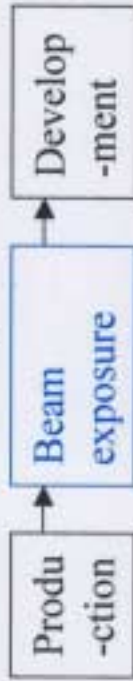


Refreshing at TONO Mine

T. Uetake

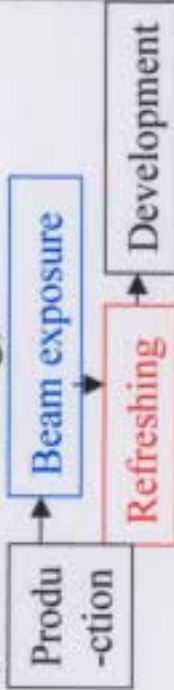
Performance of emulsion films for OPERA

Initial sensitivity



G.D. 36/100 μm
F.D. 1.3/1000 μm^3

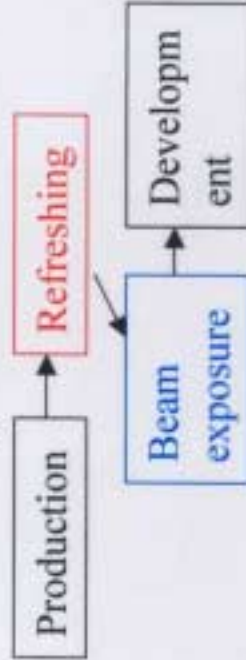
Characteristic of refreshing
(after refreshing)



G.D. Under 8/100 μm
F.D. 2.1/1000 μm^3

Condition : 30°C 98% 3days

Sensitivity of refreshed film



G.D. 35/100 μm
F.D. 1.5/1000 μm^3

no aging

	initial	after refreshing		
SU20	37 ± 1.1	≤ 10	≤ 10	≤ 10
SU26	35.6 ± 1.1	≤ 10	≤ 10	
SU28	34.6 ± 1.1	≤ 10		
SU29	37.3 ± 1.1	≤ 10		

} more than 10 samples checked by eye

G.D.

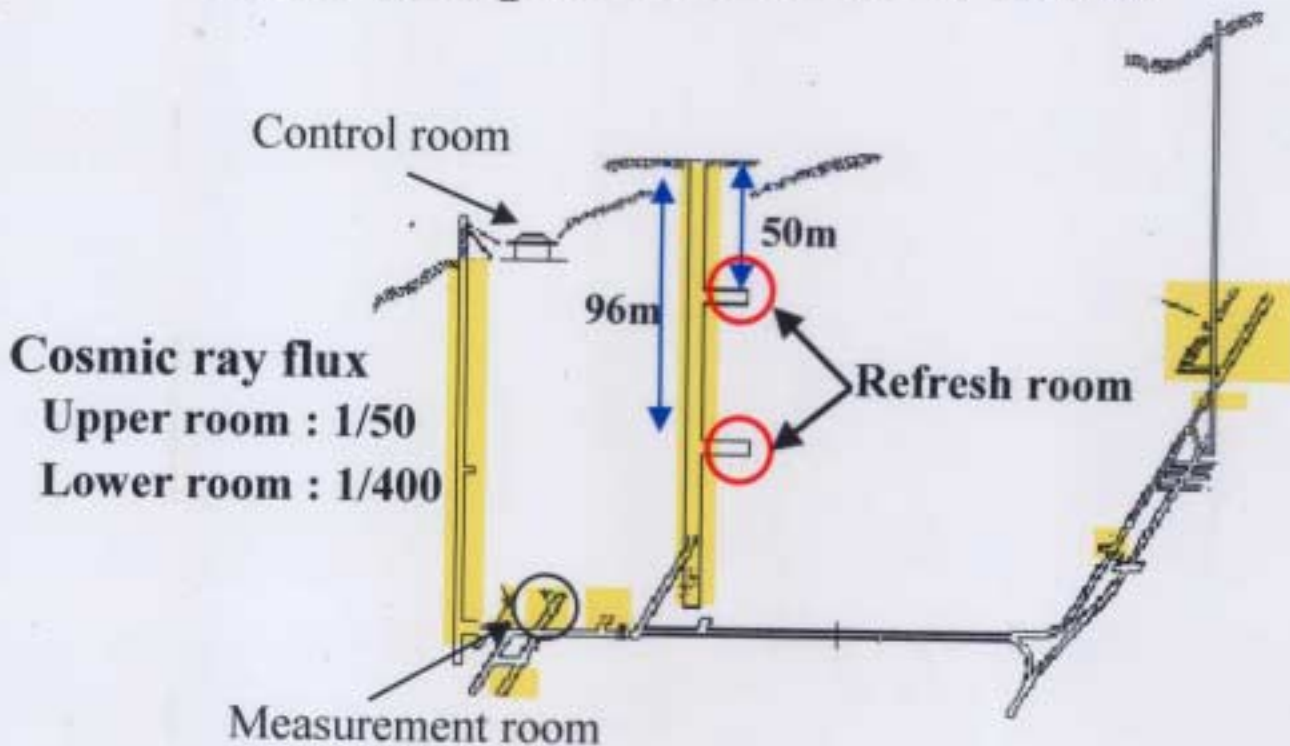
↑
 same type of emulsion film produced in different day.

