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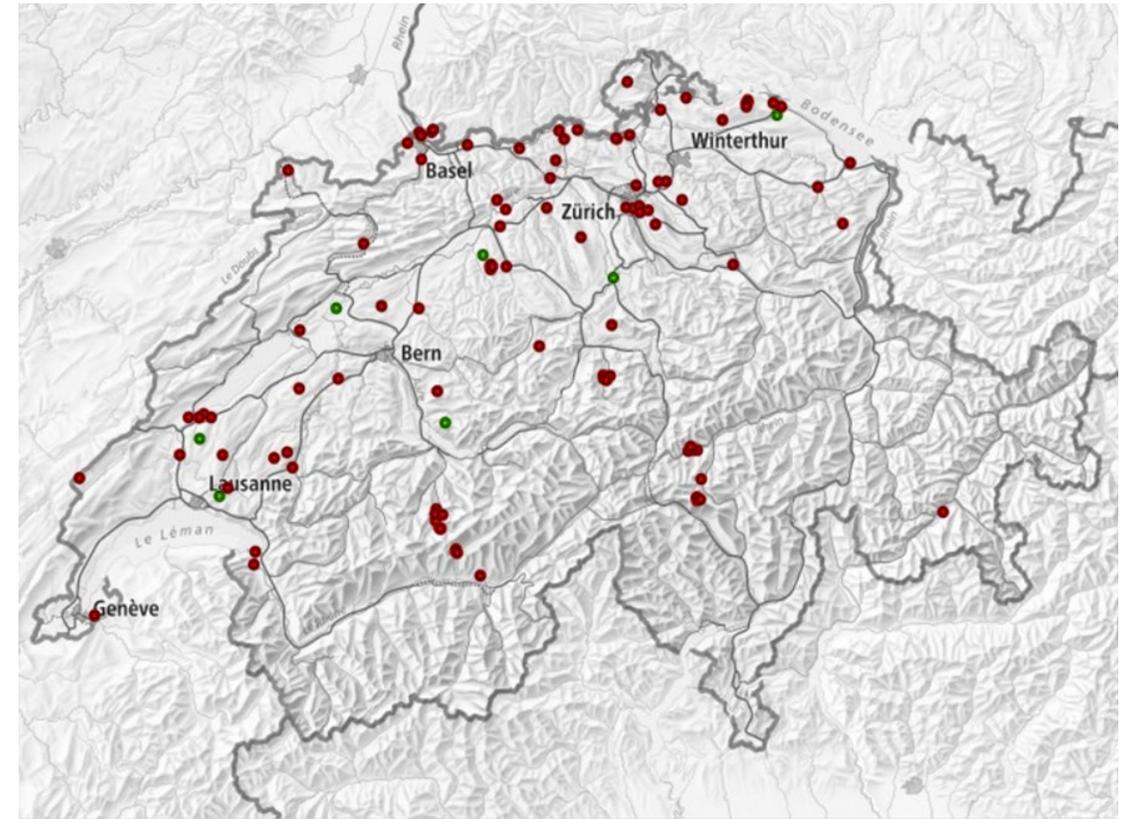
NON-SEISMIC REVERBERATIONS OF THE M5.4 POHANG EARTHQUAKE IN SWITZERLAND



WHAT STANDS IN THE WAY OF GEOTHERMAL ENERGY IN SWITZERLAND ?

