

**EARTH EXPLORATION, INC. (INDIANAPOLIS, IN)**  
**RADIATION SAFETY PROGRAM & PORTABLE NUCLEAR GAUGE AUDIT**  
**January 15, 2013**

**1.AUDIT HISTORY**

Inquiry	Yes	No	Remarks
a. Last audit of this location conducted on date <u>January 16, 2012</u>	X		11 <sup>th</sup> Audit. Audit process began January 15 and completed February 4, 2013. (wait for 4 <sup>th</sup> qtr dosimetry)
b. Were previous audits conducted yearly?	X		Yes, as of August 4, 2008
c. Were records of previous audits maintained?	X		Yes. Audits maintained on PC and in hard copy form.
d. Were any deficiencies identified during last two audits or two years, whichever is longer?	X		Other than simple records docs, no deficiencies noted by EEI or InstroTek (independent auditor)
e. Were corrective actions taken?	X		Yes

**2.ORGANIZATION AND SCOPE OF PROGRAM**

Inquiry	Yes	No	Remarks
a. If the mailing address or places of use changed, was the license amended?			Yes. Request for license renewal made in January, 2012. Received renewed license July, 2012 (Amendment No. 9)
b. If ownership changed or bankruptcy filed, was NRC prior consent obtained or was NRC notified?			N/A
c. If the RSO was changed, was license amended? Does new RSO meet NRC training requirements?	X		No RSO change.
d. If the designated contact person for NRC changed, was NRC notified?			No contact change.
e. Does the license authorize all of the NRC-regulated radionuclides contained in gauges possessed?	X		
f-1. Are the gauges as described in the Sealed Source and Device (SSD) Registration Certificate or Sheet? Have copies of (or access to)SSD Certificates?	X		
f-2. Have manufacturer's manuals for operation and maintenance?	X		
g. Are the actual uses of gauges consistent with the authorized uses listed on the license?	X		
h. Is RSO fulfilling his/her duties?	X		

**3.TRAINING AND INSTRUCTIONS TO WORKERS**

Inquiry	Yes	No	Remarks
a-1. Were all workers who are likely to exceed 100 mrem/yr instructed per [10 CFR 19.12]?	X		Exposure history of employees typically does not exceed 100 mrem/yr. ALARA and EEI radiation safety philosophy emphasized to workers.
a-2. Refresher training provided as needed [10 CFR 19.12]?	X		

b. Did each gauge operator attend an approved course prior to using gauges?	X		
c. Are training records maintained for each gauge operator?	X		
d. Did interviews with operators reveal that they know the emergency procedures?	X		Up-dates with operators performed on periodic basis throughout the year.
e. Did this audit include observations of operators using the gauge in a field situation? Operating gauge?	X		Multiple observations, interviews and discussions w/gauge operators performed by RSO and Asst. RSO(s) over the course of 2012. This type of activity occurs practically every work day gauges are used by the operators.
f-1. Performing routine cleaning and lubrication? f-2. Transporting gauge? f-3. Storing gauge?	X X X		Routine maint. by C. Loyd, D. Troutman, and G. Schuster. See section (e.) above regarding storage of gauges.
g. Did the operator(s) demonstrate safe handling and security during transportation, use and storage?	X		
h. HAZMAT training provided as required? [49 CFR 172.700, 49 CFR 172.701, CFR 172.702, 49 CFR 172.703, 49 CFR 172.704]	X X		Updates made in 2012, for necessary employees. Documented and filed.

#### 4.RADIATION SURVEY INSTRUMENTS

Inquiry	Yes	No	Remarks
a. If the licensee possesses its own survey meter, does it meet the NRC's criteria?	X		EEl maintains TroxAlert survey meter, Serial #61677. Meter calibrated Feb 3, 2012. Meter will be sent for recalibration February, 2013. (completed 2-22-13)
b. If the licensee does not possess a survey meter, are specific plans made to have one available?	N/A		
c. Is the survey meter needed for non-routine maintenance calibrated as required [10 CFR 20.1501]?	N/A		No non-routine maintenance performed.
d. Are calibration records maintained [10 CFR 20.2103(a)]?	X		Both hard copy and electronic files maintained.

#### 5.GAUGE INVENTORY

Inquiry	Yes	No	Remarks
a. Is a record kept showing the receipt of each gauge? [10 CFR 30.51(a)(1)]	X		
b. Are all gauges received physically inventoried every six (6) months?	X		Physical inventories have been performed as required. Last performed January 10, 11, 2013.
c. Are records of inventory results with appropriate information maintained?	X		Hard copy and electronic files maintained.