refresh condition
30°C 98% 3 days

TONO Mine / Toki



Sectional plan of TONO Mine



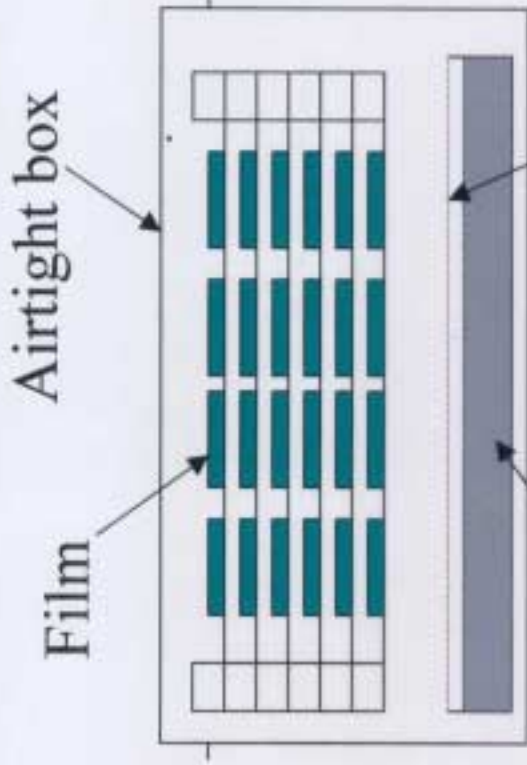
TONO Mine underground Refresh Facility

Room size
4.5m × 4.5m × 20m



Place in preparation

Refresh unit



Watertight sheet

Humidity keeper

EX. glycerin+water



Test of the prototype Refresh unit

T.Uetake











< 1 sec / film

Plan: 32000 films/day

↳ < 32000 sec \sim 9 hours by 1 person
⇓ + α for preparation

\sim 3 hours by 3-4 person.