Main obstacles

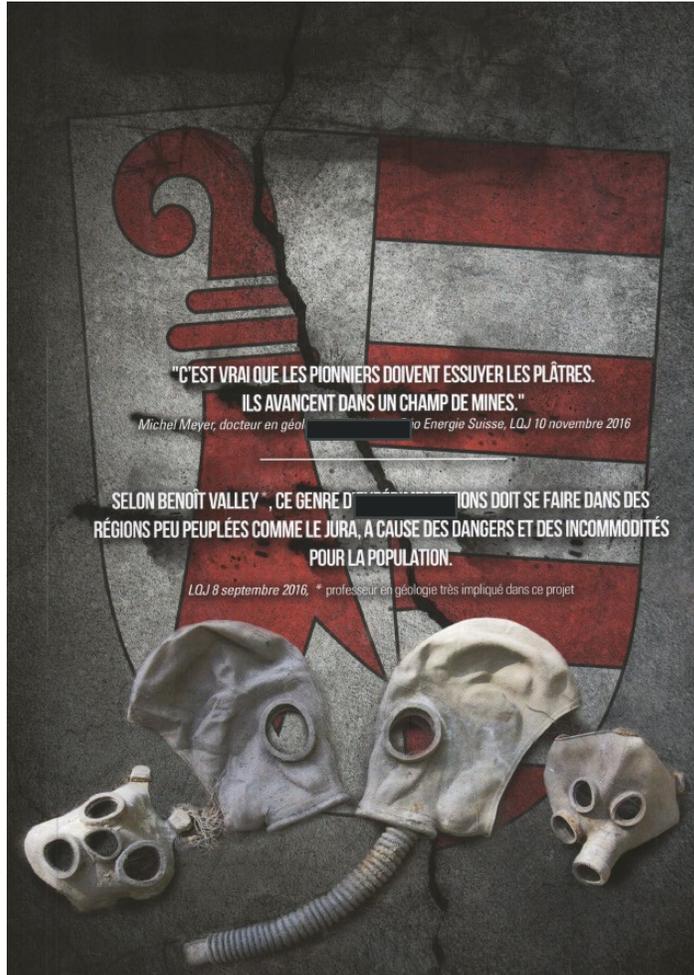
1. Geological risk
 - Fairly poorly known subsurface
 - Geothermal reservoir accessibility (incl. EGS)
2. Significant financial downside
3. **Public acceptance**
4. **Regulatory framework**
5. Local competency



- Well deeper than 500 m
- Well deeper than 500 m with free access to data



POHANG ROCKS AN ALREADY SHAKY SWISS POLITICAL SCENE



Mai 2017 Par arrêté le Gouvernement jurassien constate la validité formelle de l'initiative « contre la géothermie profonde dans le Jura »

Juillet 2017 Réouverture du puits de forage abandonné en 2009 à Bâle afin d'abaisser la pression et limiter les risques sismiques dans la région rhénane

Août 2017 Message du Gouvernement jurassien à l'attention du Parlement lui proposant de constater la validité matérielle de l'initiative

Novembre 2017 Séisme d'une magnitude de 5,4 sur l'échelle de Richter dans le Sud-Ouest de la Corée du Sud. Géo-Energie Suisse participe au projet.

Novembre 2017 Par arrêté du 22.11.2017, le Parlement jurassien a déclaré valable au fond l'initiative populaire « Contre la géothermie profonde dans le Jura »

Novembre 2017 Le Gouvernement jurassien exige des garanties consécutivement au séisme en Corée du Sud. Si un lien de causalité est établi entre les forages et le séisme il réévaluera le risque pour le projet de Haute-Sorne et, si celui-ci n'est pas acceptable, il déclare vouloir l'arrêter. Il déclare en outre vouloir nommer une commission d'experts et n'autorisera pas de travaux avant une analyse globale.

trouvez dans ce courrier, un bulletin de versement. Un don de votre part, quel qu'il soit (le montant est libre), nous aidera dans ce combat aux nombreuses dépenses. Vous pouvez également faire un don via IBAN: CH60 8000 2000 0135 9662 6 / CHF. Nous ne disposons d'aucune ressource si ce n'est la générosité de la population. Merci de votre soutien.



STOP

À LA GÉOTHERMIE
PROFONDE
DANS LE JURA





MORE POLITICAL ACTIVITY WHEN

Science

REPORTS

Cite as: K.-H. Kim *et al.*, *Science*
10.1126/science.aat6081 (2018).

Assessing whether the 2017 M_w 5.4 Pohang earthquake in South Korea was an induced event

Science

REPORTS

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The M_w 5.4 Pohang earthquake, the most damaging event in the Pohang geophysical data suggest that the Pohang earthquake system (EGS) site, which was injected directly into a fault. The magnitude of the mainshock makes it the largest known

Cite as: F. Grigoli *et al.*, *Science*
10.1126/science.aat2010 (2018).

