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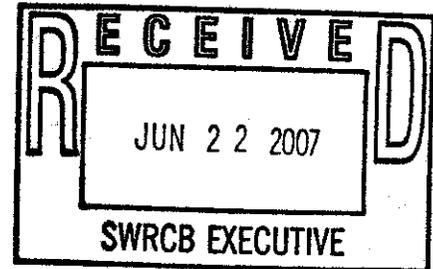
J. WILLIAM YEATES

6/12/07 Workshop
Suction Dredge
Deadline: 6/22/07 Noon

KEITH G. WAGNER
JASON R. FLANDERS

June 21, 2007

Song Her, Clerk to the Board
State Water Resources Control Board, Executive Office
P.O. Box 100
Sacramento, CA 95812-0100



Re: Comment Letter – Suction Dredge Mining.

Dear Ms. Her:

Per the State Water Resources Control Board's ("SWRCB") May 15, 2007 notice requesting comments regarding the effects of suction dredge mining on water quality, I hereby submit the following comments on behalf of our client, Friends of the North Fork and its members. The following comments supplement, and do not otherwise replace or supersede, previous oral and written comments made by this office, or Friends of the North Fork on its own behalf, regarding this matter, including the oral testimony, and written comments and exhibits that Friends of the North Fork presented to SWRCB at its public hearing on this matter on June 12, 2007.

I. SWRCB KNOWS THAT SUCTION DREDGING IS ILLEGAL IN CALIFORNIA.

The SWRCB's notice requesting comments on water quality impacts expressly acknowledges that, in 2000, the regional Clean Water Act section 404 permit and the section 401 State certification that, at one time, authorized suction dredging on some Waters of the United States within the State of California, expired.

Put plainly: SWRCB knows, and has publicly announced, that the operation of a suction dredge on Waters of the United States anywhere within the State of California is illegal.

Despite this fact, suction dredge operators persist in their illegal dredging activities, asserting that they are operating "lawfully" because the California Department of Fish and Game ("CDFG") continues to issue permits to them, despite the fact that no Clean Water Act permits exists to support the issuance of such permits. CDFG's ongoing issuance of suction dredge permits can, has, and continues to, directly aid and abet illegal suction dredging activities on rivers and streams under the SWRCB's Clean Water Act jurisdiction.

As additional legal background on this point, we have attached, as Exhibit 1 to this letter, a copy of an August 2006 decision by the Oregon United States District Court in which the court found that suction dredge mining activities that may result in discharges of pollutants into navigable waters are a violation of the Clean Water Act, and granted summary judgment halting such mining activities, because no CWA section 401 certification existed.

Accordingly, Friends of the North Fork requests that SWRCB *immediately* issue a cease and desist order prohibiting CDFG from any further issuance of suction dredge permits unless and until the applicant can demonstrate the existence of the necessary Clean Water Act section 404 permits and State 401 certification required for such activities.

II. SWRCB KNOWS THAT SUCTION DREDGING IS POISONING THE STATE'S WATERWAYS.

Among the exhibits submitted to SWRCB by our clients at the June 12, 2007 workshop is a May 2005 SWRCB report documenting SWRCB's own tests of a suction dredge in a mercury "hot spot" in the South Fork of the American River. A sidebar, at page 6 of SWRCB's 2005 report, provides the following conclusions:

Results – Laboratory Data: ALS Chemex reported that the mercury content of the samples received exceeded the upper detection limit of the analysis used and did not reanalyze the samples. As a result, the Frontier Geosciences analyses were used for this report. The bulk sample mercury concentration was 1,170 ppm; the mercury concentration of the sediment captured by the dredge was 1,550 ppm, and the mercury concentration of the sediment lost by the dredge was 240 ppm. The suspended sediment sample mercury concentration was 298 ppm. Note that these mercury concentrations are quite high. **Mercury concentrations of the waste and suspended sediment are over an order of magnitude higher than the minimum concentration necessary for classification as a California hazardous waste (20 mg/kg).** The suspended sediment's high mercury content is problematic because after resuspension by dredging, it can be carried long distances by stream current. (emphasis in original.)

The report, at page 10, goes on to conclude, among other things:

It is unacceptable to encourage suction dredgers to "clean up" mercury hotspots because dredges release too much mercury in transportable forms. There may be other reasons to discourage suction dredging of mercury hotspots once the bioavailability of floured mercury becomes known. It would be advisable for land management agencies to contact dredgers through their clubs and discourage them from trying to dredge liquid mercury from in-river hotspots on public lands. Removing mercury with hand operated suction tubes, or better yet, reporting hotspots to land management agencies is a better strategy.

Since 2005 SWRCB has known that suction dredging on rivers where mercury hotspots are known to occur, poisons California's waterways. Holding this workshop, two years later, to "evaluate a possible further course of action" is not an adequate response. It is time for SWRCB to take corrective action to prevent this documented and known public health risk.

As further background on this point, we are attaching as Exhibit 2 to this letter, a copy of the Wyoming Department of Environmental Quality's guidelines for recreational gold dredging. At page 3, these guidelines contain the following provision: "Due to mercury in the stream sediments from historic mining operations, *no activities are allowed in Rock and Willow Creeks in the upper Sweetwater River drainage.*" (emphasis in original.)

In light of the fact that suction dredging is presently illegal in the State of California in the first instance (see Part I, *supra*), it would hardly seem an imposition for SWRCB to order that suction dredging activity in the State must be suspended until SWRCB can ensure that the necessary Clean Water Act permits are in place, with appropriate conditions to ensure that such activities do not turn the State's waterways into flowing rivers of hazardous waste.

III. SWRCB KNOWS THAT SUCTION DREDGE OPERATORS ARE ILLEGALLY ACCUMULATING, TRANSPORTING, STORING AND DISPOSING OF HAZARDOUS WASTE.

At the SWRCB's workshop on June 12, 2007, numerous suction dredge operators affirmatively testified that they 1) accumulate and 2) remove mercury from the river environment as part of their operations.

Mercury is a hazardous waste that cannot lawfully be accumulated, transported, stored or disposed of in the State without appropriate hazardous waste permits. No program exists for suction dredge operators to properly permit or dispose of the mercury that they accumulate as part of their operations.

SWRCB knows that suction dredging is illegal in the State (see Part I, *supra*). The operation of suction dredges in streams where mercury is present is poisoning California's waterways (see Part II, *supra*). And, SWRCB has now been informed, by the suction dredge operators themselves, that the byproduct of such illegal activities is the illegal accumulation, transport, storage and disposal of hazardous waste without required permits.

As just one illustration of the attitudes of suction dredge miners toward the hazards of mercury toxicity, we have attached as Exhibit 3 to this letter, instructions from "Basement Chemistry For The Prospector," in which the author advises his readers that mercury "has taken a very bad rap at the hands of the do-gooders whose only knowledge of, or experience with it is that they once took their temperature with a rectal thermometer." He goes on to advise readers how to recover gold from mercury, acid and caustic solutions because he believes there might be some "things that I don't want to pour down the sink" with the solutions.

Again, these alarming circumstances indicate that SWRCB must *immediately* issue a cease and desist order to CDFG to prohibit the issuance of suction dredge permits until hazardous waste permitting and disposal programs are developed and implemented in conjunction with the California Department of Toxic Substance Control ("DTSC") to address this additional, illegal aspect of ongoing suction dredging activities in the State.

IV. SWRCB OWES A PUBLIC TRUST DUTY TO HALT ILLEGAL SUCTION DREDGING, NOW.

In January of 2007, Friends of the North Fork submitted to SWRCB a legal memorandum and exhibits demonstrating the illegality of suction dredging activity in the State due to inconsistency with, and the lack of any required permits, under a broad range of state and federal laws. Friends of the North Fork hereby incorporates the entirety of that memorandum and its exhibits, which is already in the SWRCB's possession, into SWRCB's record of proceedings in this matter, and into this letter as if set forth in full.

Friends of the North Fork's legal memorandum demonstrates that the State, and SWRCB by extension, owes a duty under the Public Trust Doctrine, to protect the State's waterways for the use and enjoyment of *all* the people of the State, including an affirmative duty to protect the biological integrity of the aquatic environment of the State's waterways. (*National Audubon Society v. Superior Court* (1983) 33 Cal.3d 419; *Marks v. Whitney* (1971) 6 Cal.3d 251).

Moreover, SWRCB's Public Trust duty to protect California's waterways supersedes any claim of "rights to mine" under the federal 1872 General Mining Law. When California was granted statehood in 1850 the federal government did not expressly reserve to itself the beds of the navigable waters within California. Thus, in granting California statehood, the federal government ceded control over such resources to the State under the Equal Footing Doctrine. (*Pollards Lessee v. Hagan* (1845) 44 U.S. 212.) Accordingly, the federal 1872 General Mining Law, which was enacted twenty-two ("22") years *after* the State assumed trusteeship over its rivers and streams, cannot, and does not, "authorize" otherwise illegal suction dredging activities in the State. (*Utah v. United States* (1971) 409 U.S. 9.)

V. CONCLUSION

The State's public agencies, including SWRCB and CDFG, owe a mandatory, trustee duty under the Public Trust Doctrine to maintain and regulate the use of the beds of the State's navigable waters in a manner that ensures the protection of public health and safety, and that maintains the Public Trust values of the State's waterways for *all* of the People of the State. At this time, the only colorable authority that remotely supports continued suction dredging in California's rivers and streams is CDFG's continued and persistent issuance of suction dredging permits, despite the patent and gross illegality of such activities under *all* applicable laws.

Friends of the North Fork appreciates SWRCB's decision to hold a workshop regarding water quality impacts associated with suction dredging, and this opportunity to present its views. However, as a matter of law and the State's mandatory trustee duties over the resources in question, far more immediate and decisive action is required.