Remained grains after refreshing

T[°C]	R.H.[%]	1day			2days			3days		
30	80±2.5	25.7±0.6[1.3±0.2]	22.4±0.6[1.4±0.2]	21.7±0.6[1.4±0.2]						
	90±2.5	19.2±0.7[1.3±0.2]	15.9±0.4[1.8±0.2]	13.8±0.5[1.6±0.2]						
±0.3	98±2.5	18.3±0.8[1.7±0.2]	12.1±0.6[2.1±0.3]	18.4±0.6[1.3±0.2]						
	80±2.5	20.2±0.6[1.5±0.2]	19.0±0.5[1.4±0.2]	18.4±0.6[1.3±0.2]						
35	90±2.5	12.4±0.5[1.7±0.2]	10.6±0.6[1.8±0.2]	10.6±0.6[1.8±0.2]						
	±0.3	98±2.5	≤10[2.1±0.3]	≤10[1.6±0.2]	≤10[1.8±0.2]					
40	80±2.5	18.0±0.6[1.4±0.2]	16.8±0.6[1.8±0.3]	14.9±0.6[1.7±0.2]						
	±0.3	90±2.5	≤10[1.3±0.2]	≤10[1.2±0.2]	≤10[1.2±1.2]					
		98±2.5	≤10[1.5±0.2]	≤10[1.7±0.3]	≤10[2.5±0.3]					

very soft and sticky

T[°C]	R.H.[%]	3days	7days	14days	28days
15±1.2	80	28±1	29±1	28±1	27±1
	90	26±1	24±1	22±0.9	18±0.8
	98	15±1	11±1	≤10.	≤10
20±2	80	28±1	25±1	23±1	23±1
	90	24±1	22±1	18±1	15±1
	98	14±1	12±0.9	≤10	≤10

Limited space

underground : $\sim 250 \text{ m}^3$

1. How many days for refresh?



refreshing condition

2. How compact we can stack?



Gap between 'net'