The November 2017 M_w 5.5 Pohang earthquake: A possible case of induced seismicity in South Korea

F. Grigoli,^{1*} S. Cesca,² A. P. Rinaldi,¹ A. Manconi,³ J. A. López-Comino,² J. F. Clinton,¹ R. Westaway,⁴ C. Cauzzi,¹ T. Dahm,^{2,5} S. Wiemer¹

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were published!



(CANTONAL) PARLIAMENTARY INITIATIVES



Some make it to parliament,

Motion no. 1224

Ban the project because of (lack of) safety!

Stop définitif au projet de géothermie profonde en Haute-Sorne

Madame la présidente,
Monsieur le président du Gouvernement, Madame et Messieurs les ministres,

Dans les réponses apportées par le gouvernement, les éléments de sécurité n'étant pas en adéquation et n'ayant pas répondu à notre attente pour sécuriser la population jurassienne nous nous voyons obligés de déposer une motion.

Par voie de motion nous vous demandons de mettre une fin immédiate et définitive au projet de géothermie profonde en Haute-Sorne.

Je remercie d'avance toutes et tous les députés qui se soucient de la sécurité de nos concitoyens de soutenir cette motion

Pour le groupe PDC-JDC
Christian Spring

Doléant, le 20 juin 2018

while others are retracted:

- 31. **Motion no 1229**
Modification de la fiche N° 5.07.1
Philippe Eggertswyler (PCSI)

La motion no 1229 a été retirée par son auteur.

- 32. **Motion no 1230**
Augmentation de la couverture du risque à 1 milliard
Philippe Eggertswyler (PCSI)

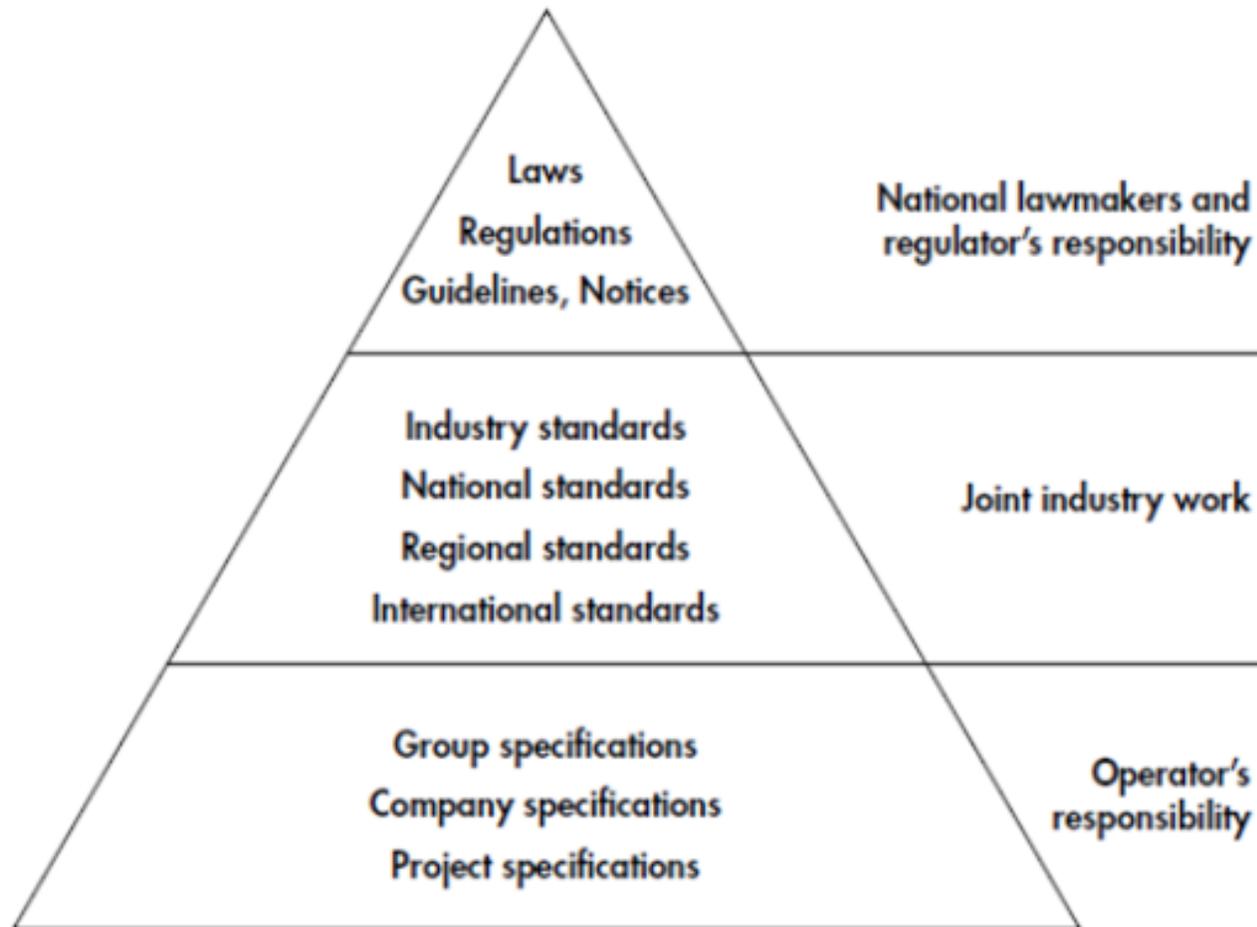
La motion no 1230 a été retirée par son auteur.

