



Memo

To: File
From: Nikolas Roche
Cc:
Date: November 9th, 2016
Re: Justification for Reduced Employee External Exposure Monitoring

Strata's Radiation Protection Program Section J.3.1 states:

"Although Strata does not expect that any workers will exceed the 500 mrem/year external exposure level that requires external gamma radiation dosimetry, in accordance with the Technical Report Section 5.7.2.3- Personnel Dosimetry, all regular fulltime employees working at the facility will be monitored for external radiation by the use of vendor supplied OSL dosimeters. Drilling rigs are considered long-term contractors, and one drilling rig crew will also initially be supplied with dosimeters. The dosimeters will be exchanged on a quarterly basis."

Strata began operation on December 2nd, 2015. Dosimeters were issued to all regular, full-time employees beginning in November, 2015. Section J.3.1 also states:

"After one year, the RSO will assess the continued need for external gamma radiation dosimetry and may adjust the program to just include workers, or work groups that had significant exposure. This assessment and potential modification of the program is important as NRC guidance recommends that the unnecessary issuance of dosimeters should be avoided."

The end of the fourth quarter, 2016, will be 12/31/2016. At that time all work groups at the site will have worn their dosimeters for a full year of operations. Section J.3.1 discusses the criteria for determining if external exposure monitoring is needed:

"In 10 CFR §20.1502(a), the NRC provides the minimal requirements for monitoring occupational external exposure. Monitoring must be performed for:

- *Adults likely to receive an annual dose in excess of 10% of the occupational dose limit in §20.1201(a). This equals 500 mrem/year (0.05 rem);*
- *Minors likely to receive an annual dose in excess of 0.1 rem, a lens dose equivalent in excess of 0.15 rem, or a shallow dose equivalent to the skin or extremity dose in excess of 0.5 rem;*
- *Declared pregnant women likely to receive a deep dose equivalent in excess of 0.1 rem during the entire pregnancy; and*
- *Individuals entering a High or Very High Radiation Area.*



The RSO is responsible for determining the dosimetry requirements based on the facility radiation levels, worker job locations and tasks, and specific license requirements. For each category of workers, the RSO must determine whether it is likely that a worker's dose may exceed the criteria from § 20.1502(a)."

Strata utilizes OSL dosimeters issued by Landauer at the Ross Project. Review of the external exposure monitoring results for the past three quarters indicates that there is a minimum amount of external exposure received at the site. This is summarized in the following tables illustrating the deep dose equivalent (DDE) as reported by Landauer.

1Q16

Employee	DDE
	Dose (mrem)
[Redacted] (WF Tech)	2.0
[Redacted]	1.0
[Redacted] (EHS)	0.0
[Redacted] (Geologist)	0.0
[Redacted] (Backhoe)	0.0
[Redacted] (Operator)	0.0
[Redacted] (Operator)	1.0
[Redacted] (Operator)	2.0
[Redacted] (Admin)	0.0
[Redacted] (Operator)	2.0
[Redacted] (Operations)	0.0
[Redacted] (Casing)	0.0
[Redacted] (Sampler/Lab)	1.0
[Redacted]	0.0
[Redacted]	3.0
[Redacted] (WF Tech)	2.0
[Redacted]	0.0
[Redacted]	2.0
[Redacted] (Operator)	2.0
[Redacted] (Operator)	4.0
[Redacted] (WF Tech - MIT)	0.0
[Redacted] (Geology)	0.0
[Redacted]	0.0
[Redacted] (Lab)	0.0

OP'S

mgt.
mgt

OP'S
OP'S

mgt

*mgt
mgt*

*mgt.
OPs*

	1.0
	1.0
(WF - Const)	0.0
(Swabbing)	0.0
(MIT)	0.0
	0.0
	1.0
(Casing)	0.0
(Operator)	0.0
(Operator)	2.0
MIT/WF Const)	0.0
(Backhoe)	0.0

	DDE (mrem)
Maximum	4.0
Minimum	0.0
Average	0.8

2Q16

	Employee	DDE
		Dose (mrem)
	(WF Tech)	1.0
OP'S		5.0
	(EHS)	1.0
	(Geologist)	3.0
	(Backhoe)	1.0
	(Operator)	2.0
	(Operator)	0.0
	(Operator)	5.0
	(Admin)	1.0
	(Operator)	2.0
	(Operations)	1.0
	(Casing)	
	(Sampler/Lab)	3.0
mgmt		0.0
mgmt		6.0
	(WF Tech)	2.0
OP'S		1.0
OP'S		
	(Operator)	3.0
	(Operator)	9.0
	(WF Tech - MIT)	1.0
	(Geology)	0.0
mgmt		3.0
	(Lab)	3.0
mgmt		3.0
mgmt		1.0
	(WF - Const)	0.0
	(Swabbing)	3.0
	(MIT)	2.0
mgmt		1.0
OP'S		0.0
	(Casing)	3.0
	(Operator)	2.0

mst.