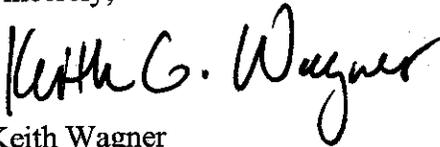
Song Her

June 21, 2007

Page 5 of 5

SWRCB knows that suction dredging 1) is illegal, 2) is poisoning the State's waterways, and 3) is a clear and present danger to public health and safety, due to the unregulated accumulation, transport, storage and disposal of hazardous waste byproducts associated with suction dredging. Thus, as SWRCB moves forward with considering how to address already known adverse water quality impacts, an *immediate* cease and desist order must be issued to CDFG, ordering that no further suction dredge permits may be issued, until the necessary regulatory frameworks and permits are developed and implemented under applicable state and federal laws, to ensure proper protections for public health and safety, and the integrity of the State's waters.

Sincerely,



Keith Wagner

cc w/ January 2007 legal memorandum and exhibits:

Edmund G. Brown, Jr., Attorney General, State of California

Mike Chrisman, Secretary, California Resources Agency

Linda Adams, Secretary for Environmental Protection, California Environmental Protection Agency

Ryan Broddrick, Director, California Department of Fish and Game

Maureen F. Gorsen, Director, California Department of Toxic Substances Control

Paul D. Thayer, Executive Officer, California State Lands Commission

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF OREGON

HELLS CANYON PRESERVATION
COUNCIL, EARTHWORKS, and
NORTHWEST ENVIRONMENTAL
DEFENSE CENTER,
Plaintiffs,

CV. 05-1057-PK

OPINION AND
ORDER

v.

RICHARD J. HAINES, STEVE ELLIS,
and UNITED STATES FOREST SERVICE,
Defendants.

PAPAK, Magistrate Judge:

Plaintiffs challenge the Record of Decision (ROD) for the North Fork Burnt River Mining Project (Project) in the Wallowa-Whitman National Forest (WWNF) in Eastern Oregon. Plaintiffs allege the U.S. Forest Service (Forest Service) violated the National Forest Management Act (NFMA), 16 U.S.C. §§ 1600 *et seq.*, the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321 *et seq.*, the Clean Water Act (CWA), 33 U.S.C. § 1251 *et seq.*, the Forest Service Organic Administration Act of 1897 (Organic Act), 16 U.S.C. § 478, 551, and the

Administrative Procedures Act (APA), 5 U.S.C. §§ 501-701.¹ This court has jurisdiction under 28 U.S.C. § 1331.

On April 7, 2004, the Forest Service issued the Record of Decision selecting Alternative 4 from the Final Environmental Impact Statement (FEIS) for this Project. Plaintiffs filed an administrative appeal with the Forest Service, and notified the Forest Service of their intent to sue in a 60-day notice letter as required under the CWA. Plaintiffs filed their complaint with this court on July 7, 2005, and moved for summary judgment on January 27, 2006. Defendants filed a cross-motion for summary judgment. Oral argument was held on May 1, 2006. For the reasons set forth below, plaintiffs' motion for summary judgment is granted as to claims under the Clean Water Act, the Organic Act and the National Forest Management Act. Defendants' motion for summary judgment is granted as to claims under the National Environmental Policy Act.

LEGAL STANDARD

A party is entitled to summary judgment as a matter of law if "the pleadings, depositions, answers to interrogatories, and admissions on file, together with affidavits, if any, show there is no genuine issue as to any material fact." Fed. R. Civ. P. 56(c); Bahn v. NME Hosp's, Inc., 929 F.2d 1404, 1409 (9th Cir. 1991).

Because NFMA and NEPA do not provide a private cause of action to enforce their provisions, agency decisions allegedly violating NFMA and NEPA are reviewed under the APA, 5 U.S.C. § 706. Native Ecosystems Council v. U.S. Forest Service, 428 F.3d 1233, 1238 (9th Cir.

¹Defendants Richard Haines and Steve Ellis are sued in their official capacity as a WWNF unit ranger and WWNF forest supervisor. For clarity, defendants will be referred to as the Forest Service.

2005) (citing Neighbors of Cuddy Mountain v. Alexander, 303 F.3d 1059, 1065-1067 (9th Cir. 2002)). Plaintiffs' claims under the Organic Act and § 313 of the CWA are also governed by the APA. Under the APA, a court may set aside an agency decision if it is "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." 5 U.S.C. § 706(2)(A). An agency's action is arbitrary and capricious "if the agency fails to consider an important aspect of the problem, if the agency offers an explanation that is contrary to the evidence, . . . or if the agency's decision is contrary to the governing law." Lands Council v. Powell, 395 F.3d 1019, 1026 (9th Cir. 2005).

Review under this standard is to be searching and careful, but remains narrow, and a court should not substitute its judgment for that of the agency. Mt. Graham Red Squirrel v. Espy, 986 F.2d 1568, 1571 (9th Cir. 1993) (citing Marsh v. Oregon Natural Resources Council, 490 U.S. 360, 378 (1989)). Deference to an agency's technical expertise and experience is particularly warranted with respect to questions involving scientific matters. United States v. Alpine Land and Reservoir Co., 887 F.2d 207, 213 (9th Cir. 1989), cert. denied, 498 U.S. 817 (1990).

Plaintiffs' claim under CWA § 401 arises under the citizen suit provision of the CWA, and not the APA. 33 U.S.C. § 1365(a)(1). Under CWA § 401, an agency that issues a permit without proper certification is in violation of the certification requirement and therefore in violation of the CWA. 33 U.S.C. § 1341; Oregon Natural Desert Ass'n v. Dombeck, 172 F.3d 1092, 1095 (9th Cir. 1998).

FACTUAL BACKGROUND

The North Fork Burnt River (NFBR) watershed is located in the Blue Mountains of

Eastern Oregon in the Wallowa-Whitman National Forest (WWNF). Gold mining in the area began in the 1860s and has continued with some gaps to the present. Miners are required, under the Forest Service's mining regulations, to submit a Plan of Operations (PoO) for agency review and approval prior to conducting certain mining operations on federal lands. At the time the ROD was issued, 34 mining PoOs had been approved. Some were approved in the early 1980s and many have no expiration dates. The parties dispute whether 15 additional mining operations will be approved and begin operations based on provisions in the ROD.

Five streams in the watershed have been listed as water-quality impaired under § 303(d) of the Clean Water Act due to high temperatures and/or sedimentation. Three of these streams are involved in this matter in that nineteen projects detailed in the ROD are or will be located on these three streams. The ROD identifies the following activities as negatively affecting water quality in the watershed: timber harvest, road building, and mining. Redband trout, Columbia spotted frog² and three plant species that exist in the area are all on the Regional Forester's list of sensitive species. There are 747 miles of road—some open, some closed—in the watershed, mostly built to serve mining operations. The NFBR Roads Analysis identified 241 of these miles as contributors to water quality problems. Road densities throughout the NFBR watershed exceed road density limitations established in the Forest Plan. If all 49 projects in the FEIS are approved, the mining operations will disturb 116 acres in the WWNF, 64 of them in riparian areas.

The mining operations in question include placer mining, suction dredge mining, and lode mining. Typical placer mining operations pass gravel, sand and other substrate over a

²The Columbia spotted frog is also a candidate for the Endangered Species List.

gravity-separation device called a sluice box and, by running water over the gold-bearing dirt, separate gold and other heavy metals from gravel known as overburden. Suction dredge mining vacuums silt, sand and small gravels from the streambed, passes the gravel and other materials through a dredge machine in order to filter out the gold, and then discharges gravel, sand and silt back into the river. Lode mining extracts minerals from a lode, vein, ledge or other rock in place between walls or boundaries. Some mining operations take place within the streambeds themselves.

On April 7, 2004, the Forest Service issued the ROD. The purpose and need for the Project is to address: 1) the unforeseen and changed conditions in the NFBR watershed that did not exist or were not recognized at the time approvals were granted to the currently approved PoOs; 2) the submission of amendments to some these existing PoOs; 3) submission of several new proposed PoOs; 4) the Forest Service's responsibility to approve or require modifications to these existing and proposed PoOs in accordance with federal mining and environmental laws; and 5) the concern that several reaches of the North Fork Burnt River and its tributaries do not meet state water quality standards for temperature and sediment. AR 07936; ROD at 1. Those reaches are listed as impaired under § 303(d) of the CWA, placing responsibility on the Forest Service to address the impaired waterways and develop strategies that will improve water quality. The NFBR Roads Analysis indicates that roads are a primary contributor to water quality degradation. The FEIS was prepared to disclose cumulative environmental impacts and determine possibilities for mitigating those impacts resulting from mining activities.

The Forest Service prepared a single FEIS to establish the requirements for all 49 mining operations at issue. Plaintiffs allege that the Forest Service thereby "authorized" 49 Plans of

Operations in a single document, the ROD. The Forest Service states that individual PoOs must be approved under the agency's mining regulations but admits that, so long as the PoOs conform to the requirements established in the FEIS and the ROD, the PoOs will be approved. Since issuing the ROD, the Forest Service has approved at least 29 PoOs. None of the operators of the 29 mining projects applied to the state Department of Environmental Quality (DEQ) for § 401 certification under the Clean Water Act.

ANALYSIS

I. Clean Water Act

The CWA establishes a comprehensive program "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters" by reducing and eventually eliminating the discharge of pollutants into those waters. 33 U.S.C. § 1251(a). The CWA program includes a complex regulatory scheme of permits, technology controls, and water quality-based pollution controls.

The CWA prohibits all discharges of pollutants from point sources into navigable waters, unless such discharges are authorized pursuant to a CWA permit. 33 U.S.C. § 1311(a). A point source is any "discernable, confined, and discrete conveyance." 33 U.S.C. § 1362(14). The CWA regulates point source discharges through the section 402 National Pollutant Discharge Elimination System (NPDES) permit program, which applies to the discharges of pollutants, and through the section 404 permit program for dredge and fill activities. 33 U.S.C. §§ 1342, 1344.