No. 1230: (retracted) motion asked for CHF 1 billion risk coverage

Quite a dynamic picture



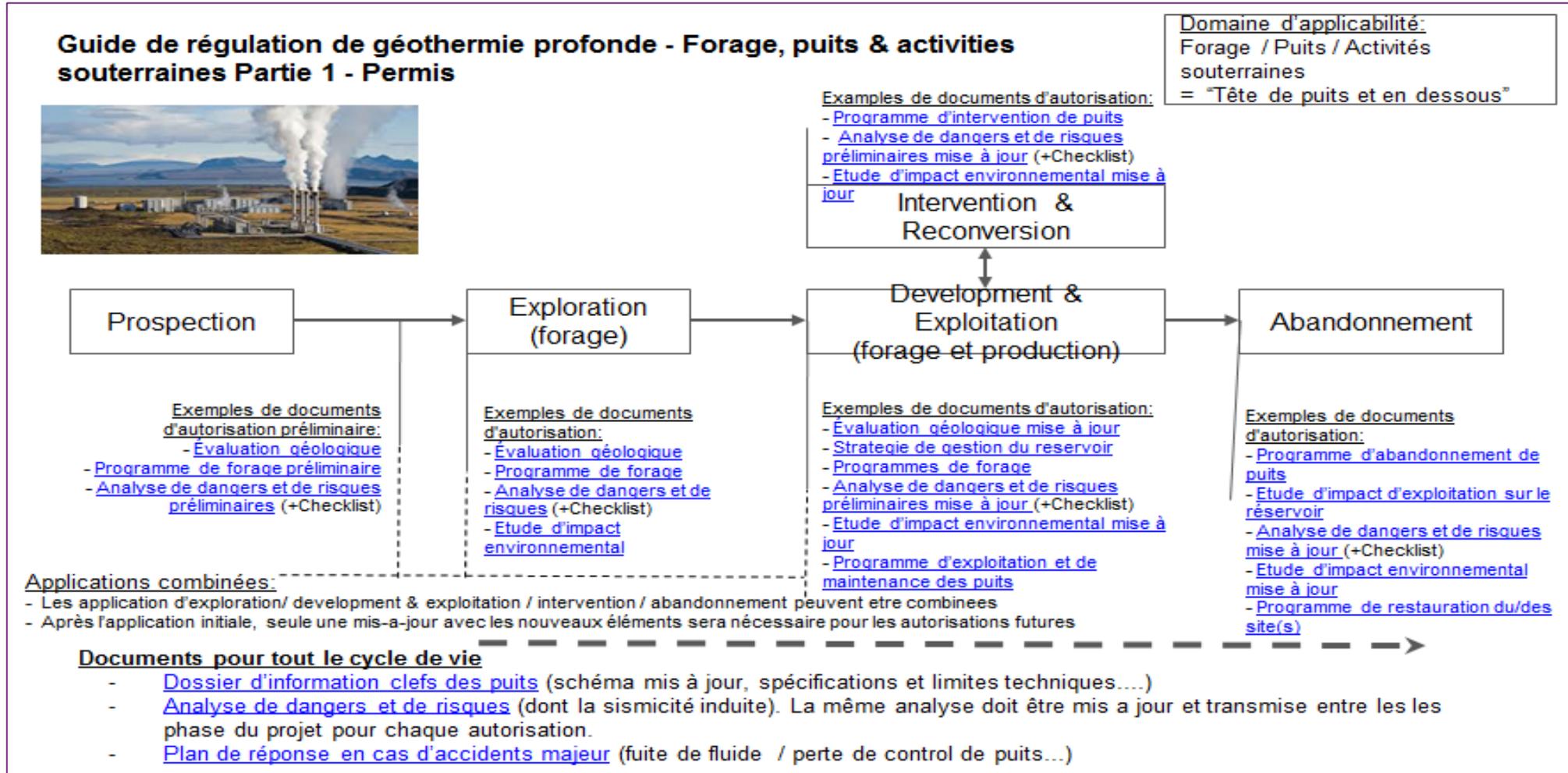
WHILE AUTHORITIES DEVELOP REGULATIONS



- (24 of 26) Cantons are the owners of the subsurface (they confer concessions)
- 1 Canton (GR) communities
- 1 Canton (VS): depends where you are
- They also act as permitting and regulatory authorities



SWISS FEDERAL OFFICE OF ENERGY SUPPORTS CANTONS BY DEVELOPING & SUGGESTING GUIDELINES





AND FOR RISKS RELATED TO INDUCED SEISMICITY ASKS THE SWISS SEISMO. SERVICE TO DEVELOP GUIDELINES

"Good Practice" Guide for Managing Induced Seismicity in Deep Geothermal Energy Projects in Switzerland

Swiss Seismological Service (SED)

ETH Zurich

GeoETH

induSED seismicity

swissenergy

Imprint	I	
1.	Introduction	4
1.1	Motivation, background and context	4
1.2	The goals and limitations of this good practice guide	4
1.3	The chosen concept: Induced Seismicity Risk Governance	6
1.4	The role of the SED in Induced Seismicity Risk Governance	6
1.5	Where and when this good practice guide applies	7
2.	Background on natural earthquake and seismic monitoring	8
2.1	Earthquake Monitoring in Switzerland	8
2.2	Seismicity in Switzerland	11
2.3	Plate tectonic context	16
2.4	Seismic hazard of Switzerland	18
2.5	The importance of local site amplification	19
2.6	Earthquake risk	20
3.	Induced seismicity – background	22
3.1	Definition and terminology	22
3.2	Differences between natural and induced earthquakes	22
