in Garfield County
 - Included information about potential water exposure in worst case scenario
 - Risk for acute health (non-cancer) outcomes
 - Risk for cancer
 - Higher than EPA baseline of 1 in a million
 - Approaching upper limit of acceptable range (100 in a million)
- Does not take many chemicals and exposures into account therefore risk could be higher

Review of HIA Methodology



Health Impact Assessment Methodology

Screening

Is there potential for gas development in Battlement Mesa to impact health?

- Previous experience in Garfield County and other locations suggest it is possible
- Citizens feel there is potential
- Previous CSPH work suggests there is potential

Health Impact Assessment Methodology

Scoping

What is the scope of the HIA?

- Battlement Mesa Concerned Citizens letter
- BOCC, GCPH input
- Stakeholder meetings

- Specific to the Antero Project in Battlement Mesa

Stakeholders

- **Citizens (groups and individuals)**
 - Battlement Mesa Concerned Citizens, Battlement Mesa Service Association
- **Industry**
 - Antero (Encana, Bill Barrett, etc)
- **Property owner**
 - Battlement Mesa Company
- **State agencies**
 - CDPHE, Colorado Oil and Gas Conservation Commission
- **Local agencies**
 - Garfield County: Board of Commissioners, Public Health, Oil and Gas Department
- **Local health providers**
 - Grand River Hospital

Stakeholder Meetings

- General Stakeholder meetings
 - 1st introduction of HIA, solicit concerns
 - 2nd update, solicit concerns
- Board of Commissioners
- COGCC
- CDPHE
 - Colorado Central Cancer Registry
- Antero
 - 1st: introduction of HIA and BM gas project; site visit tour of 4 gas development and production sites
 - 2nd review of Antero communications with BM and more on HIA
 - 3rd discussion of air sampling and modeling
 - 4th discussion of traffic and employee analysis

Health Impact Assessment Methodology (con't)

- Assessment
- Recommendations
- Report



Health Impact Assessment Methodology

Implementation

- GC BOCC has responsibility to implement recommendations as they see fit
- CSPH supports implementation by conducting community meetings regarding HIA and findings

Health Impact Assessment Methodology

Evaluation

- Evaluate HIA as a public health tool
 - Monitor the response to the HIA
 - Solicit feedback from BOCC regarding recommendations
 - Provide self assessment of HIA process to county by the end of the year

Next Steps

- Address information gaps:
 - Background ambient air in BM
 - Emissions during drilling, fracking, completion, production; and traffic, water facility at set back distances
 - Establish health tracking system
 - Conduct health and exposure survey

- CSPH proposing longitudinal environmental and health monitoring study