States are responsible for developing water quality standards to protect the desired conditions of each waterway within the state's regulatory jurisdiction. 33 U.S.C. § 1313(c). A water quality standard includes three elements: 1) one or more designated uses, such as fish

propagation; 2) numeric and narrative criteria specifying the water quality condition necessary to protect the designated uses; and 3) an antidegradation policy that ensures that uses are protected and that high quality waters will be maintained and protected. 33 U.S.C. § 1313(c)(2), 1313(d)(4)(B); 40 C.F.R. §§ 131.6, 131.10-12. Waterbodies that do not meet water quality standards are deemed "water quality-limited" and placed on the CWA's § 303(d) list. States must develop total maximum daily loads (TMDLs) for all § 303(d)-listed waterbodies in order to bring them back into compliance with applicable water quality standards. In Oregon, § 303(d)-listed waterways are subject to the state's antidegradation policy which prevents new or increased pollution and further degradation of water quality. OAR 340-041-0004(1), (7).

A. CWA § 401

Section 401 provides: "Any applicant for a Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters, shall provide the licensing or permitting agency a certification from the State in which the discharge originates or will originate . . . that any such discharge will comply with the applicable provisions of [the Clean Water Act]." 33 U.S.C. § 1341(a)(1). Federal agencies are thereby prohibited from issuing federal licenses or permits until applicants have obtained certification from the state that discharges resulting from federally permitted activities will conform to the CWA's permitting and water quality requirements. Id.

Plaintiffs argue that the Forest Service violated the CWA when it authorized Plans of Operations without first requiring the applicants for those PoOs to obtain § 401 certifications. Plaintiffs contend that approval of a PoO amounts to a federal license or permit to conduct mining activities, and that mining operations may result in discharges into navigable waters, thus

triggering a need for § 401 certification. The Forest Service argues that the challenged ROD is neither a license nor a permit because there are significant steps that will occur between the issuance of the ROD and final approval of a PoO by the Forest Service, at which time the miner may commence operations. However, the Forest Service does not dispute that 29 of the PoOs detailed in the ROD have been approved by the Forest Service and that no § 401 certifications were required prior to those approvals. The Forest Service does not dispute that mining activities may result in discharges into navigable waters.³

While the Forest Service disputes whether the ROD is a license or permit that would trigger § 401, it is undisputed that the Forest Service has approved and will continue to approve PoOs without first requiring applicants to receive § 401 certification from the State of Oregon. AR 8365. Section 401 intends state certification to precede approval of a discharge-causing activity by a federal agency. California Trout, Inc. v. FERC, 313 F.3d 1131, 1138 (9th Cir. 2002), cert. denied, 540 U.S. 818 (2003); Natural Resources Def. Council v. U.S. EPA, 279 F.3d 1180, 1183 (9th Cir. 2002); Ackels v. U.S. EPA, 7 F.3d 862, 865-67 (9th Cir. 1993). The agency's responsibility under the CWA is clear and, as here, the Forest Service has not complied with the § 401 requirement of certification prior to permitting miners to begin mining operations. See 33 U.S.C. § 1341(a)(1) ("No license or permit shall be granted until the certification required by this section has been obtained[.]"). Regardless of how the permit or licensing process is defined, the record shows, and the Forest Service admitted at oral argument, that it has not and will not

³In its reply brief, the Forest Service's contends numerous factual issues exist regarding whether activities identified in the PoOs "will or could" result in discharges to waters of the U.S. Defendant's reply at 1-2. However, the relevant inquiry is whether the activities "may" result in discharges to waters of the U.S. and plaintiffs provide sufficient factual support that the mining activities in question may result in such discharges. Plaintiffs' memo at 17-21.

require § 401 certification prior to final approval of PoOs. Thus, mining activities that may result in discharges of pollutants into navigable waters will commence without § 401 certification, a violation of the CWA. Plaintiffs' motion for summary judgment on the issue of § 401 certification is granted.

B. CWA § 313

Section 313 requires all federal agencies to comply with water quality standards, including a state's antidegradation policy. 33 U.S.C. § 1323(a). Federal agencies must ensure that any authorized activity on federal lands complies with all applicable water quality standards. See Idaho Sporting Congress v. Thomas, 137 F.3d 1146, 1153 (9th Cir. 1998); National Wildlife Federation v. U.S. Army Corps of Engineers, 384 F.3d 1163, 1167 (9th Cir. 2004).

Plaintiffs argue that by using the ROD and the FEIS to describe substantive requirements that each PoO would need to incorporate to receive agency approval, the ROD violates § 313 because it fails to include provisions sufficient to ensure compliance with state water quality standards. The Forest Service argues that the mining projects will maintain water quality and not degrade existing beneficial uses of the waterways. Plaintiffs point to the fact that the Forest Service has approved additional mining operations in waters that are on Oregon's § 303(d) list as water-quality limited for sedimentation, and that Oregon's antidegradation policy does not allow further degradation through new or increased discharges. OAR 340-041-004(7).⁴ The FEIS provides sufficient evidence that the mining operations in question will result in discharges to waterways. The Forest Service does not dispute plaintiffs' assertion that discharges will result

⁴Three § 303(d) listed streams are involved in this matter. Total maximum daily loads (TMDLs) have not been established for these streams.

from the mining operations.

According to the FEIS, mining activities have heavily impacted § 303(d)-listed streams and are a primary cause of the listings, based on a correlation between sediment production and historic mining activities. AR 08121, 08132-34. However, the Forest Service contends that some additional sediment reaching these streams does not violate Oregon law as long as there is no further degradation of water quality. While the Forest Service points to references in the FEIS that address water quality concerns, its reassurances fall flat based on the history of mining's effects on the streams in question, and the admission in the FEIS that mining operations could contribute to fish habitat degradation in downstream fish-bearing reaches. AR 08144; FEIS III-64. Based on the extreme degradation already present in these water quality-impaired stream segments, filtering buffers, silt fences and stream buffers may not provide adequate protection from significant, new sediment loads. For that matter, the Forest Service acknowledges that several mining-related activities will contribute sediment to the waterways within riparian areas, e.g. stream crossings, check dams, and roads. Specifically, the Forest Service admits that suction dredging causes discharges to streams. See Def's Reponse to Pl's CSF ¶ 11. This court cannot find support in the record for the Forest Service's position that implementation of the requirements to the PoOs as outlined in Alternative 4 of the ROD will protect water quality and result in no measurable increase in sedimentation. This court finds the Forest Service's decision to allow new mining operations on § 303(d)-listed streams arbitrary and capricious.

The Forest Service argues that Alternative 4's contemplation of road closures and decommissionings will reduce road-related sedimentation and improve water quality.

Alternative 4 proposes the following activities to forest system roads recognized as contributing to water degradation: closing approximately 63 miles of roads currently used for mining access, maintenance on approximately 15 miles of roads, reconstructing approximately 24 miles of roads, and decommissioning approximately 11 miles of roads. AR 8057; FEIS II-39. Roads are the largest contributor of activity-generated sediment in the watershed. AR 7950; ROD at 15.

The Forest Service contends that road-related sediment reduction activities will likely compensate for whatever sediment escapes as a result of mining activities. This court disagrees and notes the prospective nature of the road-related projects. The FEIS states that most road closures and decommissionings will not occur until roads are no longer need for mining. The timing of those projects is, at best, uncertain. Mining, once started, may continue for many years. Also, while the Forest Service had some funding available for some road-related activities at the time the ROD was signed, it is unclear when the balance of the funding would become available. AR 07953; ROD at 18. Finally, the dispute as to whether the road-related activities can compensate for degradation attributed to mining activities is a question this court need not resolve in that the Forest Service does not submit that the road-related activities bring mining activities into compliance with Oregon law. Def's Memo at 19 (describing road-related sediment reductions as "icing on the cake"). Because this court finds that Alternative 4 will not comply with Oregon's water quality standards and thus the Clean Water Act, plaintiffs' motion for summary judgment based on the Forest Service's violation of § 313 is granted.

C. Conclusion

As noted above, part of the purpose and need for the Project at issue here is to address the fact that several reaches of the North Fork Burnt River and its tributaries do not meet state water

quality standards for temperature and sediment. AR 7936; ROD at 1. The Forest Service may not ignore or defer its responsibility to remedy existing water pollution in the project area based on a misguided notion that the right to mine trumps federal and state environmental laws. For the foregoing reasons, plaintiffs' motion for summary judgment on claims under the Clean Water Act is granted.

II. The Organic Act

The Forest Service Organic Administration Act of 1897 (the Organic Act) established the national forest system. The Organic Act authorizes the Forest Service to promulgate regulations for the use and preservation of national forests,⁵ and specifies that individuals entering the national forests for the purpose of exploiting mineral resources "must comply with the rules and regulations covering such national forests." 16 U.S.C. § 478; Clouser v. Espy, 42 F.3d 1522, 1529 (9th Cir. 1994), cert. denied, 515 U.S. 1141 (1995). Forest Service mining regulations require mine operators to comply with all applicable federal and state water quality standards, including those issued pursuant to the Clean Water Act. 36 C.F.R. § 228.8(b). Also, all mining operations shall be conducted so as, where feasible, to minimize adverse environmental impacts on National Forest resources. 36 C.F.R. § 228.8. While mining in national forests is governed by the General Mining Act of 1872, "where mining activity disturbs national forest lands, Forest Service regulation is proper." Clouser, 42 F.3d at 1529 (citing United States v. Weiss, 642 F.2d 296, 298 (9th Cir. 1981)).

To the extent that this court finds a violation of the Clean Water Act, a finding that the Organic Act has been violated follows. This court does not believe the law supports the Forest

⁵16 U.S.C. § 551.

Service's concession of authority to miners under the General Mining Act in derogation of environmental laws and regulations. While some tension exists between an individual's right to mine and the Forest Service's responsibility to safeguard public land, "[t]he Secretary of Agriculture has been given the responsibility and the power to maintain and protect our national forests and the lands therein. While prospecting, locating and developing of mineral resources in the national forests may not be prohibited . . . , the Secretary may adopt reasonable rules and regulations which do not impermissibly encroach upon the right to the use and enjoyment of placer claims for mining purposes." Weiss, 642 F.2d at 299. The Forest Service has failed to minimize adverse environmental impacts as required by regulations, and failed to ensure that mining operators comply with water quality standards. Plaintiffs' motion for summary judgment on their Organic Act claim is granted.