(Operator)	6.0
(MIT/WF Const)	0.0
(Backhoe)	1.0
(WF Tech)	2.0
(Geologist)	2.0
-	0.0
(Operator)	1.0

	DDE (mrem)
Maximum	9.0
Minimum	0.0
Average	2.1

3Q16

	Employee	DDE
		Dose (mrem)
OP'S	[Redacted] (WF Tech)	0.0
	[Redacted]	5.0
	[Redacted] (EHS)	0.0
	[Redacted] (Geologist)	0.0
	[Redacted] (Backhoe)	1.0
	[Redacted] (Operator)	3.0
	[Redacted] (Operator)	3.0
	[Redacted] (Operator)	4.0
	[Redacted] (Admin)	0.0
	[Redacted] (Operator)	1.0
	[Redacted] (Operations)	1.0
	[Redacted] (Casing)	
	[Redacted] (Sampler/Lab)	1.0
	[Redacted]	
OP'S	[Redacted]	2.0
OP'S	[Redacted] (WF Tech)	0.0
OP'S	[Redacted]	2.0
OP'S	[Redacted]	
	[Redacted] (Operator)	1.0
	[Redacted] (Operator)	4.0
	[Redacted] (WF Tech - MIT)	1.0
	[Redacted] (Geology)	0.0
Mgt.	[Redacted]	0.0
	[Redacted] (Lab)	0.0
Mgt.	[Redacted]	1.0
Mgt.	[Redacted]	1.0
	[Redacted] (WF - Const)	0.0
	[Redacted] (Swabbing)	4.0
	[Redacted] (MIT)	
Mgt.	[Redacted]	0.0
Mgt.	[Redacted]	0.0
	[Redacted] (Casing)	0.0
	[Redacted] (Operator)	2.0



mgt.

(Operator)	3.0
(MIT/WF Const)	0.0
(Backhoe)	0.0
(WF Tech)	0.0
(Geologist)	0.0
	0.0
(Operator)	4.0
(WF Const.)	2.0
(AP)	0.0

	DDE (mrem)
Maximum	5.0
Minimum	0.0
Average	1.2

As can be seen by the first three quarters, the summation of the maximum reported doses equals 18 mrem. Even assuming that the fourth quarter results will be the highest dose received (9 mrem in 2Q16), the maximum DDE for the year would be 27 mrem. This is less than 1% of the annual occupational dose limit in 20.1201(a). Additionally, there are no minors employed at the Ross Project, and due to the nature of the process there will not exist High or Very High Radiation Areas.

The extremely low doses received by employees at the Ross Project from external exposure are expected at modern ISR facilities. The processes employed by ISR facilities do not produce large sources of external radiation. The highest exposure level recorded at the Ross Project to date is <1 mrem. Additionally, the majority of personnel at the Ross Project does not work with radioactive material but rather perform administrative work or new wellfield construction. Of the personnel that do work with radioactive material, only those working in the processing plant are likely to receive any external exposure. For those working in wellfield construction, the personnel dosimeters introduce an occupational hazard if they get in the way of work or reduce visibility.

Therefore, as there is not a significant source of external exposure, and one year of data will have been obtained to verify the low doses expected to be received by work groups at the Ross Project, Strata proposes to reduce the number of personnel who will be wearing personnel dosimetry to survey the amount of dose received through external exposure. These work groups will include the operators as they have historically received the highest doses and are the most likely to be exposed to external radiation. Personnel who have offices in the plant or work in the plant (laboratory personnel) will also continue to be issued personnel dosimeters to monitor their exposure. The RSO and VP-Production will also continue to be issued personnel dosimeters as they are likely to spend time in the processing plant next to tanks. All other employees at the Ross project, including the long term contractors (drill rigs), will no longer be issued personnel dosimeters.

If the process or procedures change significantly at the Ross Project, if the 4Q16 results are significantly elevated, if the reported DDE indicates an increasing trend for personnel still issued dosimeters, or if the area monitor located in the Administration building demonstrates an increasing trend (currently reported as ND), Strata's RSO may decide to reissue dosimeters to various work groups to verify that external exposure monitoring is no longer needed for those work groups.



Memo

To: File
From: Michael Griffin
Cc:
Date: November 21, 2016
Re: External Exposure Monitoring for 2017

As discussed in Nikolas Roche's memo dated November 9, 2016, Strata has collected 4 quarters of external exposure monitoring data for all full time employees and a contract drilling crew. Results verify the low doses expected to be received by work groups at the Ross Project and the decision has been made to reduce the number of personnel who will be wearing personnel dosimetry to survey the amount of dose received through external exposure. These work groups will include the operators as they have historically received the highest doses and are the most likely to be exposed to external radiation. Personnel who have offices in the plant or work in the plant (laboratory personnel) will also continue to be issued personnel dosimeters to monitor their exposure. The RSO and VP-Production will also continue to be issued personnel dosimeters as they are likely to spend time in the processing plant next to tanks. All other employees at the Ross project, including the long term contractors (drill rigs), will no longer be issued personnel dosimeters.

The following personnel according to work group will continue to be issued external dosimetry beginning with Q1 2017:

Operations

[REDACTED]

Laboratory

[Redacted]

Radiation Safety/Safety Office

[Redacted]

[Redacted]