#### 6.PERSONNEL RADIATION PROTECTION

Inquiry	Yes	No	Remarks
a. Are ALARA considerations incorporated into the radiation protection program? [10 CFR 20.1101(b)]	X		ALARA philosophy constantly emphasized to gauge operators.

b. Is documentation kept showing that unmonitored users receive $\leq 10\%$ of limit? [10 CFR 20.1502(a)]	X		Survey w/ calibrated meter performed and area dosimeter maintained for soil lab techs at part-time work station close to gauge storage area as supplement to public dose calculations.
c. Did unmonitored users' activities change during the year which could put them over 10% of limit?		X	
d. If yes to c. above, was a new evaluation performed?			N/A
e. Is external dosimetry required (user receiving $>10\%$ of limit)? And is dosimetry provided to users?  1) Is the dosimetry supplier NVLAP approved? [10 CFR 20.1501(c)] 2) Are the dosimeters exchanged quarterly for film badges and at industry recommended frequency for TLDs? 3) Are dosimetry reports reviewed by the RSO when they are received? 4) Are the records NRC Forms or equivalent? [10 CFR 20.2104(d), 10 CFR 20.2106(c)] • NRC-4 "Cumulative Occupational Exposure History" completed? • NRC-5 "Occupational Exposure Record for a Monitoring Period" completed? 5) If a worker declared her pregnancy, did licensee comply with 10 CFR 20.1208? • Were records kept of embryo fetus dose per 10 CFR 20.2106(e)?	X  X X X  X X		Reviewed and signed by RSO upon receipt of reports.      N/A. No pregnant employees working with gauges.
f. Are records of exposures, surveys, monitoring and evaluations maintained [10 CFR 20.2102, 10 CFR 20.2103, 10 CFR 20.2106]?	X		

## 7.PUBLIC DOSE

Inquiry	Yes	No	Remarks
a. Are gauges stored in a manner to keep doses below 100 mrem in a year? [10 CFR 20.1301(a)(1)]	X		
b. Has a survey or evaluation been performed per 10 CFR 20.1501(a)? Have there been any additions or changes to the storage, security or use of surrounding areas that would necessitate a new survey or evaluation?	X	X	Recent survey performed w/TroxAlert survey meter. Area dosimetry supplement pdc's and that public doses are $<100$ mrem/yr. Area badge yearly dose equivalent = 88-91-87 mrems.
c. Do unrestricted area radiation levels exceed 2 mrem in any one (1) hour? 10 CFR 20.1301(a)(2)]		X	No, based on information above and surveys performed in 2012. Area badge provided for soil lab as supplement to public dose calculations.
d. Are gauges being stored in a manner that would prevent unauthorized use or removal? [10 CFR 20.1801]	X		Means and methods of in-house security same in 2012. Access to storage room only by authorized gauge operators. Others escorted by authorized gauge operators.
e. Records maintained? [10 CFR 20.2103, 10 CFR 20.2107]	X		

## 8. OPERATING AND EMERGENCY PROCEDURES

Inquiry	Yes	No	Remarks
a. Have operating and emergency procedures been developed?	X		Discussion with gauge operators made periodically throughout 2012.
b. Do they contain the required elements?	X		
c. Does each operator have a current copy (telephone numbers) of the operating and	X		
d. emergency procedures?	X		
e. Did any emergencies occur? If so, and were they handled properly by operator? Were appropriate corrective actions taken?		X	

## 9. LEAK TESTS

Inquiry	Yes	No	Remarks
a. Was each sealed source leak tested every 12 months or at other prescribed intervals? Six month testing frequency required and performed for (older) Model 3411 gauges.	X		Leak tests performed January & July 2012, and results received from Troxler Labs. All test results <185Bq (0.005 uCi).
b. Was the leak test performed as described in correspondence with NRC and according to the license?	X		
c. Are records of results retained with the appropriate information included?	X		Test results maintained in individual gauge files and electronically also.
d. Were any sources found leaking and if yes, was NRC notified?		X	All test results < 185 Bq (0.005 uCi).

## 10. MAINTENANCE OF GAUGES

Inquiry	Yes	No	Remarks
a. Are manufacturer's procedures followed for routine cleaning and lubrication of gauge?	X		
b. Does the source or source rod remain attached to the gauge during cleaning?	X		
c. Is non-routine maintenance performed where the source or source rod is detached from the gauge? If yes, was it performed according to license requirements (e.g., extent of work, individuals performing the work, procedures, dosimetry, survey instrument, compliance with 10 CFR 20.1301 limits?		X	No non-routine service performed by EEI. If necessary this service is provided by manufacturer of gauge, or InstroTek of Grand Rapids, Michigan.

## 11. TRANSPORTATION

Inquiry	Yes	No	Remarks
a. DOT-7A or other authorized packages used? [49 CFR 173.415, 49 CFR 173.416(b)]	X		EEI's improved security during transportation of gauges includes use of steel "jobsite" boxes, bolted to the beds of pickup trucks.