III. The National Forest Management Act (NFMA)

NFMA establishes the legal framework for managing Forest Service lands, including the requirement that a land and resource management plan (LRMP or Forest Plan) be prepared by the Forest Service for each national forest, and that all permits, contracts and other usages of land be consistent with the Forest Plan. 16 U.S.C. § 1600 et seq.; 16 U.S.C. § 1604(a) and (i). The Forest Plan for the WWNF was adopted in 1990 and amended in 1995 to provide additional protections for inland native fish as required by the Inland Native Fish Strategy (INFISH). INFISH creates buffer zones in riparian habitat conservation areas (RHCAs), and establishes specific standards and guidelines for minerals management. INFISH MM-1⁶ through MM-6.

Plaintiffs argue that the Forest Service's authorization of mining operations for the NFBR

⁶"MM" is the abbreviation for "minerals management" in INFISH.

Project is not consistent with the standards and guidelines of the Forest Plan, specifically INFISH standard MM-1, MM-2, and with Forest Plan open-road density standards.

A. INFISH Standard MM-1

Plaintiffs argue that some measures adopted by the Forest Service in the ROD to protect fish and wildlife habitat are inadequate to ensure consistency with standard MM-1. Standard MM-1 requires minimization of adverse impacts to inland fish from mineral operations. For mining operations in RHCAs, operators must take all practicable measures to maintain, protect and rehabilitate fish and wildlife habitat that may be affected by the operations. INFISH Standard MM-1; AR 02298.

Plaintiffs contend that the buffer zones established by the Forest Service are inadequate in that a number of mining plans will operate in RHCAs within 25 feet or less of an adjacent stream.⁷ AR 08113-14; FEIS III-33, Table III-14. The Forest Service replies that other measures to minimize effects on water quality were adopted along with the 25-foot buffers, and that moving buffers further out than 25 feet would affect a prohibition on mining. Whether this is so does not relieve the Forest Service of its obligation to analyze the impact of mining with a buffer of 25 feet or less in RHCAs, which is the buffer width proposed by the miners in their PoOs. The FEIS echoes comments by the Environmental Protection Agency that 25-foot buffers would not reduce long-term impacts from sediment into streams. See AR 08374 (EPA comments that 25-foot buffers and silt fences seems geared to reduce only short term impacts from sediments); AR 08109 (Forest Service's analysis of submitted PoOs as not including

⁷For operations not in RHCAs, the Forest Service explains that ten feet is the minimum buffer width requested on most mining operations in the EIS, and twenty-five feet is the standard buffer for processing. AR 08374.

adequate and consistent mitigation measures to protect long-term site productivity and minimize sediment). The Forest Service argues that plaintiffs' misapprehend the agency's responsibility, implying that the Forest Service may simply adopt PoOs without making critical inquiries into whether operators are taking "all practicable measures" to protect fish and wildlife habitat in RHCAs. This court finds that the analysis laid out in the FEIS is inadequate regarding the selection of buffer width such that the ROD is inconsistent with INFISH standard MM-1 and the Forest Plan for the WWNF.

B. INFISH Standard MM-2

Plaintiffs argue that the Forest Service did not comply with standard MM-2 and therefore acted inconsistently with the Forest Plan when it authorized road and settling pond construction within RHCAs. Standard MM-2 provides that structures, support facilities, and roads should be located outside of RHCAs unless no alternative exists, and where no alternative to road construction exists, such construction must be limited to the minimum necessary for the approved mineral activity. AR 02298. The Forest Service argues that the ROD does not "locate" any new roads, and that MM-2 does not apply to settling ponds.

1. Roads

The Forest Service admits that "six PoOs envision the possible construction of any roads" and that roads may be constructed in RHCAs. Def's memo at 23-24. Plaintiffs argue that the record contains no evidence that the Forest Service did the required analysis as to whether alternatives exist such that roads might be located outside of RHCAs, or that the roads were limited to the minimum amount necessary as required under MM-2. The Forest Service makes a semantic argument that the ROD does not actually "locate" roads in RHCAs, but that some PoOs

propose construction of roads in RHCAs that will be staked on the ground by Forest Service engineers if no alternative exists at the time the miner seeks to build the road. This court is not convinced that the difference between "locating" and "staking" a road cures the defect alleged by plaintiffs. If the result will be the same—roads constructed in RHCAs—the Forest Service is responsible for analyzing the necessity of these new roads, whether alternatives exist, and providing more specific assurances that new road construction will be limited to the minimum amount necessary to comply with MM-2. The Forest Service must provide a more thorough analysis on the issue of new road construction in RHCAs to satisfy the mandate of MM-2.

2. Settling Ponds

The Forest Service authorized settling pond construction within RHCAs in seven PoOs. AR 08100-01. Plaintiffs argue that the record contains no evidence that the Forest Service did the required analysis as to whether alternatives existed to locating settling ponds in RHCAs. The Forest Service argues that MM-2 applies only to structures, support facilities and roads, and that settling ponds are none of these such that MM-2 does not apply to the location of settling ponds. The Forest Service relies on a standard form that applicants submit with PoOs for its argument that a settlement pond is a "surface disturbance" rather than a structure or facility, and further argues that the agency's interpretation of its own regulations is entitled to substantial deference. See Thomas Jefferson Univ. v. Shalala, 512 U.S. 504, 512 (1994).

As an initial matter, the court notes that the form in question is not an agency regulation or a rule that is entitled to deference. An agency's rule must be subject to notice and comment and be codified in the Code of Federal Regulations (CFR) to have the effect of law. Western Radio Services, Inc. v. Espy, 79 F.3d 896, 901 (9th Cir.), cert. denied, 519 U.S. 822 (1996). In its

reply brief, the Forest Service explains that it is not arguing that the form is a regulation, but that the INFISH provisions incorporated into the Forest Plan "are to be treated as regulations for deference purposes." Def's Reply at 18, citing Friends of the Southeast's Future v. Morrison, 153 F.3d 1059, 1069 (9th Cir. 1998). However, in Morrison, the court found that while the Forest Service's interpretation of its own regulation is entitled to substantial deference, that interpretation "does not control where . . . it is plainly inconsistent with the regulation at issue." Id. at 1069. But the court's logic from Morrison is not persuasive here as this is not a case of an agency's interpretation not conforming with regulations, but rather inconsistent interpretations by an agency make the interpretation forwarded in the instant case less credible.

Here, plaintiffs point to other Forest Service interpretations of settling ponds as "structures" or "support facilities" that call into question the Forest Service's argument in this case. See U.S. v. Mead, 533 U.S. 218, 228 (2001) (explaining that agency inconsistency is an indication of unpersuasiveness); see also Young v. Reno, 114 F.3d 879, 883 (9th Cir. 1997) (ascribing considerably less deference to an agency interpretation which conflicts with that same agency's earlier interpretation rather than a consistently held agency view) (citation omitted).

The NFBR ROD discusses settling ponds as being "constructed" or "built."⁸ AR 07947, 08048. Also, the descriptions of settling ponds as structures in other Forest Service documents is entitled to some weight even though those documents do not construe settling ponds in the context of INFISH. Based on those descriptions of settling ponds, this court finds that the settling ponds in this case are subject to INFISH standard MM-2. The Forest Service must

⁸The court notes plaintiffs' arguments in their reply brief as to the placement of other facilities structures within RHCA's. Plaintiff's Reply at 40. Because these arguments appear for the first time in plaintiffs' Reply, these claims are waived.

perform the required analysis under MM-2 as to whether alternatives exist to locating settling ponds in RHCAs.

C. Forest Plan Open-Road Density Standards

Plaintiffs argue that the Forest Service's authorized mining plans fail to comply with the open-road density standards of the WWNF Forest Plan. This open-road density guideline provides that the Forest Service must "[m]eet the specific open-road density guidelines found in the direction for individual management areas unless a specific exception is determined, through the Forest Service NEPA process, to be needed to meet management objectives." AR 00227. The Forest Service points out that prior to the ROD, the open-road density for all the subwatersheds in the project area exceeded the Forest Plan guidelines. AR 08075; FEIS II-57.

The Forest Service argues that it has complied with the open-road density provisions of the Forest Plan in that road closures and decommissionings will decrease open-road density in one of the management areas, and that the agency has complied with its responsibility under NEPA and found an exception to the guideline was necessary to meet the management objectives of providing access for miners and others. In the ROD, the Forest Service notes that mining plans will exceed road densities "due to mining and private property access needs, administrative use and needs of other forest users." AR 07951. However, the ROD and the FEIS do not present an analysis of whether these are the specific management objectives that warranted exceptions from open-road density guidelines.

To the extent that the Forest Service relies on the speculative road closures and decommissionings addressed above, this court is not persuaded the Forest Service has made a proper finding regarding open-road density in the project area. Also, the Forest Service has

failed to make a determination that the plans at issue necessarily warrant a specific exception from the Forest Plan's open-road density guideline to achieve management objectives. While the Forest Service argues that it is not required to make more "formal findings" on this issue, this court disagrees because without more analysis, a reviewing court will not have a basis for rational review. See Motor Vehicles Manufacturers Ass'n v. State Farm Mutual Auto Ins. Co., 463 U.S. 29, 43 (1983) (requiring a "satisfactory explanation" for an agency action). Because the Forest Service failed to clearly identify and discuss management objectives that require exceptions to the open-road density guidelines, this court finds that the ROD is not consistent with the Forest Plan.

For the foregoing reasons, plaintiffs' motion for summary judgment on claims under NFMA are granted.

IV. The National Environmental Policy Act (NEPA)

Under NEPA, the Forest Service must prepare an environmental impact statement (EIS) on the environmental effects of and alternatives to proposed major federal actions significantly affecting the quality of the human environment. 42 U.S.C. § 4332(2)(C). An EIS must consider direct, indirect, and cumulative impacts of the proposed action. 40 C.F.R. § 1502.16, 1508.8, 1508.25(c). NEPA applies to the evaluation by the Forest Service of the proposed plans of operations (PoO) for mining activities in national forests. Cady v. Morton, 527 F.2d 786, 796 (9th Cir. 1975). Depending on the environmental impacts in a proposed PoO, the Forest Service may be required to prepare an EIA. 36 C.F.R. § 228.4(f).