3.3	Mechanisms of induced seismicity	23
3.4	Induced seismicity in the context of deep geothermal energy	24
3.4.1	Types of geothermal energy systems	24
3.4.2	Challenges for deep geothermal energy systems	26
3.5	Pre-drilling indicators of seismogenic response	26
4.	Case history of induced seismicity related to geothermal in Switzerland	29
4.1	The Basel 'deep heat mining' project (petrothermal project, 2006)	29
4.2	The St. Gallen hydrothermal project (2013)	31
5.	Project accompanying assessment of induced seismicity concern	34
5.1	Induced seismicity risk governance of deep geothermal projects	34
5.2	Existing frameworks for induced seismicity management	34
5.3	Evaluation of the GRID scores	35
6.	Risk assessment in all project phases	40
6.1	Category 0 projects	40
6.2	Category I projects	40
6.2.1	Hazard assessment in the planning and operation phase for Category I	40
6.3	Category II projects	42
6.3.1	Hazard and risk assessment in the planning phase for Category II	43
6.3.2	Hazard and risk assessment during the stimulation phase for Category II	44
6.3.3	Hazard and risk assessment during the operation and post-operation phases for Category II	44
6.4	Category III projects	44
6.4.1	Hazard and risk assessment in the planning phase for Category III	44
6.4.2	Hazard and risk assessment during the stimulation phase for Category III	46
6.4.3	Hazard and risk assessment during the operation and post-operation phase for Category III	46
7.	Suggestions for hazard and risk acceptance criteria	47
7.1.1	OPAM	47