Setting

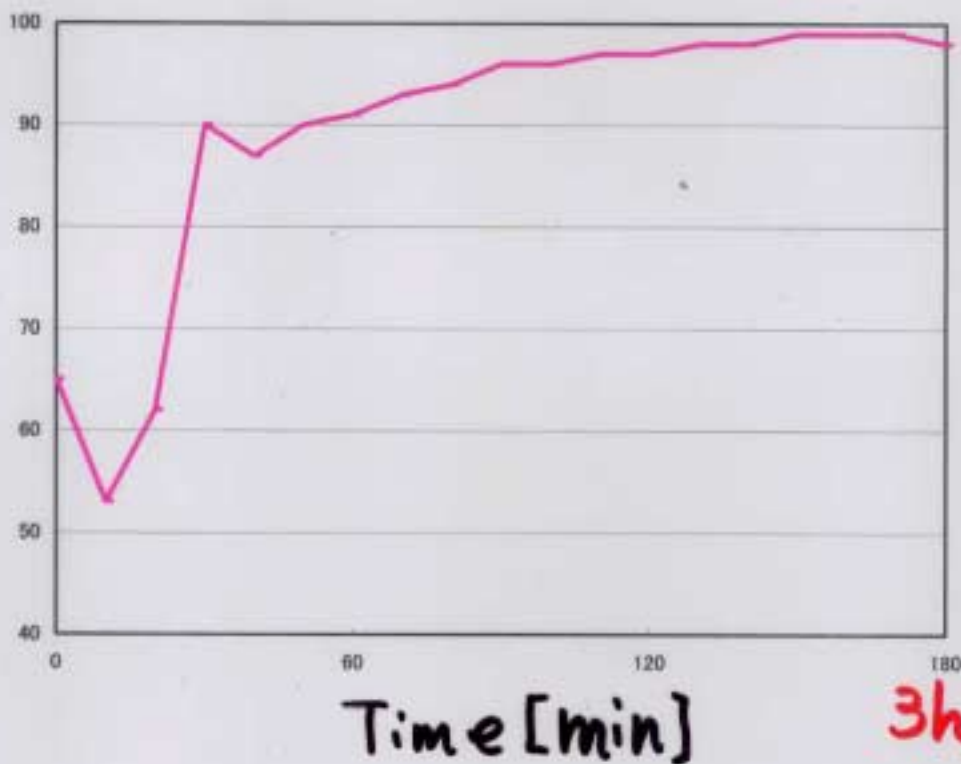
film



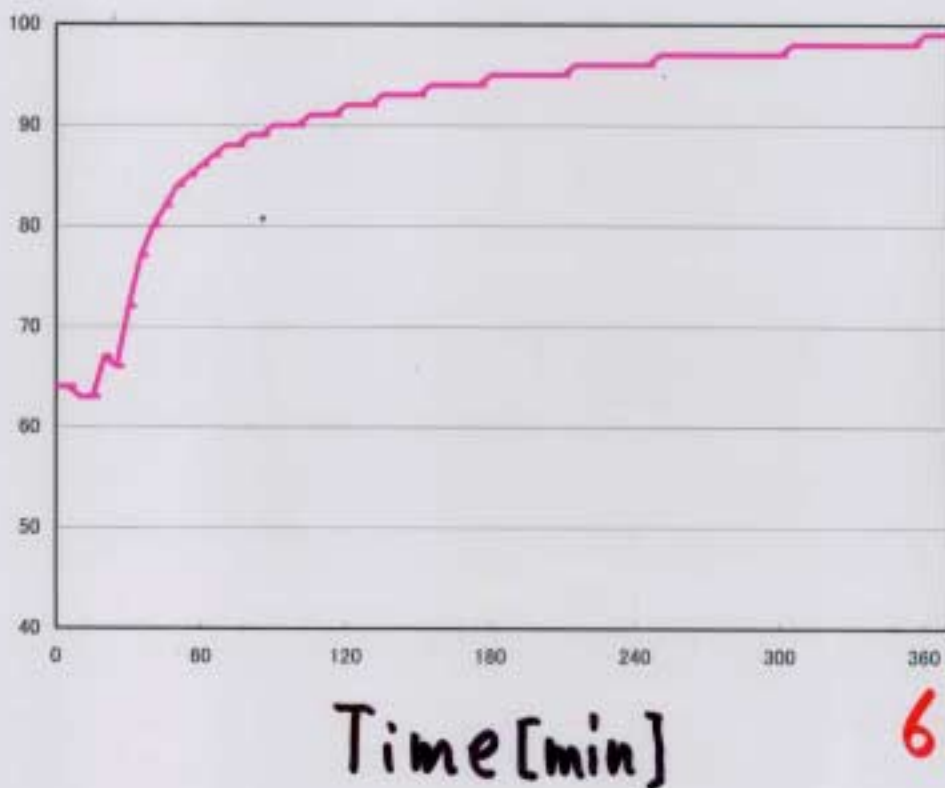
Gap

Humidity sensor

RH
[%]