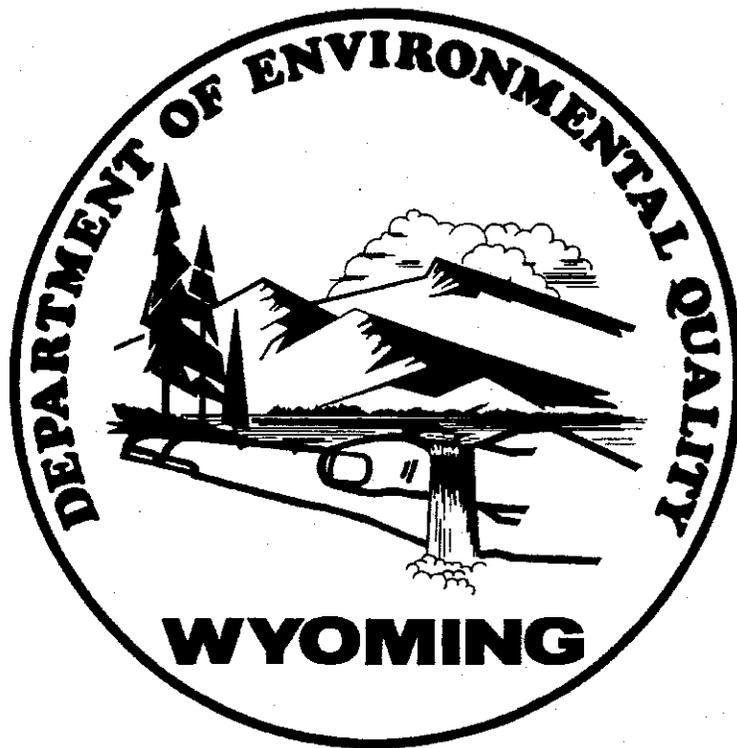
Plaintiffs argue that the Forest Service violated NEPA by considering forty-nine proposals together and, thus, failing to analyze site-specific impacts from each mining operation,

and also by failing to consider an adequate range of alternatives to each of the proposed mining operations. This court disagrees. The NFBR FEIS is not a programmatic EIS and does not suffer from the same flaws that courts have found when analyzing programmatic as opposed to site-specific EISs. See California v. Block, 690 F.2d 753 (9th Cir. 1982); Natural Resources Defense Council v. Morton, 388 F. Supp. 829 (D.D.C. 1974). Also, different agency actions may be analyzed in a single EIS when these actions are sufficiently related and in a similar geographic location. Inland Empire Public Lands Council v. U.S. Forest Service, 88 F.3d 754, 763-64 (9th Cir. 1996) (utilizing one EIS to analyze eight timber sales in a watershed).

Regulations authorize agencies to consider similar actions in a single document and encourages them to do so when one EIS will provide superior analysis in assessing the combined impacts of similar actions. 40 C.F.R. § 1508.25(a)(3). Even the purpose and need for the project describes related actions (mining) with cumulative impacts that need to be addressed in concert on a watershed level. AR 7936; ROD at 1. NEPA does not require an agency to analyze every proposed event and provide a specific alternative to each. The Forest Service has provided an adequate level of detail in the summaries laid out in the FEIS. See AR 06526-06807. The FEIS contains a "reasonably thorough discussion of the significant aspects of the probable environmental consequences." Churchill County v. Norton, 276 F.3d 1060, 1071 (9th Cir. 2001) (citation omitted). For the foregoing reasons, the Forest Service's motion for summary judgment on claims under NEPA should be granted.

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**DEPARTMENT OF ENVIRONMENTAL QUALITY
LAND QUALITY DIVISION**



GUIDELINE NO. 19

Noncoal:

**Non-commercial Recreational Panning &
Gold Dredging**

TABLE OF CONTENTS

	<u>Page</u>
I. Introduction	1
II. Application for a Letter of Authorization	1
III. Restrictions & Concerns	3
A. Surface/Mineral Ownership & Management	3
B. Stream Restrictions	3
C. Prospecting Methods & Equipment	4

List of Attachments

A - Application Form	A1
B - Map of LQD Districts	B1
C - Addresses for Federal & State Agencies	C1
D - Wyoming Class 1 Waters	D1
E - Contact Information for Wyoming Game & Fish Department	E1

I. Introduction

This document has been prepared primarily in response to questions from people who wish to use recreational hand panning or recreational dredging equipment in non-commercial searches for gold in Wyoming. These activities are regulated by the Land Quality Division (LQD) and, for activities on federal lands, by the appropriate Federal agency (e.g., the Bureau of Land Management (BLM) or the United States Forest Service (USFS)).

The information contained in this guideline may also apply to searches for any precious metal or gem for non-commercial use by recreational hand panning or recreational dredging.

Recreational panning is using non-mechanized equipment such as a pan, sluice box, or pick and shovel without disturbing the earth above the water line of any surface water or outside a dry stream bed.

Recreational suction dredging is using a suction or jet dredge with an intake diameter up to 3 inches and a rating up to 10 horsepower or using hand-operated sluice equipment and related tools. Dredging must occur beneath the existing water surface or upon non-vegetated sand and gravel bars within the active stream channel.

Presently, the Wyoming Environmental Quality Act allows for an exemption from permitting and bonding requirements for mining operations that involve *only minor surface disturbances and are infrequent in nature* (W.S. § 35-11-401 (e)(v)). On federal lands, this level of activity corresponds to the "casual use" category under BLM 43 CFR 3809 regulations. Therefore, non-commercial, recreational searches for gold which involve only hand panning or limited use of a small mechanized suction dredge can often be covered by a simple application for a Letter of Authorization, as outlined in Section II of this Guideline. There are specific concerns and restrictions for protection of human health and the environment, and these are outlined in Section III of this Guideline.

II. Application for a Letter of Authorization

Any person planning to search for gold (or any precious metal or gem), *by any method other than recreational hand panning*, must confirm that the proposed activities and location(s) can be approved through a Letter of Authorization. In general, this application process is applicable for searches that:

- ▶ use small portable suction dredges with a suction hose intake of 3 inches or less in diameter; and
- ▶ use small portable suction dredges powered by 10 horsepower or less engine; and
- ▶ use no other machinery other than a small portable suction dredge; and
- ▶ are on drainages which are not designated as environmentally sensitive in accordance with established criteria (see Section III).

No activities using tracked or wheeled mechanized equipment (e.g., backhoe, dozer, bobcat, power rock saw, or trencher) or explosives can be authorized through this application process. These activities must be authorized through LQD's permitting process, which includes applications for exploration licenses or mining permits and reclamation performance bonds.

To apply for a Letter of Authorization for non-commercial, recreational panning or dredging, complete the Application Form (**Attachment A**) and submit it to the address shown on the form. Include a map of the proposed locations and include Township, Range, and Section numbers on this map. For example, a copy of part of a topographic map from the U.S. Geological Survey (USGS), with the Township and Range numbers handwritten on the map, with a scale of 1 inch to 24,000 inches or 1 inch to 2,000 feet is acceptable. Maps are available at no cost from a variety websites (e.g., <http://wgiac.state.wy.us/wsdcl/>, <http://topozone.com>, or <http://terrasever.homeadvisor.msn.com>) and, for a nominal fee, from organizations, including the Wyoming State Geological Survey in Laramie, Wyoming ((307) 766-2286).

Upon receipt of an Application Form (Attachment A), the LQD reviews the information provided to ensure the proposed activities and locations are acceptable. After review, the LQD sends a letter to the applicant acknowledging receipt of the application and information as to whether the proposed activities and locations are acceptable. **If the application is acceptable, a Letter of Authorization (LOA) will be issued.** *Please allow sufficient time, usually a few weeks, for LQD's review and approval prior to commencing the planned activities.* Please note that the number of requests generally increases dramatically just before July 1, which is also a very busy time for other mining activities.

For the LQD to continue use of this application process for non-commercial, recreational panning or dredging, applicants must be aware of the restrictions and concerns listed in Section III. In particular, ***permission from all surface and mineral owners and land management agencies must be obtained prior to any activity to avoid trespass disagreements; and restrictions on specific stream segments must be followed.*** Please note that the application process only addresses LQD requirements and ***does not*** constitute permission for the proposed activities by the surface owner(s) or the land management agency. The Letter of Authorization does not waive obligations to obtain other permissions that may be required (e.g., USFS, BLM, United States Army Corps. of Engineers (USACE)).

A Letter of Authorization for non-commercial, recreational panning or dredging is valid for a maximum of one field season, which along most stream segments is between July 1 and September 10 to avoid disruption of fish spawning. A copy of the LOA must be kept on site at the panning or dredging location(s) for inspection. The LOA may be renewed annually by contacting the LQD after September 10 and receiving a renewal for the next field season. However, if a new location(s) is part of the renewal request, a map(s) of the new location(s) must be submitted.

The Application Form must be filed with the LQD Office in Cheyenne, which is LQD's official record keeping office. Copies of the form will be forwarded to the LQD District Office(s) in which the proposed activities will occur. The LQD District Offices can provide assistance on access, restrictions, and related information (Attachment B). At the present time, the LQD is not charging a fee.

III. Restrictions & Concerns

The following restrictions and concerns relate to a variety of topics and are intended to help ensure compliance with applicable statutes and regulations and protection of human health and the environment. Failure to comply with specific restrictions could result in a Notice of Violation and a fine of up to \$10,000.00 per day as long as the conditions resulting in the violation persist (W.S. §35-11-901(a)).

A. Surface/Mineral Ownership & Management

Permission from all surface and mineral owners must be obtained prior to any activity to avoid trespass. In some areas, the ownership is a split estate (i.e., different surface and mineral owners). The increasing number of users and variety of uses, particularly on federal lands, has brought more attention to ownership and management issues.