"Good Practice" Guide for Managing Induced Seismicity in Deep Geothermal Energy Projects in Switzerland October 2017 II

7.1.2	Suggested acceptance thresholds	47
8.	Suggestions for modeling induced seismicity rates, hazard and risk	49
9.	Seismic monitoring guidelines	50
9.1	Goal	50
9.2	General recommendations for technical project monitoring	50
9.3	Recommendations for seismic monitoring	51
9.3.1	Operation of a seismic network	51
9.3.2	Measurement accuracy	52
9.3.3	Integration of seismic data sources	53
9.3.4	Transparency	54
10.	Seismic reflection	55
10.1	Power and limitation of seismic reflection surveys	55
10.2	Recommendations	55
11.	Mitigation and resilience strategies for induced seismicity	57
11.1	General considerations	57
11.2	Traditional traffic-light systems	57
11.3	Adaptive traffic-light systems (ATLS)	58
12.	Bibliography	60

Schatzalp 2017 presentations on Geothermal Risk of Induced seismicity Diagnosis (GRID)

http://www.seismo.ethz.ch/export/sites/sedsite/research-and-teaching/_galleries/pdf_products_software/Good-Practice-Guide-for-Managing-Induced-Seismicity-in-Deep-Geothermal-Energy-Projects-in-Switzerland_v1.0.pdf



A SPECIFIC PERMIT FOR A ENGINEERED GEOTHERMAL SYSTEM IN THE CANTON OF JURA (PROJECT HAUTE-SORNE)

Generalities (3 specific rulings): *strict adherence to Environmental Impact Assessment; evaluations and comments of the Swiss Seismological Service to be incorporated;*

Monitoring of naturally occurring and induced seismicity (5 specific rulings): *permit to install microseismic observation network independent of permit to explore & develop geothermal resource; 6 months of background monitoring acc. to guidelines set by the Swiss Seismo. Service; real-time, automated & data publically available; velocity model updated using best available technology;*

Insurance coverage (2 specific rulings): *Fr. 80 Million insurance coverage; evidence must be systematically collected;*

Hydraulic stimulation operations (6 specific rulings): *employ TLS and ATLS, indep. expert group, assessment of statistical measures of earthquake catalogue («b-value»); specific guidelines, for example, if seismicity cloud maps out a lineament, immediate stop;*

Update risk analysis (4 specific rulings): *1:1 million probability of fatality must not be exceeded; new information requires update; group of experts to be involved; if potential damages exceed Fr. 64 Million, revise guidelines;*

Procedure in the event of an earthquake greater than the expected threshold of the first damage (1 specific ruling): *stop.*

Beyond the 21 conditions for induced seismicity, there are another 42 conditions

Autorisation no. 969/2014



70 WEEKS AFTER THE EVENT & 45 WEEKS AFTER THE SCIENCE PAPERS

- The public opinion has long been formed, but:
- Wait for evidence-based policy-relevant outcomes in the scientific literature
- Stay level-headed as interest groups suggest evidence-based policy and others seek policy-based evidence (“get your own scientist”)
- Be aware of the risks when you take your science to places like Science and “throw it over the wall”





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Swiss Federal Office of Energy SFOE

THANK YOU FOR YOUR ATTENTION



Questions now or later
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