b. Package performance test records on file?	X		
c. Special form sources documentation? [49 CFR 173.476(a)]	X		Source certificates filed in hard copy files and electronically.
d. Package has 2 labels (ex. Yellow-II) with TI, Nuclide, Activity, and Hazard Class? [49 CFR 172.403, 49 CFR 173.441]	X		Maintenance of labels is performed as necessary. Heavy transparent tape used to protect labels from premature wear.
e. Package properly marked? [49 CFR 172.301, 49 CFR 172.304, 49 CFR 172.310, 49 CFR 172.324]	X		
f. Package closed and sealed during transport? [49 CFR 173.475(f)]	X		
g. Shipping papers prepared and used? [49 CFR 172.200(a)]	X		
h. Shipping papers contain proper entries? {Shipping name, Hazard Class, Identification Number (UN Number), Total Quantity, Package Type, :Nuclide, RQ, Radioactive Material, Physical and Chemical Form, Activity, category of label, TI, Shipper's Name, Certification and Signature, Emergency Response Phone Number, Cargo Aircraft Only (if applicable)} [49 CFR 172.200, 49 CFR 172.201, 49 CFR 172.202, 49 CFR 172.203, 49 CFR 172.204, 49 CFR 172.604]	X		
i. Shipping papers within drivers reach and readily accessible during transport? [49 CFR 177.817 (e)]	X		
j. Secured against movement? [49 CFR 177.834]	X		As improvement to security and movement, in most of our trucks, EEI uses the steel, locking security boxes noted above. When gauges are not transported in the steel boxes, they are secured to the trucks with steel cables, robust chains and ratchet straps to prevent theft/movement during transportation.
k. Placarded on vehicle, if needed? [49 CFR 172.504]			N/A
l. Proper overpacks, if used? [49 CFR 173.25]			N/A
m. Any incidents reported to DOT? [49 CFR 171.15, 16]		X	

## 12.AUDITOR'S INDEPENDENT SURVEY MEASUREMENTS (IF MADE)

Inquiry	Yes	No	Remarks
a. Describe the type, location and results of measurements. Do any radiation levels exceed regulatory limits?		X	Based on previous surveys with TroxAlert survey meter, readings of <0.06 to 0.16 mrem/hr obtained in unrestricted areas. New survey performed 1-15-13 yielded same result.

### 13. NOTIFICATION AND REPORTS

Inquiry	Yes	No	Remarks
a. Was any radioactive material lost or stolen? Were reports made? [10 CFR 20.2201, 10 CFR 30.50]		X	
b. Did any reportable incidents occur? Were reports made? [10 CFR 20.2202, 10 CFR 30.50]		X	
c. Did any overexposures and high radiation levels occur? Reported? [10 CFR 20.2203, 10 CFR 30.50]		X	
d. If any events (as described in items a through c above) did occur, what was root cause? Were corrective actions appropriate?		N/A	
e. Is the licensee aware of telephone number for NRC Emergency Operations Center? [(301) 816-5100]	X		Posting on (2) Bulletin Boards.

### 14. POSTING AND LABELING

Inquiry	Yes	No	Remarks
a. NRC-3 "Notice to Workers" posted? [10 CFR 19.11]	X		Posting on Bulletin Boards.
b. NRC regs., license documents posted or a notice posted? [10 CFR 19.11, 10 CFR 21.6]	X		
c. Other posting and labeling? [10 CFR 20.1902, 10 CFR 20-1904]	X		

### 15. RECORD KEEPING FOR DECOMMISSIONING

Inquiry	Yes	No	Remarks
a. Records kept of information important to decommissioning? [10 CFR 30.35(g)]	X		No decommissioning performed in 2012.
b. Records include all information outlined in [10 CFR 30.35(g)]?	X		

### 16. BULLETINS AND INFORMATION NOTICES

Inquiry	Yes	No	Remarks
a. NRC Bulletins, NRC Information Notices, NMSS Newsletters, received?	X		All correspondence from NRC maintained in files at Indianapolis office.
b. Appropriate training and action taken in response?	X		

### 17. SPECIAL LICENSE CONDITIONS OR ISSUES

Inquiry	Yes	No	Remarks
a. Did auditor review special license conditions or other issues (e.g., non-routine maintenance)?	X		No special license conditions or issues.

## 18. DEFICIENCIES IDENTIFIED IN AUDIT; CORRECTIVE ACTIONS

Inquiry	Yes	No	Remarks
a. Summarize problems/deficiencies identified during audit.	X		No deficiencies found.
b. If problems/deficiencies identified in this audit, describe corrective actions planned or taken. Are corrective actions planned or taken at ALL licensed locations (not just location audited)?	X		
c. Provide any other recommendations for improvement.			Continue to self scrutinize the RSP and administer in diligent manner, in order to create a safety culture as desired by EEI and the NRC.

## 19. EVALUATION OF OTHER FACTORS

Inquiry	Yes	No	Remarks
a. Senior licensee management is appropriately involved with the radiation protection program and/or Radiation Safety Officer (RSO) oversight?	X		Management involvement with RSP continues to be diligent. Quarterly, bi-yearly and yearly correspondence as a means of checks and balances occurs between management and RSO. This includes the requirements of a Confirmatory Order (CO) as a result of the Alternative Dispute Resolution (ADR) with the NRC, August 2009. The CO requires special activities and correspondence with the NRC by EEI over the course of five years. These activities and correspondence are required of both management and the RSO. To-date, all requirements of the CO has been met by EEI.
b. RSO has sufficient time to perform his/her radiation safety duties?	X		
c. Licensee has sufficient staff to support the radiation protection program?	X		

Audit performed by Christopher S. Loyd, RSO

Route To: R. Olson \_\_\_\_\_