- ▶ Owners and land management agencies who must be contacted for permission may include: private individuals; the USFS; the BLM; and/or the Wyoming Office of State Lands and Investments. Surface and mineral ownership maps are available from the various BLM offices (**Attachment C**). Land records at the County Courthouse should also be checked to verify the current ownership of a particular tract of land. Claim markers are required to be present on existing claims and must be posted on new claims.
- ▶ Operations on private lands and/or on a mining claim require permission from the landowner and/or claim owner. *In Wyoming, the stream bottom belongs to the landowner.*
- ▶ The LQD does *not* process requests for mining claims. The BLM in Cheyenne ((307) 775-6256) can provide information on whether there are any existing claims on the location of interest and can provide instructions on filing a claim.

B. Stream Restrictions

Surface waters in Wyoming are classified by the Wyoming Department of Environmental Quality (WDEQ) Water Quality Division (WQD) according to a variety of criteria, including water quality, fish populations, unique characteristics, and similar factors. A copy of the current classification list for the majority of streams in Wyoming is available on the WQD website (<http://deq.state.wy.us/wqd/watershed/11690-doc.pdf>). In general, Class 1 Waters are of the highest quality and greatest concern and, as a result, the most restricted. A list of the Class 1 Waters is included in **Attachment D**. Surface waters that support fisheries are generally Class 2, and activities are restricted at certain times of year to allow for fish spawning. Other restrictions are site specific.

- ▶ **No activities, except *hand panning*, are allowed in any *Class 1 Water*.**
- ▶ **Due to mercury in the stream sediments from historic mining operations, *no activities are allowed in Rock and Willow Creeks* in the upper Sweetwater River drainage.**

- ▶ Activities in Class 2 Waters are limited to the period of July 1 to September 10, annually. (Note: Almost all of the 'popular' panning and dredging areas are on Class 2 Waters.)
- ▶ Activities in or disturbance of streambanks, shore line vegetation, wetlands, beaver ponds, or in silt or clay material is prohibited due to the impacts to fisheries, wildlife habitat, increased erosion, and stream re-routing.
- ▶ Contact information for the Wyoming Game and Fish Department (WGFD) is provided in **Attachment E**. Anyone conducting panning or dredging activities should contact the appropriate WGFD office for current stream information and site specific restrictions.

C. Prospecting Methods & Equipment

The best areas to search for gold are in gravel deposits, around boulders near the upstream end of pools where the current first starts to slow, in cracks and pockets in exposed bedrock, and around midstream boulders on the inside of a streambed at or near the head of a gravel bar where the larger materials have accumulated. These are also the areas where activities will result in the least damage to aquatic life and create the least instability in the stream channel.

- ▶ **All panning and dredging activities, including hand panning, must be confined to stream bottom gravels or areas well back from the streambanks to avoid undercutting or erosion of the stream bank or any disturbance of shoreline vegetation, and soils.**
- ▶ All small portable suction dredges must have a suction hose intake of 3 inches or less in diameter and powered by a 10 horsepower or less engine.
- ▶ Only materials removed from the stream may be placed back into the stream. Sluicing of materials originating outside of the specific stream is prohibited.
- ▶ *All fueling and dredge servicing shall be done away from streams in order to prevent spills of fuels or lubricants in the streams.* A petroleum sheen shall not be visible on the surface of the water during dredging activities. Storage areas for tools, refuse and fuel shall be as far away from streams and drainages as possible. Dredging and camping sites shall be left clear of litter and refuse. All refuse shall be disposed of away from the site in an approved waste disposal facility.
- ▶ Any increase in water turbidity caused by panning or dredging activities must settle or dissipate within *fifty (50) feet* downstream of the discharge point. If increased water turbidity is visible beyond fifty feet then the operation is likely in violation of WQD water quality standards and must be modified or discontinued.
- ▶ "High-banking" is a frequently used term which may have different meanings. Some

people think of "high-banking" as just moving the "processing" location (i.e., instead of the water going through a dredge in the stream, the water goes through a sluice box set up outside the stream). Others think of "high banking" as excavating material from streambanks or other locations outside of a stream or its tributaries to process that material for its gold content. The latter type of activity is prohibited. In addition as outlined below, care needs to be taken with respect to "high banking" in which the sluice box is set up outside the stream.

There are three primary concerns related to "high banking." One concern is that the discharged material may not settle within 50 feet of the discharge point. The second concern, related to the first, is that the discharge may cause erosion of the stream bank or land surface. These two concerns are often addressed by digging a small settling hole or series of check dams to slow the discharge and allow settling of solids. However, these holes and dams can be relatively large and, unless reclaimed, remain long after the activity is completed.

As mentioned previously, the Wyoming Environmental Quality Act allows for an exemption from permitting and bonding requirements for mining operations that involve only *minor* surface disturbances and are *infrequent* in nature (W.S. § 35-11-401 (e)(v)). These limitations must be kept in mind in relation to the disturbance created by high banking. In particular, settling holes or check dams should be as small as possible and reclaimed after use to minimize land disturbance and potential safety hazards. Those interested in high banking should check with the surface and mineral owners and land management agencies to determine site-specific restrictions and concerns.

- ▶ Use of metal detectors for removal of mineral specimens, with the same restrictions as for panning and dredging (e.g., within the high water line) may be allowed under "Non-commercial Recreational Panning & Dredging". However, removal of artifacts or other uses of metal detectors unrelated to non-commercial, recreational searches for precious metals or gems are not allowed under "Non-commercial Recreational Panning & Dredging". Those interested in using metal detectors must check with the surface and mineral owners and land management agencies to determine site-specific restrictions and concerns.
- ▶ Machines or explosives shall not be used to move in-stream boulders, logs, and other natural obstructions which are too large to move by hand.
- ▶ No tracked or wheel equipment shall be used in-stream.
- ▶ No damming or diversions of streams are allowed.
- ▶ All dredging and camping sites shall be accessed by existing roads and trails.
- ▶ Vehicle access to sites which involve ford crossings of Class I and Class II streams are not allowed.

- ▶ Panning and dredging sites shall not be within 500 feet of a developed campground. In a few instances, campground boundaries and mining claims may overlap. In these cases, the land management agency should be contacted.
- ▶ Dredging sites shall not be located within 100 feet of a bridge support, nor should the dredging interfere with any existing habitat improvement structure, stream channel improvements, gauging stations or diversions.
- ▶ Mercury or other processing extractive chemicals shall **not** be used.

ATTACHMENT A

Application Form for Noncommercial Recreational Panning and Dredging

MAIL TO:

Wyoming Department of Environmental Quality
Land Quality Division
122 West 25th St., Herschler 3W
Cheyenne, WY 82002

Dear WDEQ, LQD Staffer:

1. I understand the Wyoming Environmental Quality Act allows the Wyoming Department of Environmental Quality (WDEQ) Land Quality Division (LQD) to grant an exemption from permitting and bonding requirements for mining operations that involve only minor surface disturbances and are infrequent in nature (W.S. § 35-11-401(e)(v)). I have read Guideline No. 19, which provides information about LQD's concerns and restrictions related to Noncommercial Recreational Panning and Dredging, and I believe that I qualify for an exemption because my activities will cause minor disturbance and will be infrequent in nature. I hereby agree to comply with all of the conditions in Guideline 19 and submit this application for the current field season (i.e. July 1 to September 10).

2. My activities will be conducted with the following type(s) of panning or dredging equipment which I have identified:

Type:

_____ Dredge intake nozzle diameter (in) _____ Engine (hp)
_____ Schedule (dates) from _____ to _____ Average hours
worked/week

3. My activities will be conducted at the following location(s): List claim names, Township, Range, Section, and County here. Maps showing legal location shall be attached as additional pages.

4. I agree to get permission from all surface and mineral owners and land management agencies as required prior to conducting any gold seeking activities.

5. If I plan activities in future years in the same area, I will contact the LQD for a renewal. If I plan activities in areas not listed on this form, I will submit an additional application form(s).

Printed Name(s): _____ Signed: _____

Street Address: _____ Dated: _____

City/State/Zip Code: _____ Vehicle License # & State: _____

Phone # w/Area Code (home): _____ Phone # w/Area Code (work): _____



 **Basement Chemistry** 
For The Prospector

Using Mercury

By Dr. A. K. Williams
San Pedro, Costa Rica

Specifics

- Mercury is the only metal which occurs as a liquid at ordinary temperatures
- Mercury is one of only two metals which occurs naturally in both its metallic and oxidized state, The other being copper.
- Mercury will form amalgams with almost all metals except Iron and Aluminum.
- Occurrence in earth's crust 0.5 ppm. That is 0.5 mg/kilo.
- Melting point is -38.87 C .
- Boiling point is 356.72 C
- Density at 25C $13.534\text{ gr/cubic centimeter (cc)}$
- Vapor pressure at 25C $2 \times 10^{-3}\text{ mm}$
- Surface tension 484 dynes/cm
- Electrical resistivity $95.76\text{ microohms/cm}$
- Does not tarnish in air at normal temperatures, but when heated near the boiling point will convert to Mercuric Oxide
- It will react slowly with sulfur at normal temperatures to form Mercuric Sulfide.
- It will react with Nitric Acid and with hot concentrated Sulfuric Acid.
- It will not react with dilute Hydrochloric Acid, cold Sulfuric Acid, or Alkalis.
- It will react with ammonia in the presence of oxygen.
- Metallic Mercury can be recovered from solution by the addition of hydrogen peroxide in the presence of alkali hydroxides such as Caustic Soda or Lye.
- Mercury can be recovered from solution by cementing with Copper, Aluminum, Zinc, etc.
- Mercury will react rather violently with Aluminum. Do not use Mercury in an Aluminum Gold pan or try to store it in an Aluminum vessel.