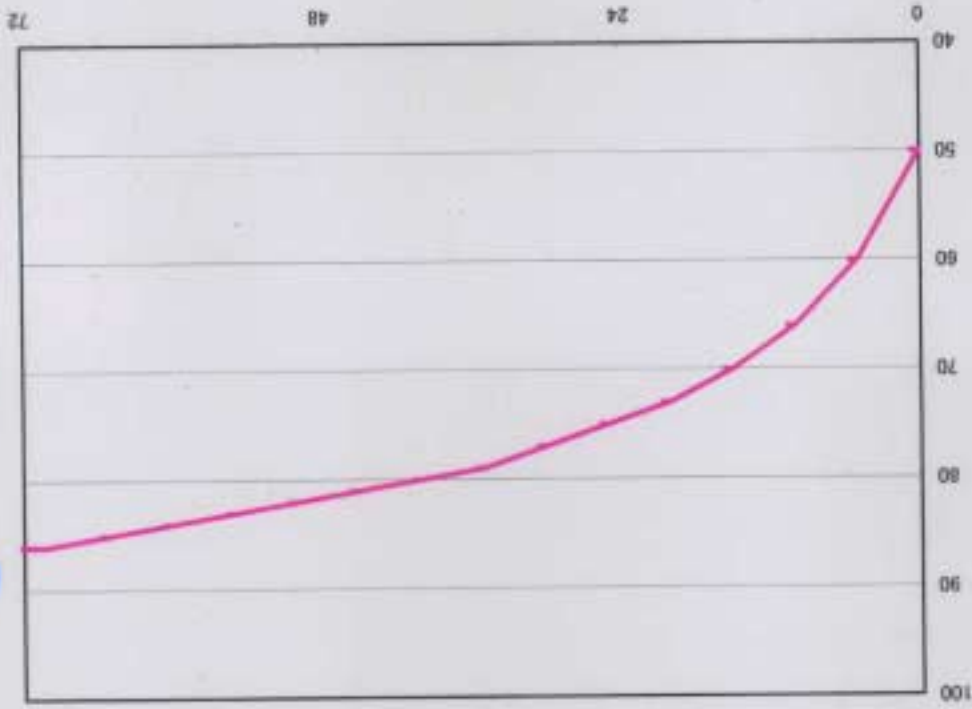


R.H
[%]



3day

Time [hour]

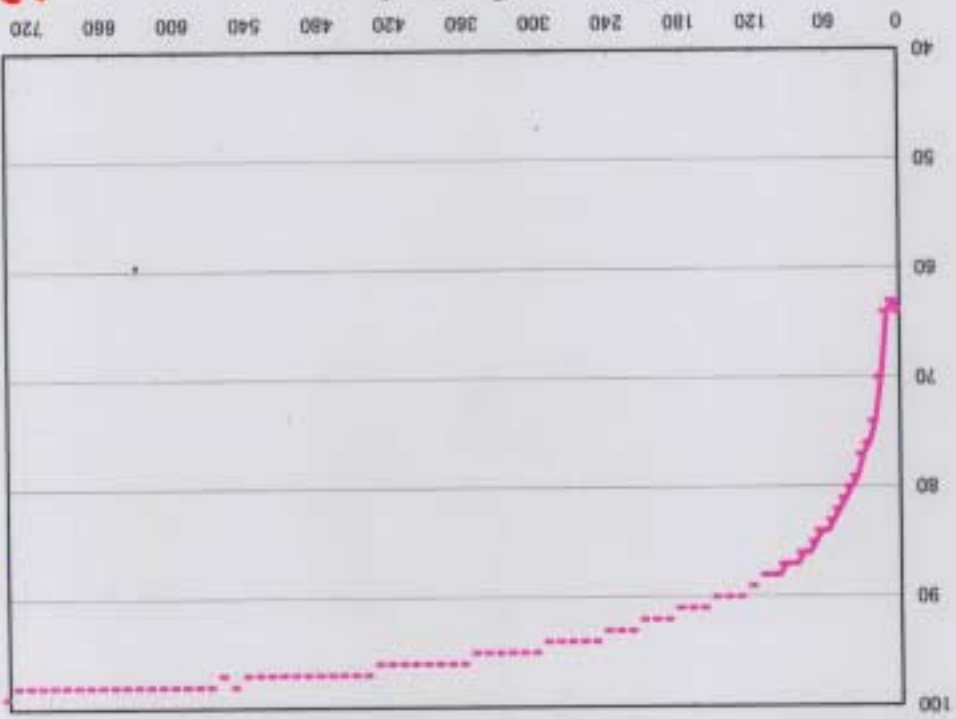


RH [%]

Gap 0.5mm

12hour

Time [min]

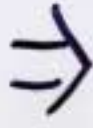


RH [%]

Gap 2mm

Estimate volume of stacking space

Plan: amount of processing = $8000 \text{ m}^2/\text{month}$



552 Bricks/day

Condition:

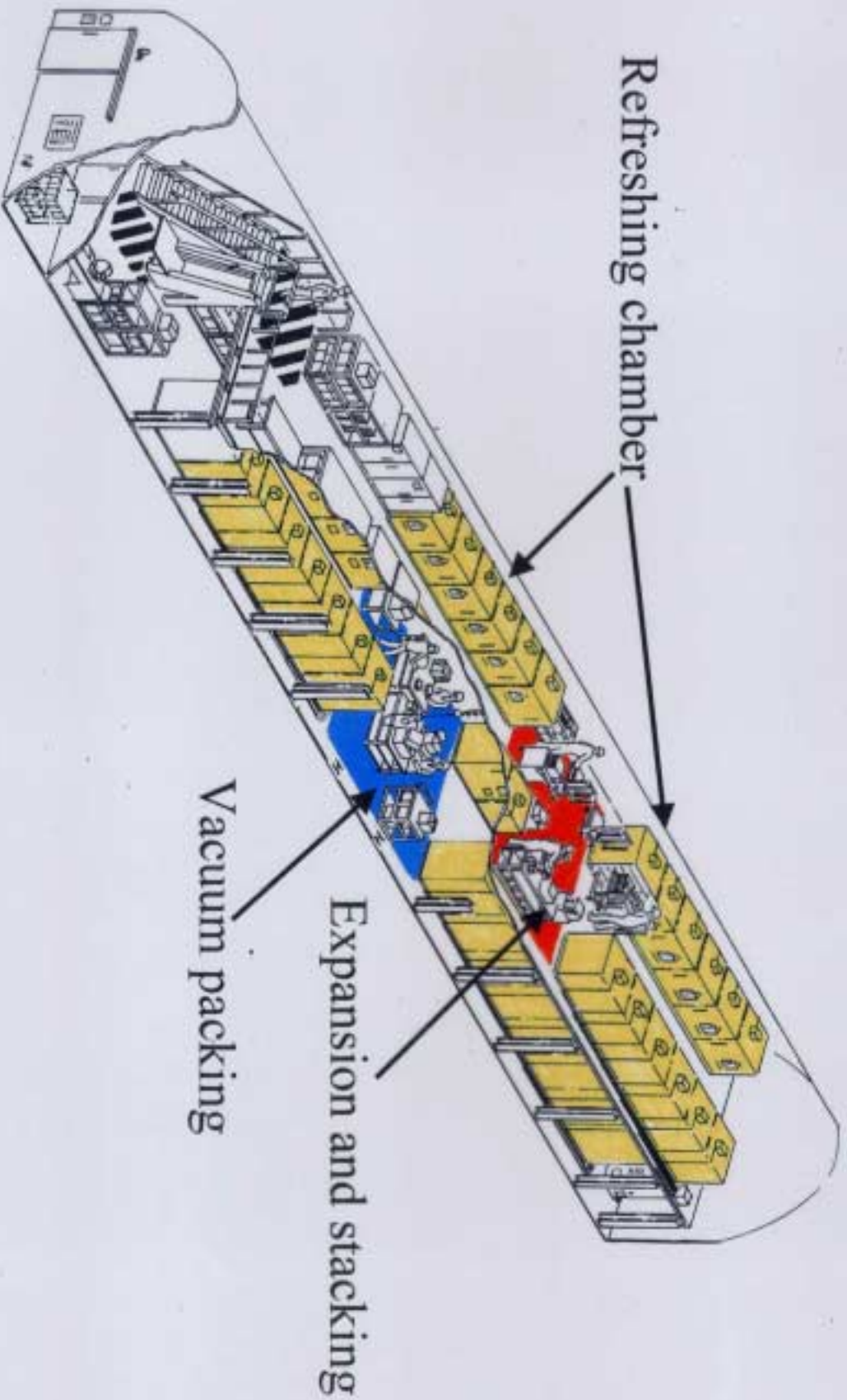
To "deal" films + refreshing + to correct
1 day 30°C 98% 3 days 1 day

"

~ 5 days operation

Space: Gap 1 cm $60 \text{ m}^3 \Rightarrow \sim 1/4$ hall }
5 mm $30 \text{ m}^3 \Rightarrow \sim 1/8$ hall } **reasonable**

Refresh facility (schematic view)



Schedule

2002 Summer

finish designing

~ 2003 spring

construct the facility