Toxicity

Mercury like all heavy metals is toxic. It behaves just like other heavy metals such as Lead, Copper, Arsenic, Zinc, etc. Heavy metals have the characteristic of not being easily excreted from the body. If you ingest a large amount of Mercury for example it will stay in your body for a long time. If you ingest a little Mercury each day it will accumulate in your body until if, you take no action, it could produce toxic symptoms such as hair loss etc.

Mercury has a relatively high vapor pressure, which means that at normal temperatures if you left a bowl of mercury out in the air a significant amount would vaporize and would be in the air. If you continued to breathe this Mercury containing air you certainly would ingest a significant amount of Mercury. The most dangerous thing about Mercury is that the lungs readily absorb the vapors. This you must avoid. So far as I can determine metallic Mercury is only slowly absorbed through the skin or mucous membranes. In fact, Mercury in various forms has been used for medical purposes for 100's of years. How many of you have used mercurichrome or merthiolate to disinfect cuts etc or to swab out a sore throat? There was at one time a much-used medicine called "Blue Pill or Blue Mass" which was a mixture of metallic Mercury and honey. Merck Index states "occasional swallowing of Mercury is without harm".

I am not saying that Mercury is not toxic. It definitely is but so is almost any chemical that you come in contact with; It is just a matter of amount. There are a few precautions that you must follow when working with Mercury. These will be discussed in a following section. What I'm trying to say is that Mercury deserves respect but not fear. It has taken a very bad rap at the hands of the do-gooders whose only knowledge of, or experience with it is that they once took their temperature with a rectal thermometer.

If any one of you feel that you have a problem with heavy metal poisoning, hair loss, loose teeth, kidney damage, muscle tremors etc please have a check for heavy metal intoxication. It's simple and inexpensive. If you have a problem there is a treatment which involves infusing EDTA (ethylene diamine tetracetic acid) into your blood. This is a treatment known as "chelation" and it will very effectively remove the heavy metals from your system.

Precautions

- When working with Mercury always use latex gloves, it's cheap and is good procedure.
- Always store Mercury in tightly closed containers (not Aluminum).
- Always put a layer of water on top of the Mercury *unless* it is charged Mercury.
- Never heat Mercury or amalgam in an enclosed space.
- If you must heat Mercury do it in the outdoors or a well-ventilated space.
- Always stand upwind of hot mercury. Do not breathe the fumes.
- Do not let Mercury contact Aluminum. It will destroy it.
- Avoid spilling mercury. It is very difficult to clean up.
- Never heat Mercury indoors or in any enclosed space.
- Never try to distill (retort) Mercury in a glass retort.

How to Clean Mercury

The term "clean" can mean different things to different people. It can mean

simply Mercury that has no black crud floating around on top of it, or, it can mean that the Mercury is mirror bright, silvery without the usual yellow film of mercuric oxide floating on top. Or, it can mean that the Mercury is pure Mercury and contains no other metals dissolved in it.

In order to remove the usual black crud that inevitably floats around on top of your Mercury is very simple. Get yourself a funnel and a coffee filter. Take the round filter and fold it in half twice. Open it so that one side has one layer of paper and the other has three layers. Put this cone filter in the funnel. Now take a pin or needle and put a very small hole in the very tip of the paper. Pour in your cruddy Mercury. The Mercury should pass through the filter in tiny drops. If it does not pass through, open the hole just a bit. If it runs through in a steady stream, the hole is too big and you will have to start over. This method will remove all of the floating oxides etc and give you Mercury that you can work with.

Second. If you have Mercury that has other metals amalgamated in it and is sort of thick with what appears to be "clots" floating around on it you can filter these amalgam clots by several methods. The first and easiest is to purchase a syringe (10 ml or larger) from the drug store. Make a ball of absorbent cotton and push it into the bottom of the syringe. Push in the plunger to pack it as tightly as possible. Pour in your Mercury and force it slowly through the cotton with the syringe plunger. The residue on the cotton will contain most of the amalgams including Gold. Probably the best way to recover the amalgamated metals including gold is to simply take the cotton ball from the syringe and burn it with a propane torch or other. Be sure you are outside or in a well ventilated space.

A second way to remove amalgamated materials from Mercury is to squeeze it through a piece of chamois. Be sure to wear gloves when using this method. This method is somewhat cleaner than the cotton filter in that the amalgam usually separates from the chamois and you eliminate the need to incinerate the cotton.

Remember, although you have filtered your Mercury, you still have metals in the Mercury, which are in true solution and that cannot be removed by filtration. In order to remove all the dissolved/amalgamated metals from Mercury you will have to retort or distill it. In order to distill Mercury you should purchase a Mercury retort. They are relatively inexpensive. Yes, you can make one from pipefitting etc, but they are usually rather clumsy, massive affairs, which are a bit of a grunt to use. They're two types of Mercury retorts. Vented and non-vented. The non-vented type is simply a boiling vessel and a cooling tube from which the Mercury drips into a catch vessel. With this type of retort NEVER put the exit end under water in a catch vessel. If you do, a very slight drop in the temperature of the boiling Mercury will create a vacuum sufficient to suck water back through the system right into the boiling Mercury at 675 F. Please believe me when I tell you, that is BAAAAD! It will ruin your whole day and probably put you in the

hospital (if you are lucky).

The vented type of retort is made specifically to prevent this problem. In this type, near the exit end of the retort there is a very small tube, which extends upwards a few inches. The purpose of this tube is to allow you to immerse the exit end of the retort in water. If your heat source should fail and the temperature in the "hot vessel" drop, air will be sucked in through the small tube instead of water through the exit. In any case, if you retort your Mercury you will now have Mercury, which is, for all practical purposes, clean and pure. Any amalgamated metals such as gold will be left behind in the retort. Actually, in order to have Mercury which is considered chemically pure it must be distilled three times. Triple distilled Mercury. This has no practical value for mining.

Applying Mercury to Copper Plates

Every time I see someone trying to apply Mercury to a copper or brass plate it makes me react just like they were scraping their fingernails on a blackboard. I see people spending hours trying to clean the plate by sanding, scrubbing with steel wool, washing with acid, etc. Then, worst of all, trying to put metallic Mercury directly onto the plate by chasing it all around with rags, sponges, squeegees, and any number of other devices. Of course, most of the Mercury ends up in their shoes, in the water, on the ground, everywhere except on the plate. Gentlemen, this is NOT the way to do it. The simple, effective, professional way to coat one metal with another is to apply a solution of metal salt onto the other metal and let the resulting battery action reduce the salt to metal which will then coat the base metal with a even, thin film.

If this seems complicated, its because I sort of set you up. It's so simple as to make your old method seem like building a H bomb. All you need is a little nitric acid and some Mercury. Dilute your nitric acid with an equal volume of water; put it in a plastic bottle with a good tight top. Now put a small glob of Mercury in the bottle and let it stand for awhile. When you are ready to apply the Mercury to a plate simply be sure there is no grease on the plate by wiping with a detergent solution. No matter how cruddy the plate looks, not to worry, simply dip a swab into the acid solution and wipe it onto the plate. MAGIC. Your plate is now coated with Mercury. A bottle/swab such as shoe polish comes in works nicely for this.

I think that most folks believe they should have a thick coat of Mercury on the plate. Actually, the opposite is true. You should remove excess Mercury with a squeegee or other because as gold sticks to the plate the mercury film gets thicker and thicker. When this happens, gravel, which is usually moving over the plate, will scrub the excess off the plate and you will lose mercury and any gold that it contains. Erosion of thick amalgam layers from sluice plate is a common

problem and one that usually goes unnoticed.

How Amalgamation Works

I get a distinct idea that most folks have a distorted idea of just how amalgamation works. First of all, the way we in the gold business talk about amalgam is a bit of a misnomer. A true amalgam is when one metal is actually dissolved in another in which case we would not be able to filter out the gold from our amalgamated concentrates. It would simply pass right through the filter. We normally utilize the unique properties of *partially* amalgamated gold in order to recover it easily.

Visualize a gold particle like a golf ball. When it comes in contact with mercury the mercury begins to dissolve in the gold. Now we have a gold particle with a layer of mercury sticking to its surface because of the very high surface tension of mercury. The mercury will now continue to dissolve in the gold and penetrate deeper into the particle. This process, however, is rather slow and the deeper it penetrates the slower it goes. Yes, if you have enough mercury and enough time the gold will eventually dissolve into the mercury (or vice/versa). However, in our theoretical particle what we now have is a center of gold/no mercury, a surface of gold/mercury, and on top of that a layer of mercury/no gold. Right, we have our amalgamated gold and now we want to get rid of the mercury. We just need to heat it, right. Yeah, but look what happens. As we heat it the excess mercury coating boils off. Now the true amalgam at the surface gets hot and the mercury boils off leaving the gold, right? Dead wrong! What happens is as the mercury evaporates from this surface area the gold which was dissolved in it falls away from the parent particle and is left as a usually black powder which you normally throw away because it don't look like gold. This same effect is true if you use nitric acid to remove the mercury.

So, the fact is that every time you amalgamate gold particles and recover the gold the particles get a little smaller. If you have any doubts try it. Take some rather fine gold and amalgamate and recover it several times. After three or four times you will notice that the particles get smaller and smaller. If you continue this process, eventually you will end up with very fine, black, gold powder and no yellow particles. Of course the finer the gold that you amalgamate the more you will convert to the black powder form. This is because the finer the gold particles, the more surface area that is exposed for amalgamation and the larger the percentage of conversion (or loss).

Recovering Mercury from Solution

I'm sure that all of you who use mercury for catching or cleaning up concentrates also occasionally use nitric acid also. This means that you surely will end up with nitric acid solutions, which contain mercury. Please let me encourage

to not throw this solution away. O.K. I'm the same. I don't have time or inclination to spend the time to recover a couple of grams of mercury. What I do is that I have a "stock pot". A plastic jug in which I put any leftover mining chemicals. No matter what, acid, caustic, mercury solutions, anything that even might have something worth recovering or things that I don't want to pour down the sink. When I feel like it I recover the mercury by cementation usually with a copper strip suspended in the waste. Assuming that the waste solution is not too acidic, the mercury will drip to the bottom ready for use again. You can also use aluminum. You can drop in a little table salt and a white cloud of silver chloride will settle out. Filter this off and store it for later silver recovery. If you think there might be some gold in the solution you can filter it through a coffee filter add some powdered zinc, mossy zinc, or just chunks of zinc. Any precipitate you get might contain gold. I'm sure most of you have your own pet methods and that's fine, just don't throw all that stuff away. Keep it for when the weather has you housebound.

Charged Mercury

Now we have arrived at the *mystery* of mercury. A lot of folks have heard of it. Most haven't. Most that have heard of it respond "oh yeah, that's the stuff that company X sells (for a lot of \$'s). It's some mysterious stuff that you can't get anywhere else". Baloney! Merlin the magician died a long time ago and there just ain't been no magic since. You can make all you want right in your carport and it shouldn't cost you more than \$5.00 tops.

First thing is that I don't like the term "charged mercury" but since I can't think of a better one, we will use it. Now we all understand amalgamation, right? We also understand that gold is not the only metal that will form amalgams with mercury. Mercury will form an amalgam with two other metals of interest. Sodium or potassium. Doesn't matter which, they are very similar and for our purposes it doesn't matter which you use. "Charged mercury" is nothing more than a mercury/sodium amalgam. The trick is how do we make it? O.K., you could just take some sodium metal and drop little chunks of into hot mercury. However, there are two things wrong with that procedure. First, dumping anything into hot mercury is a little hazardous since it tends to make little mini-explosions. Second, sodium is a metal, white, very soft, can cut it with a knife, it would be a little hard to lay your hands on. It's not a common material. Also, you would have to store it under oil or kerosene because water vapor in the air will cause it to burn. It reacts *violently* with water and can cause explosions. Not to worry, there is a better way. There are many ways to skin a cat. The problem is that first you must *catch* the cat. We got him! Actually, a gentleman/scientist named Faraday caught the cat for us. If I can paraphrase Faradays Law it states in effect that for every 28.6 ampere/ hrs of current you can deposit 1 mole of metal (in the case of sodium, 23 grams) from solution onto the cathode of an electrolytic cell. Well that certainly is impressive. So, what does it mean to us? It gives us a way to produce

all the sodium amalgam that we want cheaply and easily. This will be discussed in detail later. What can this "magic mercury" do for us? Sodium amalgam is one of the strongest reducing agents known to science. If you take a metal oxide such as common rust (iron oxide) and you "reduce" it you will end up with metallic iron and oxygen. Sodium amalgam will cause this reaction to occur. It is the absolute best rust remover that you could ever devise. It will also reduce other materials such as zinc, magnesium, manganese, sulfides, etc. This 'charged mercury" or mercury amalgam will always be mirror bright and shiny with no yellow film of mercuric oxide floating on the surface. In order for mercury to amalgamate with gold the two metals must be able to come in contact with each other. If either the mercury or the gold has a coat of anything on it you will never get it to amalgamate. It's like the gold is enclosed in little plastic bags. They just can't get together. Now the mercury surface is perfectly clean due to the reaction of the sodium with the water. When this stuff touches a particle of gold which has it's own coat of iron or other metallic oxide or sulfide, it will immediately reduce that too, leaving only the fine powder metal that will wash away leaving a nice clean gold surface just waiting to be amalgamated by the mercury which is also present. One thing that the amalgam will not remove is oil/grease. For that you will have to use a detergent. When you get some of this stuff and put it in water you will note that it fizzes giving off hydrogen gas. That is why it works. As we said before, sodium reacts with water. What we have done is to make a sodium battery. When the fizzing stops it means that all the sodium has reacted and it is now "discharged" to ordinary mercury. Now you must re-charge it.

"Charging " Mercury

Charging mercury is such a simple procedure that it is amazing that almost no one knows how to do it. Yes, there are a few folks out there who manage to obtain a tiny fraction of their mercury as sodium amalgam. Usually, less than one percent. It does work but it can't work for very long before it is discharged and must be recharged. Maybe there are a few of you who know much more than I do about it. If so, please contact me.

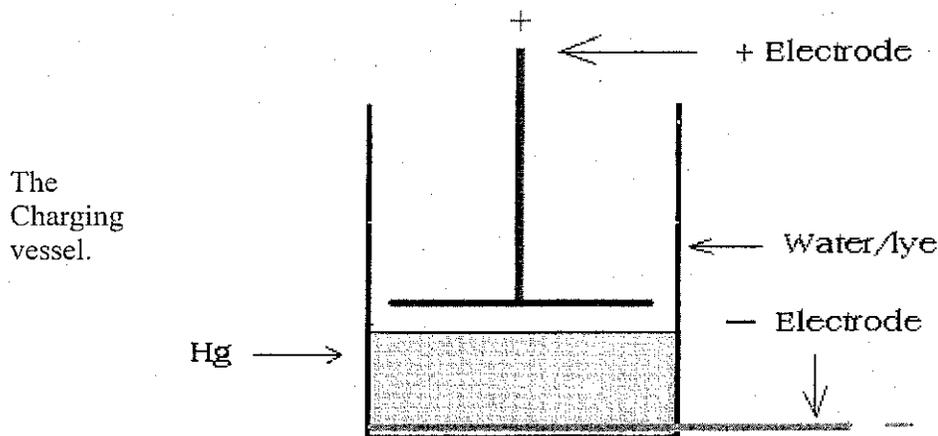
In order to charge your mercury you must have a charging vessel. I will be glad to sell such high tech vessels for only \$29.99 plus postage. Also I will sell you the necessary "charging salts" for the *amazing* price of only \$9.99 plus postage. For those of you who insist on making your own I will provide instructions *free of charge*. How's that for a deal! (I'm working on a kickback deal from your local supermarket).

It will require a trip to the super. You should purchase an "Old Fashioned" tumbler glass of the hard, clear, plastic type. Don't try to get around me by using one of those soft, polyethylene "tupperware" types. They won't work. In order to save a trip back to the store, buy a container of good ol Red Devil Lye. You now have 90% of your materials in hand. If you don't have any epoxy glue, you should

pick up a tube of that too.

Now you should drill or melt a small hole in the glass at the very bottom of a size such that a solid copper wire of size # 14 or so can be inserted in the hole and extended to the opposite side of the glass. Seal around the wire at the hole and glue the loose end of the wire the bottom of the glass. This will be your reaction vessel with the cathode or negative terminal. You now must make an anode or positive electrode. This can be piece of re-bar, a steel bolt, an old screwdriver or whatever. I recommend using a bolt with two nuts and a disc of steel a bit smaller than the vessel. Cut a hole in the center so that it can be sandwiched between the nuts. While this is not absolutely necessary, It will allow a bit more current to flow through the cell with a resulting faster charge rate. Now fashion an anode clamp to hold the anode and prevent it from falling into the mercury. A piece of wood with a tight fitting hole works fine.

The following drawing illustrates whatthe vessel should look like.



Now all you have to do is connect your reactor to a source of DC power capable of delivering at least 1 ampere of current. A 12 volt car battery is convenient for this purpose. You can use a battery charger if you like. If you have two batteries you can connect them in series and cut your charging time in half. You should watch the system in the beginning just to be sure you are not pulling too much current which will cause the cell to get too hot and maybe boil. Don't let it get that hot. This is not usually a problem and is easily fixed by simply reducing the amount of lye in the water layer or putting a light bulb in series with the system. The amount of mercury in the cell and the amount of current flowing through the system determine the time required. You will know when the mercury is well charged because it will be a gray, solid, putty-like mass. Not a liquid. At this point put on gloves and pour off the water/lye layer, wash the mercury surface with clean water and immediately dry it with an absorbent paper towel. Store it in

a clean, dry, tightly closed plastic bottle or jar.

Usually, no matter how tight the bottle some water vapor will get in. You can fix this problem by putting a packet of drying agent such as silica gel, calcium sulfate, or calcium carbide in the container with the mercury. These materials will effectively scrub out any water, which gets in.

A Few More Thoughts

It might be worth while discuss the subject of surface area as it of paramount importance when amalgamating. First let me explain that liquids always try attain a shape that results in the least surface exposed. What shape would that be? Spherical. When anything liquid or solid is in the shape of globe or sphere there is no way to reduce the surface area more. If you change the shape of a sphere to some other eg, A cube, a cylinder etc the surface will increase to some extent. However, If you want to increase the surface area by millions or hundreds of millions you simply divide it into several separate pieces. If you take a marble and divide it into 1000 smaller marbles the surface will increase by 100,000 times or so. Don't hold me to these numbers they are only for example. If you had divided it into 1000 cubes the area would have been much more than the marble or the 1000 spheres. If you want to increase it still further just grind it into finer and finer particles. I think I recall reading that one lb of carbon ground to face powder size or less would have a surface area more than that of the entire earth. Something like that.

Amalgamation is very dependent upon surface area. Especially of the mercury. If you keep your mercury in a single glob it will cause you less headaches because there is less surface to corrode which can cause "flouring". Also that single glob of mercury will take much longer to contact all the gold particles.

If you use charged mercury to recover gold from concentrates it's all right to allow it to break up into smaller globs. Things will go much faster but you should try to get the mercury back in one glob *before* it is discharged or the globs will corrode rapidly and will be much more difficult to recover.

So, the more that charged mercury is spread out or its surface area increased the more of the sodium is also spread out and the more contact it has with the water. The more contact it has with water the faster it reacts and the faster that it discharges. That is bad for us. I wish I could say that you could use charged mercury on a copper plate at the end of your sluice. Well, you can but it won't work very well. That little glob of charged mercury that would last 30 minutes in your pan, when spread in a thin film on a plate probably will last no longer than 30 seconds.

I can already hear some folks saying, "he ain't so smart, I'll just take a battery and connect it right to the sluice plate and keep the mercury charged all the time". I wish! It wont work because if the mercury is not discharging its not a reducing agent and will not clean either itself or the gold. It only works when it is discharging.

I must admit that I have sort of an idea how one might be able to use charged mercury on a plate but like a lot of my ideas I haven't put it to the test yet.